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Contents

Cover photo: Comb built in the space between frames in Ilaria Baldi's standard Langstroth Hive: what the beekeeper wants vs the bees' natural building practice.

Natural Bee Husbandry magazine
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Editorial

John Phipps, Editor, Natural Bee Husbandry magazine

Beekeeping Sites of Historic Importance

Readers of NBH will be familiar with the photo above of the apiary in the gorge just below my village, established in the 1780's with just a few hives, and which increased in size to over 250 by the time it was abandoned in the 1960's.

Over the years it has attracted visitors from many parts of the world who have become fascinated by this unique example of natural beekeeping, set in a beautiful gorge which leads down to the sea and whose sides are covered with a multitude of forage plants, particularly species of spurge and euphorbia; herbs - mainly sage and thyme; a succession of innumerable wild flowers; as well as almond, carob, Judas and citrus trees.

Of additional interest are the caves behind the hives where the beekeepers spent most of the summer months, and the small church founded in 1781 by the original beekeeper, on his return from a monastery on Mount Athos.

During Easter I was delighted to guide two beekeepers/ornithologists around the site - Hans and Monika Metzler from Switzerland. It has been three years since my last visit and what was once not too difficult to reach is now quite hazardous with its pathways obstructed by undergrowth, shrubs and trees. Also, further deterioration in the hives was notable, especially with the tiles covering the tops of the walls which had become displaced.

I believe that sites such as these need protection, they are vital historical resources for those who want to learn about traditional beekeeping practices around the world, they need to be identified, recorded and catalogued in the same way that IBRA over many decades has done with their excellent register of bee boles.

On a practical level, local work parties need to be formed to ensure that safe access to the sites is maintained and that where possible repairs are made to the hives themselves. More difficult, but not impossible, is having the apiaries recognised as important heritage sites in need of conservation, both at local and international levels.

An example of the difficulties in achieving the latter has recently been described to me by Norr, in Spain. During lockdown he found during his searches a group of eighteen old, abandoned, mainly walled apiaries near the mountain village of Fonfria, 1300m above sea level, in the El Bierzo region, of Castille and Leon. (See Restoration of Old Apiaries in Spain, NBH18, Winter 2021).

Top: Walls comprising of about 250 stone bee hives from 1780's in a gorge below the Editor's village in Greece. Above: An example of one of the old apiaries found by Norr in Spain. The walls were built quite high in an attempt to keep out bears.

Since then, Norr has tried to get the sites recognised by various political and cultural bodies, both locally and beyond, as part of their historic heritage, the abandoned apiaries being once of economic importance to the mountain villagers in the eighteenth century.

Having read the long list of communications Norr made with the organisations over two years, I have great admiration for his persistence. Despite letters being unanswered, promises made and not kept, the authorities breaking the law in not replying or giving reasons within a specified time, not passing on information to significant archaeologists as well as a local political party seeing it as a nice addition to their election manifest (only to make no action afterwards), convinced him more and more of how corrupt were the authorities.

Fortunately, at the moment, after the visit of an archaeologist, the apiaries have the lowest form of protection - that of being part of the local Cultural Heritage, but there is a long route ahead for more important aspects of conservations including funding for necessary restoration.

Register of Old Beekeeping Apiaries

I would very much like to start a register of beekeeping sites of interest and of historic and cultural importance. Readers can help by sending relevant data and photographs of the apiaries to me at editor@naturalbee.buzz. Thank you!

Editorial

Nicola Bradbear, **Bees for Development**

Dear Friends

Periods don't become defined by the styles for which they are known until long after they have ended, and maybe the past fifty years will be regarded as the *beekeeping crazy* era, when it was thought that we could keep honey bee colonies in sub-standard housing, shift them from place to place, reduce the range and abundance of available flora, stop them reproducing normally, take away all their honey and feed them white sugar instead, treat them with chemicals, and we then complained that they became sick and died!

BfD has always promoted Nature-based Beekeeping, and we strive to articulate why this approach is best for bees and best for people. Having worked within this sector for over 30 years and in more than 40 nations, we believe that we have understanding of how best to help people to build sustainable livelihoods based around bees.

In this edition Janet Lowore, our Programme Manager shows (page 6) that three nations using Nature-based Beekeeping feature within the list of top 20 honey-producing countries – these are Angola, Ethiopia and Tanzania. The honey and beeswax from these countries are in strong demand because they are very clean, with no residues from human-applied medications. It is possible to envisage a future where beekeepers no longer routinely treat their bees with chemicals, and the recent Learning from Bees Conference (page 32) gave a glimpse of this happier situation, with speaker after speaker reporting populations of wild-living honey bee colonies that are surviving without human intervention.

At BfD we know of many regions where Nature-based Beekeeping is thriving – however we do not always have the images that we need to convey the story to you! Therefore, we have been delighted to partner with Briana Marie of *Photographers without Borders*, who travelled from California to visit Bees for Development Ghana – read her story on page 12.

In Ethiopia, bees are being killed by the powerful insecticides that farmers are often encouraged to use. We are working hard to train farmers in way to avoid their use – you can read about this work in BfD Ethiopia's More Bees Newsletter on page 18–21.

During BfD's 30 years it has always been a struggle to identify funds for our work – and never more so than now. We must raise more funds, hence our London Bee Garden Party Fundraiser – please see details on page 44??. Do join us if you can – an afternoon celebration of bees, and raising funds for our work to continue.

In this edition we also bring you news from other world regions, including Robert Mtisi's account of his visit to the Apimondia Africa Symposium in Durban, South Africa. Our Journal is created to inspire beekeepers in the financially poorer nations of the world, and this is the third edition in which we join up with our friends at Natural Bee Husbandry magazine to produce this combined edition. The articles that you see in the parts of the magazine labelled BfD Journal, are our content – the other articles are provided by Natural Bee Husbandry magazine. By joining together, we save resources and provide you with a much wider range of articles – please do let us know what you think!!

Nicola Bradbear

About Bees for Development *Journal*
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BfD article

Nature-based Beekeeping

Janet Lowore PhD, Programme Manager at **Bees for Development**

BfD article

When we tested our new video on *Nature-based Beekeeping*, one viewer said that they were only partially convinced about its benefits because "*those countries which are practising traditional beekeeping are not among the list of top world honey producers, because of the way of traditional beekeeping*". This is an interesting comment and one for us to address here!

First let us check if the statement above is true. The FAOSTAT database (FAOSTAT 2022), which has information for 130 nations' honey production, shows that it is not: **Nature-based Beekeeping systems**, i.e., those using low-cost, fixed-comb hives, predominate in **three** of the top twenty honey producing countries (see Table 1): Angola, Ethiopia, and Tanzania, and are widespread in some of other countries, for example Turkey. As we all know the leading honey producing nation in the world is, by a long way, China.

Considering the relationship between the size of the nations and their honey production, the statistics look very different. For example, Russia, which produced an average of 64,858 tonnes of honey per year during 2018 - 2021 is a very large country – producing **3,793** tonnes of honey per 1 million sq km - compared to Tanzania (a much smaller country) producing (*pro rata*) **33,073** tonnes of honey per 1 million sq km. And Tanzania leaps ahead of the USA producing **6,746** tonnes of honey per 1 million sq km.

Of particular note is Turkey which surges into the lead, way ahead of China, producing **133,260** tonnes of honey per 1 million sq km compared to China's **48,364** tonnes. We could argue that a metric about honey yield in connection with land area is not very meaningful, because not all land is equally suitable for beekeeping, but that raises the question about *what is the best metric* for successful beekeeping? Because there are many other important considerations apart from volumes of honey produced.

Honey exports

China is the world leader, exporting maybe a quarter of its total harvest (Zheng *et al*, 2018). Ethiopia exports less than one tenth of its total yield

Above: local style hive in use in Turkey. © Bees for Development

(Nega & Eshete, 2018). Why this difference? One possible reason why Ethiopia is not a top honey exporting country, despite producing much honey, is because Ethiopia enjoys a very large domestic demand for honey. If Ethiopia wished to increase exports, one solution might be for local people to stop consuming honey and export it instead – surely not a popular or successful suggestion!

Value and quality

What about value? China produces 3.5 times more honey than New Zealand, however New Zealand honey exports are worth US$327m (€299m) (compared to China's US$230m (€210m) (Shahbandeh 2022). This difference in value is due, not to a difference in beekeeping system, but to New Zealand's very successful marketing campaign which revolves around high value manuka honey, with its scientifically proven medical properties.

What about quality? Data from FAOSTAT reports that the fourth largest honey producer is Iran.

However, a recent research report from Iran analysed "*225 honey samples using palynology, sensory, nuclear magnetic resonance (NMR) and conventional physicochemical analyses*". The results showed that 85% of collected samples were adulterated, largely with sugar. It is believed that the contamination stemmed from the frequent practice of supplementary feeding of bees with sugar – it was learned that beekeepers receive sugar subsidies from the government and sugar feeding is widespread (Khansaritoreh *et al*, 2021). A recent study from China revealed that 84% of honey samples contained residues of antibiotics (Zheng *et al* 2018). A further reminder that bigger is not always better.

Nation	Volume of honey in tonnes (average across four years 2018-2021)	Land area of nation in million km²	Tonnes of honey produced per million km² (*pro rata*)
China	464,147	9.597	48,364
Turkey	104,418	0.784	133,260
Argentina	75,534	2.780	27,171
Iran	74,273		
Ukraine	69,451		
USA	66,337	9.834	6,746
India	64,967		
Russian Federation	64,858	17.100	3,793
Mexico	60,621		
Brazil	48,851		
Canada	40,207		
Spain	32,142		
Tanzania*	31,257	0.945	33,073
Republic of Korea	29,285		
Romania	26,108		
Ethiopia*	24,886	1.112	22,380
Germany	23,625		
Angola*	23,403		
New Zealand	22,625		
Greece	22,514		

Table 1. Selected honey production data. *Countries where Nature-based Beekeeping predominates. Source of honey data: FAOSTAT 2022 https://fenix.fao.org/faostat/internal/en/#search/honey. Source of country land area data: Worldometer 2022 https://www.worldometers.info/geography/largest-countries-in-the-world.

Best systems

This goes to the heart of the original question. It is true that more intensive bee farming systems produce large volumes of cheap honey: the reason China is the largest honey producing nation is because of the highly intensive way that bees are managed. Nature-based Beekeeping systems and commercial bee farming systems are completely different. A shift from one to the other does not involve minor modifications in approach, a different kind of hive or a new piece of equipment: it is a completely different business model. Nature-based Beekeeping is near to nature, and sugar feed and antibiotics are not used or needed, because the bees can manage without them. Unlike commercial bee farming, Nature-based Beekeeping is low risk, low intensity and accessible to people regardless of their financial status. Commercial bee farming, of the type seen in China in particular, is a heavily managed and intensive system. Nature-based Beekeeping is almost wholly done by people using their own labour as part of a mixed livelihood portfolio. Commercial bee farming is a capital-demanding, single-enterprise business, much mechanised – with machinery made viable due to economy of scale – and use of employed labour. A high concentration of bee colonies in one location means sugar feeding is necessary, with possible risk of sugar contamination. A high concentration of bee colonies in their non-endemic habitat such as *Apis mellifera* in Asia, gives rise to risk of diseases outbreaks necessitating use of antibiotics and miticides – other sources of possible contamination. There are many levels of intensity, with numerous examples of successful small-scale beekeeping, which fall between the Nature-based Beekeeping approach and large-scale commercial bee farming systems.

National development goals

The problem, from a sustainable development perspective, is how can a low-income country assess whether Nature-based Beekeeping is contributing to its national development goals. This is probably a better way to phrase the original question – and indeed is a valid question. The answer lies in *what to measure* and *how to measure*. When measuring the health of honey bees, the value of beekeeping towards supporting the livelihoods of poor people or the contribution of beekeeping to forest conservation – Nature-based Beekeeping is better. Using metrics such as yield per colony or scale of export industry; Nature-based Beekeeping performs less well. Measuring resilience, sustainability and living within the limits of natural systems, Nature Based beekeeping triumphs. We know that Nature-based Beekeeping delivers on ecological and social outcomes. If it were possible to better market the intangible values of Nature-based Beekeeping and ask customers to pay a premium for uncontaminated honey produced in wholly natural ways that are kind to bees and planet – then Nature-based Beekeeping also delivers greater economic benefits.

References

KHANSARITOREH,E.; SALMAKI,Y.; AZIRANI,T.A.; FARNOOD HENAREH, F.; ALIZADEH,K.; RAMEZANI,E.; ZARRE,S.; BECKH,G.; BEHLING,H. (2021) The sources and quality of Iranian honey. *Heliyon*, Volume 7. Issue 4.
DOI: 10.1016/j.heliyon.2021.e06651.

NEGA,T.; ESHETE,Y. (2018). Review of Ethiopia's Global Position in Honey and Other Bee Products Production and Marketing: Analysis of Sectoral Opportunities and Limitations. Biomed *J Sci & Tech Res* 10(3)-2018. DOI: 10.26717/ BJSTR.2018.10.001969.

SHAHBANDEH,M. (2022). Export value of leading natural honey exporters worldwide 2021, by country. Accessed: https://www.statista.com/statistics/755194/export-value-leading-honey-exporter-worldwide/

ZHENG,H-Q.; CAO,L-F.; HUANG,H; NEUMANN,P. (2018) Current status of the beekeeping industry in China. Chapter in book: *Asian Beekeeping in the 21st Century* (pp:129-158). Chapter in book: Asian Beekeeping in the 21st Century (pp:129-158).

The Scientist and the Beekeeper: the Tale of Varroa-Resistance in Norway

Part Two

Dr. Melissa Oddie

I had visited Norway several more times during my PhD, but once that was defended and obtained, I thought my mornings of coffee and bee conservations with Terje had come to an end. When the invitation appeared however, I finished up my postdoc in Sweden the following year, packed my tiny apartment and my two cats into a rental van and started on my next adventure. The project officially began in 2020 and I arrived on the 15th of March, crossing the border nearly on the stroke of midnight, just hours before the national borders shut down in response to the coronavirus pandemic.

Dr. Melissa Oddie and Terje Reinertsen.

It was odd, being in a new country, moving into a new, empty home and immediately being shut up there for months while I collected myself and my work to prepare for the daunting task of repeating Terje's great accomplishment. The wonderful thing about bee work, however, is you do not need to be around anyone else to do it, so thankfully, I could continue to work, even while my friends and family were home, trying to keep busy, waiting for an end to the quarantine. Once spring really got going, I barely noticed the change.

The first thing we needed to have was a solid profile of Varroa dynamics in Terje's colonies over at least one active season: I needed to know what the mites were doing in there, how their populations changed and which points in time were crucial to colony success. So, the observations began. Every week I counted mites on boards. I must have counted nearly every single mite that lived and died in those colonies from spring to autumn. I took mite reproduction rates, estimated bee brood volume, the number of adult workers, queen changes and many other parameters I will not mention here. I needed to know *everything*.

Of course, I could not do it alone. If my experience had taught me anything it was that the research gathered could only get this program so far. I needed the beekeepers and their experience. The champion who had offered to start the breeding program was one Roar Øimo, a bee breeder in the secluded little town of Hurdal, nestled in a very classical Norwegian spruce forest at the edge of a long lake. He was a friend of Terje and had learned from him in much the same way I had; shadowing and listening. He had not been treating his colonies for ten years, but this was the first time we could raise the community around him to play the same game. Roar has also become a friend over the years. With his tall frame, easy stance and long blond hair worn in matts, he strikes a friendly and approachable figure. He is a community leader, and without his help I am sure this program would never have gotten off the ground, because he also knew bees, and people listened to and trusted him. If I had to convince the community alone, I would have been seen as only an outsider with big ideas. Mite levels were not great in Hurdal, and colony losses to this day seem to be higher than Terje's wonder bees, so there is/was certainly room for improvement.

The BLUP method of selective breeding was a concept that I learned of only after the initial project design, but the methods of both shared many similarities: centrally, using a point scoring system to measure the best breeding colonies. Armed with the knowledge I was gathering from Terje's bees on what a fully adapted surviving population looked like, I attributed a series of points to each of the hundred or so colonies in Hurdal using several scoring criteria: The first was docility. Any colony that failed to obtain a perfect score in that, lost points. The second was honey, this scoring was much more linear, colonies only failing to score points in they produced no honey. What received the most attention though, was the Varroa. I learned that at least for Norway, and in Terje's population, mite loads in autumn could be counted up to 20 per day and the population would remain stable, yet there were absolutely no colonies that ever dropped higher than that. 80% of Terje's colonies that year had counts between zero and 10. So, colonies in Hurdal that had drops between zero and ten in autumn obtained a very high score in my algorithm, colonies from 10-20 a middling score, and anything above that, lost points. The algorithm used has adapted a little based on new findings, but the basis has remained fundamentally the same. The population has always been free-mated, and I saw no reason to change that. Mating flights and male success is something of a black box to me, and I concluded that whatever nature had designed was probably better than any system I could.

Terje, though he takes a peripheral role in the project now, helping breed and rear queens, is still a crucial element of the effort, because it was his initial breeding that gave me the numbers I needed for a successful population, and occasionally, we still have our bee conversations over coffee.

The Hurdal breeding program is now three years old. The first two years provided some discouraging challenges, with something that apparently was not entirely Varroa-related sweeping the area in our first year and knocking out colonies at double the national average over winter. Even some of Terje's colonies, that I had been monitoring, received an uncharacteristically large blow (30%). The colonies that following spring were small, and the queens produced were replaced often. In this past year however, the colonies seemed to have picked themselves up, growing to sizes that much more resemble their normal ones and though the mites seem to be as present as ever, I have seen some evidence that gives me hope.

That is about as much of a story as I can relate currently. I expected it would be about five years before I would have any evidence to the success or failure of the program and so far, I can only guess that there may be some solid data of a change at year four, but from the experiences I have had, which now you share, I can provide a few bits of advice if you are inclined to try your luck at resistance breeding yourself. The next part of this article will be an outline of how to get started and some things one might focus on:

1. Be aware of your mites

If you are not planning on having most of your colonies die in this endeavour, then it is imperative you know their mite levels, because only then can you intervene before it is too late. There are many advantages to running a breeding program with some form of mite counting: 1. It is much less costly, the breeding efforts only require you to control the genetic material being passed down in your stock, it does not rely on the death of your weak colonies. My recommendation then is to treat the colonies that appear to be doing badly (i.e., have a lot of mites) and either remove them far enough from your breeding apiary that they cannot contribute drones, or else castrate them by drone cutting, which should help with the mites as well. From a Norwegian perspective at least, the golden mite drop range was between zero and 10 in the autumn, i.e., when winter bees are produced. Norway has the luxury of one of the lowest colony densities in Europe, so it may be that mite spread due to robbing is much less of a problem there, which is something to consider. It is important to be aware of other colonies around you, and this leads me into point 2. Counting mites will also allow you to deal with colonies before they become targets for robbing and end up sharing their mites with your colonies and others. This is both good for you and your fellow beekeepers, whom I will advise you to rely on in tip two and three.

2. Try to choose and breed your own queens

There is little dispute now in the scientific community that bees do adapt locally. Using local bees will almost always serve you more consistently than importing bees from a completely different environment. If you are worried that perhaps your local bees lack the Varroa-surviving magic in their genes, I think I have yet to come across a control population I have used that did not have at least a handful of promising survivors among them. Therefore, I believe that they are there, in practically every line of bees you could choose. All you need to do is find them. Equally, some might think that Norway's climate might be just North enough to give the mites a disadvantage that makes overcoming them possible, and that climates without snow or temperate seasons may not be able to breed resistance at all. To this I mention *Apis ceranae*, the native host of the mite that lives happily in South East Asia and is doing just fine in the wild and in captivity. I would also direct you to a population of European honeybees in Cuba, that has obtained resistance nationwide.

Scoring your colonies based on trait performance is a fantastic way to root out your survivors: at the end of the year, you give every colony a numbered score for every trait you want to improve in your stock, and then add them to produce a final breeding score for each colony. Each colony then gets one score per year and the following year, you breed from the colonies that scored the highest. For example, my own project looks at docility, honey production and Varroa counted on the bottom boards as the three most important, and highest scored traits. The most effective scoring is focused at the apiary level, so you can account for differences in the environment. You can take an average of the colonies in one apiary and assign a score to each colony based on how much better or worse they are from that average. So, if the apiary average for honey production is 40Kg, a colony that produces 30Kg would score low in your system, while a colony that produces 50Kg would score high. As for which numbers to use scoring each trait, that is going to vary by location and environment, so unfortunately the score values that work for one area, like mine, may not work for another, like yours. This is where beekeeping experience comes in, knowing your own environment and your own bees and making scoring decisions based on this is likely to give you the best results.

Breeding your own queens is a lot of work, and it can be difficult, but the level of control you gain over your stock will be well worth it. If you lack the resources to start your own breeding, you might partner with a local breeder who can graft some of your queens for you, this leads me to my final bit of advice:

3. Share effort and share experience

In my mind, the breeding project I am involved in currently has only been successful because I have most of the communities' beekeepers taking part: They purchase queens from the project breeder and supply me with data on their colonies' performance, which in turn, provides me with the data and the genetic pool I need to select the best queens for breeding the following year. Alone, the breeder has a pool of about 60 colonies, but together, our project colonies number over 100. Still small beans, but for the isolated community, that is nearly all colonies present in the area, which is buffered from other towns by tall hills and forest.

The central benefit of working together, beyond simply having more colonies in your genetic pool, is that the experiences and knowledge of all those beekeepers will become available to you and everyone else, with such a complex problem as breeding bees for parasite resistance (and it is very complex let me assure you), insight from many will undoubtedly reveal things that you did not know.

There are a large number of breeding programs that have already been started, by scientists and beekeepers alike. Most of them are far older than my own little effort up in Norway. Asking around, you might be surprised at what is already being done close to you, and now, people are becoming more used to speaking about it.

The beauty of this day and age is that you can message practically anyone from anywhere in the world instantly and this has allowed communities to come together and continue to share their experience internationally, just like I am sharing mine with you here. I think we almost have an obligation to use it, to share knowledge and improve our methods together. If two heads are better than one, two billion should get the job done.

A journey started once started, must be continued...

From the start of my journey, lost on a little Norwegian back road, to the development of a full-scale resistance breeding program, the thing that has helped me the most, I think, and the last bit of advice I will impart, has been to keep an open mind. I accepted that the textbook learning I had first was not the only way to solve problems. Seeing the world, and learning how others see it, not only allows you to reach your goals, but illuminates many more that are equally possible. With this outlook I have been able to connect with a vast number of people in many meaningful ways. I got to share their experience and add it to my own so the truth of Varroa resistance came a little closer, and the breeding program became possible. If I follow this track further, perhaps all of Norway will want to have resistant bees one day, and Varroa here will be whittled down from the catastrophic plague it has been, to only a mild annoyance. One thing is for certain though, if we keep open minds and work together, I think we can achieve anything.

Using Prophylactics for Preventing Honey Bee Diseases

Is there a need for vaccination against American foulbrood?

Katrin Sonnleitner and Dr. Johannes Wirz; translation and photo by Martin Kunz

Whenever a study financed by the pharmaceutical industry is published, it is brought with great energy to attention globally. This is what happened with the news about a vaccine aiming to immunise bee colonies against American foulbrood (AFB).

The "oral vaccination" was carried out in a laboratory experiment as follows: Bees were fed sugar water with dead foulbrood bacteria (*Paenibacillus* larvae). These bees were then locked into a cage together with a queen for some time. The dead bacteria now also was in the royal jelly, which the workers started feeding to the queen, and eventually they found their way into the queen's eggs. The larvae that developed from these eggs were then infected with foulbrood bacteria, and in the laboratory trials it was found that their mortality was reduced to 30-50 per cent; field trials are being planned. The media reports that are now reporting an "approval for a foulbrood vaccination" actually only refer to an approval for field trials, not the vaccine itself.

Lay readers are in awe, and some amateur beekeepers may even be delighted. Those who breed queens may even sense a new business with the sale of "immunised" queens. Hopes for a vaccine are likely to resonate above all in those beekeepers who extract all the honey from their colonies and then feed them refined sugar for the winter, which is of little use to the bees (apart for the calorific value of its sucrose). "With a teaspoon of sugar!" would be Mary Poppins' comment.

In bee appropriate beekeeping circles we ask instead the following question: How do bees take care of their health in the context of nature? Studies have shown, for example, that feeding sunflower honey to bees and their larvae reduced their infection rate with Nosema and European foulbrood (sour brood), and feeding acacia honey reduced infection with American foulbrood by at least the same factor as the new vaccine. Honeys with proportions of different flowering plants were equally effective. Furthermore, feeding experiments showed that bees preferred the "correct" honey depending on the pathogenic bacteria. Honey from a variety of sources is therefore not only food for the bees, but also 'medication'.

Therefore, those who leave their bees as much of their own honey as possible, at the same time provide them with an independent, natural prophylaxis against fatal bee diseases, which also happens to be less costly for the beekeeper while being just as effective as a man-made vaccine.

Furthermore: The actual approval of such a vaccination is a long way off - at least for Germany!

Above: food variety - an important factor in self-mediation!

Authors

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Bibliography

Dickel F, Bos NMP, Hughes H, Martín-Hernández R, Higes M, Kleiser A and Freitak D (2022) The oral vaccination with *Paenibacillus* larvae bacterin can decrease susceptibility to American Foulbrood infection in honey bees—A safety and efficacy study. Front. Vet. Sci. 9:946237. https://doi.org/10.3389/fvets.2022.946237
Gherman, B.I., Denner, A., Bobiş, O. et al. Pathogen-associated self-medication behavior in the honeybee *Apis mellifera* . Behav Ecol Sociobiol 68, 1777–1784 (2014). https://doi.org/10.1007/s00265-014-1786-8
Erler S, Denner A, Bobiş O, Forsgren E, Moritz RF. Diversity of honey stores and their impact on pathogenic bacteria of the honeybee, *Apis mellifera*. Ecol Evol. 2014 Oct;4(20):3960-7. https://doi.org/10.1002/ece3.1252. Epub 2014 Sep 26. PMID: 25505523; PMCID: PMC4242578.

Further reading (in German only)

Hrsg. Niedersächsische Landesamt für Verbraucherschutz und Lebensmittelsicherheit (LAVES): Einordnung der AFB-Impfung und der zugehörigen Studie
Dr. Johannes Wirz im Mellifera-Blog über Zuckerfütterung und Bienengesundheit
Bigna Zellwegers Vortrag „Das diverse Immunsystem der Honigbienen und was der Mensch damit zu tun hat" im Rahmen der von FreeTheBees organisierten Bienenkonferenz „Bienen ohne Grenzen"

Notes from Greece

Not far from my mountain village there is a permaculture settlement where people from several countries spend time together - maybe just a few weeks, months, or even years. The people currently staying there visited my apiary to see examples of a Warré hive, top bar hive, log hive, catenary hive, modified top-bar Langstroth, Layens and Greek skeps and a Portuguese Cork hive. If any of them wished to make a wooden hive, they could have my workshop and tools at their disposal. After a few days a group of them came by - they had made their minds up - they wished to make a skep. Fortunately, I have plenty of rye straw in store (purchased from Simona Vatinaite in Lithuania) and the group set to work for the morning removing the outer coverings of the stalks and cutting off the seed heads which they were able to take away for their chickens. Ensuring that they had plenty of material to complete a skep - and a copy of the BIBBA publication "Make Your Own Skep" by Revd Nobbs, they departed saying that they would complete the work at their camp. A few days later, they returned, full of delight, with their first ever skep. Sylvia, from Austria, I understand, constructed most of the skep and the entrance nearer the bottom included a kind of porch. It is currently awaiting a swarm - not far from an apiary of some forty colonies. I hope they are successful managing to attract a swarm!

Top: Sylvia from Austria making the skep; Above: Pauli, from Holland, Sylvia from Austria and Jose from France, with the completed skep.

Sadly, one of my colonies of bees, the one in the "Ukrainian Gable Hive" which is just outside my office window, came to an end in the middle of March, leaving behind a clean set of combs as yet untouched by wax moth. Within four days of cleaning the floor, a huge swarm clustered on the hive and within fifteen minutes they were safely inside. I expected the swarm as there had been scouts around for a couple of days with, interestingly, some staying overnight in their prospective home. This site is always the first one chosen in my garden. Whilst other bait hives are placed in the way which is meant to attract the bees, the 'Ukrainian Hive' faces north and with an entrance nearly one metre above the ground.

Swarms are always attracted to bait hives in this part of my garden!

Bees for Development Ghana

Briana Marie, Photographers without Borders, USA

Aerial view of the Afram Plains

BfD article

BfD Ghana is a story of humans learning to dance with nature.

It's a story of beekeepers following and sharing their passion. It's a story of devastation and conservation; can the latter be enough to counter the former? It's a story of women who shine when given the full education and opportunities that their male counterparts have been given. It's a story that mirrors the old proverb; "give a man a fish..." It's a story of success; the joy that shines from beekeepers that have discovered new skills to move their life in a positive direction.

This grassroots NGO with a staff of only four is far-reaching and incredibly successful. Currently they have two main beekeeping trainers; Gideon who serves the Afram Plains region and Isaac who works in Techiman. In Donkorkrom, Afram Plains area there are now over one thousand beekeepers. Their basic mission is simple; teach beekeeping in rural areas to increase economic sustainability. But within that mission are many layers.

The deepest layer is conservation. It is quite simple. The bees need the forests to survive and thrive. The honey supports the people. If the people protect and restore the forests, the circle is complete. These fragile ecosystems are at risk from bush burning and charcoal selling.

Bush fires are nothing new but, unfortunately, with climate change the bush fires now get out of control and burn longer and hotter than in previous years. Farmers have lost their crops. Beekeepers have lost their hives and huge swathes of landscape are burned. In addition, the large trees are burned and cut down for charcoal profit. It was shocking and heart-breaking to drive through miles and miles of burned brush. The short-sighted practices are having long-term damage. The beekeeping communities on the fringes of Digya National Park in Ghana's Eastern Region are quickly realising the value of their forests and becoming their protectors. I clung to this small bit of hope as we continued in these areas.

Abdul Shafik, a beekeeper in Apesika

The next layer is economic education. They are teaching entrepreneurship, planning, business communication, organisation and basic business economics. These skills are incredibly

helpful for the forward progress of these villages. In addition, they have started "Buzz Clubs" which teach beekeeping to classes of middle school students. These valuable classes serve two important functions; giving these students a solid trade skill that will aid their economic future and training hundreds of children to value and work for conservation.

Gideon is a passionate beekeeper and lights up when he sees people he has trained getting excited about their bees and the upcoming honey harvest.

> "It's all I have dreamed of. When I go to them, and they are facing a problem, I go to them and help them. There are occasions when I teach them, and we solve a problem together. I enjoy it so much. So joyful!"

His life has been complicated and was never easy. At the age of five he was given away as child labour by his grandmother to work for another family. He worked hard fishing at night and farming during the day. Eventually he ran away and put himself through school. At this point, it's so obvious that the local beekeepers hold Gideon in high esteem and are so grateful for what he has taught them. His story is an incredible lesson on perseverance and giving back.

Isaac is very interested in the economics of teaching beekeeping. He is proud of their financial success and loves to hear how the new beekeepers are spending their newly found profit. He's curious about all the impacts and progress that can be discovered with new skills and knowledge. "I love getting to know how they are spending the money. I am so proud of them. The beekeepers are seeing the differences in their lives".

In the Techiman District, cashew farming is the primary crop. Adding beekeeping not only helps with the pollination of the cashews, but also provides another financial opportunity for the farmers. BfD Ghana has a successful teaching model where they have trained expert beekeepers and have coordinators who train and support new beekeepers. This apprentice model is sustainable as new beekeepers are trained to keep bees, build hives and process honey and wax. There is a pride in these programmes that is so obvious to the observer.

Top: beekeeping in the forest: Kojabator is a remote village across the Volta River on the edge of Digya National Park; middle: Abomasalifo, Atta Boateng, Ernestina and Felicia harvesting their first crop of honey from their top-bar hives; bottom: honey is harvested at night from a Burdaso tree log hive – it is cooler, so the bees are calmer.

Training is working. The knowledge is spreading, and the new beekeepers are experiencing financial success.

BfD Ghana was pleasantly surprised how able and successful the female beekeepers have been. It is a testament to the belief that is being proven again and again; if women are given education and opportunity then they can rise to the challenge and experience similar if not even greater success than men are achieving. As a woman, I can't help but feel immense pride for these ladies. Their joy was contagious and entire communities were cheering for them!

With this new-found knowledge, BfD Ghana has begun a new programme of training female beekeepers to become onsite master beekeepers to train other women's groups. Currently they are being trained in Saltpond by Kwame and will soon move to be representatives in Afram Plains and Techiman.

I was awestruck when we visited both the Boabeng Monkey Sanctuary and Kakum Nature Park; conservation has been the priority and the effect was inspiring: huge trees filled with wildlife. An absence of trash and a plethora of rich sights and sounds; evidence of a complex biodiverse wildlife habitat. I'm optimistic that Bees for Development Ghana can create more such places to protect what's left of the forests and to replant many more trees. With beekeepers as advocates for conservation, there is hope.

Briana visited BfD Ghana with support from Photographers without Borders: a not-for-profit-organisation registered in the USA and Canada. Photographers without Borders is a global community of photographers and filmmakers protecting land and water through ethical storytelling. They firmly uphold the UN Sustainable Development Goals and UNDRIP, while prioritising capacity-building for community-based storytellers and community-led initiatives within their work.

For further information please see www.photographerswithoutborders.org.

Top: carrying honey buckets; middle: Afram Plains Fire. Fragile ecosystems are at risk from bush burning and the selling of charcoal; bottom: Hawa Issah getting ready for harvest.

Apimondia Africa Region

Symposium 2023

Dr Robert Mutisi, Working for Bees,
Manicaland, Rusape, Zimbabwe

The Symposium took place 21-24 March at the Durban International Conference Centre, South Africa. Almost 500 delegates from thirty African and eight other countries enjoyed the opportunity to meet and hear the latest news and developments.

Topics included: styles and costs of beehives; the role of bees in farming and human life; diversity of beekeeping; honey adulteration; the regulatory framework in the honey value chain; and beekeeping in school initiatives.

Technical tours focused on honey and beeswax processing, hive inspection and construction. The main topics of interest were sustainable beekeeping; hive choices for rural development; the effects of pesticides on bees, and how beekeeping can be used as a tool to address hunger, poverty and protect the environment.

Bee products, honey and mead competitions attracted high-quality entries, as did the bee equipment and produce exhibitions.

Symposium significance

The Symposium brought together stakeholders to share experiences, ideas and knowledge on how the apiculture sector can be improved in local areas and countries. Delegates represented academia, beekeepers, equipment manufacturers and suppliers, honey processors and traders and policy makers. Beekeepers had an opportunity to learn and interact with fellow beekeepers from across Africa. Honey processors and traders had an opportunity to access information on honey characteristics, quality and regulatory frameworks that will assist in meeting customer requirements.

Institutions of learning had the opportunity to identify potential research topics and provide advice on current best practice thinking. Policy makers had an opportunity to share knowledge and ideas on how regulatory frameworks can be used to promote bee health, beekeeping, bee population growth and to protect all pollinators. Development partners benefitted from knowledge and experience on how they can enhance their planning for community projects to have positive impact and how to record success.

> "On a personal level, I learnt how to handle a systematic honey and mead competition and about the different causes of honey adulteration. With a degree of sadness, I also learnt that there was more focus on expensive 'modern' rather than low-cost hives that can be replicated at community level. I gained valuable experience of how to work with honey as a honey steward and judge and in presenting and chairing workshop sessions."

Images © Robert Mutisi. 1: Beeswax competition entries; 2: (L-R) Ms Adonsi from South Africa, Mr Mudongo and Dr Robert Mutisi from Zimbabwe; 3: Light honey on the shelves ready for judging.

BfD article

Beekeeping and Gender Equality in Uganda

Grania Mackie, International Consultant, Social inclusion and enterprise development, UK

Making a sustainable living in rural communities in Uganda is challenging for both men and women, particularly in the context of climate change and biodiversity loss. Fifty-five percent of the rural population in Uganda lives in multidimensional poverty. But there is gender inequality in poverty. Female-headed households have higher rates of multidimensional poverty than male headed households (Uganda Bureau of Statistics, 2022). A combination of poor access to productive resources, services and information, the burden of unpaid care and domestic work, and discriminatory social norms persistently keep rural women below men in almost all social indicators, such as education, gender-based violence, land ownership, and productive employment. In the main, beekeeping is a male-dominated activity. Ownership of equipment, know-how and land has been passed down through male members of the family. Women, although involved in apiary maintenance, often do not have ownership or much control over apiaries or any livelihood generated from them.

In Adjumani District, northern Uganda, **Bees for Development** and the Uganda National Apiculture Development Organization (TUNADO) have been working together in addressing the gender-based barriers that limit women's participation, and benefits from, beekeeping.

Bee the Voice project has taken a three-pronged approach to negotiate changes in restrictive gender norms and change women's roles in beekeeping:

1. Charles with his wives, Shyron and Consh; 2. Newly made hives drying before siting; 3. Both Justin and Welialili are Bee Champions; 4. Welialili by sited hives

- **Re-balancing and re-negotiating gender roles:** The core of the project is a participatory community capacity building methodology based on the Gender Action Learning System (GALS). The GALS methodology worked with men and women in understanding and addressing gender-based barriers that prevent them benefiting equally from beekeeping. Image 1 shows Charles and his wives, Shyron and Consh, standing by Shyron's apiary which the family have constructed since October 2022. Following the GALS training, they decided that each family member will have their own apiary and all members would help with making hives and constructing hive stands.
- **Women as role models and experts:** TUNADO has encouraged and trained female bee champions and apiary mistresses to normalise the roles of women in apiary management. The champions will provide technical support to both women and men beekeepers and advocate for changes in gender norms through beekeeping. Image 2 and 3: Both Welialili and Justin are bee champions and very strong advocates of/for the GALS methodology. They spoke about how they have benefitted from the approach since they attended the workshops.
- **Value chain development:** The Project developed the honey value chain where women (and men) learned how to assess and improve apiary productivity and quality. Image 4 shows newly made hives drying before being sited ready to be occupied by honey bee colonies.

Improving access to processing and marketing opportunities for beekeepers has increased through Jephina Enterprises, a women-owned honey and bee product wholesaler and retailer. Jephina has improved also the sustainability of **Bees for Development** support through backward chain upgrading and facilitating beekeepers' access to equipment and processing services.


4


3

In twelve months, the project has had a significant impact in the communities where it works. Here are some of the results:

- Informal employment opportunities in beekeeping have been created for 126 beekeepers (85 women and 41 men) in Adjumani. 1,012 local-style hives have been woven and sited in apiaries, with an average of eight hives per beneficiary. There was an increased household income for the beneficiaries, earning them US$1,850 (€1,670).
- Three GALS workshops were conducted in Adjumani with 121 participants attending the sessions through eleven groups, facilitated by group coordinators and auxiliaries (103 women and 18 men). The gender participatory community capacity building has seen families combining their efforts to benefit from beekeeping.
- Ten women bee champion group coordinators were trained and supported. They are taking up leadership within beekeeping groups and mobilising and inspiring other women to join beekeeping.
- Thirteen young women were trained as apiary mistresses and are now all in paid employment offering beekeeping technical extension services to beekeepers and raising the profile of women as expert beekeepers through their example.
- There is increased respect for women from their male counterparts as evidenced by men accepting mentoring by women beekeepers and selling through the women-coordinated honey buying points.

TUNADO is a membership body with over 300 members in Uganda. TUNADO unites beekeepers with development partners, government, packers, processors, service providers, and all other stakeholders towards apiculture development in Uganda

Bee The Voice project was supported by Hub Cymru Africa, funded by **Welsh Government.** Images © Bee the Voice.

Issue No.1.

BfDE Newsletter

Bees for Development Ethiopia

More Bees

Supporting agro-biodiversity and livelihoods in Amhara, Ethiopia

This onion plot, in Kuhar Abo, Fogera, is managed using Integrated Pest Management approaches and enables farmers to learn in practice.

In Ethiopia agricultural intensification has been identified as a key pillar in national development plans to increase food security and to support farmers' livelihoods. Irrigation agriculture allows farmers to extend their farming seasons and harvest food and cash crops throughout the year. Yet intensive irrigated agriculture comes with challenges and chief amongst these is the risk of pest and disease outbreaks. Farmers and agriculture extension workers think that chemical-based pest control i.e. pesticide application is the only remedy. Yet intensive pesticide application brings many unintended negative consequences as noted here.

Disadvantages of using pesticides

- Kills beneficial insects e.g. pollinating insects, natural enemies of crop pests and honey bees
- Poses health risks for farmers
- Causes environmental contamination e.g. pesticides can enter lakes and streams
- Residues can build up in food produce, potentially harming those who eat the produce
- High cost

Did you know?

Many pesticides which are banned for use in the European Union, because they are highly dangerous to humans and the environment, are still made, sold and exported to Africa – where they pose great risks to people and the environment.

For example, imidacloprid, which kills bees, is banned for use in Germany and France, but is sold by these nations to countries in Africa, including Ethiopia.

Bees for Development Ethiopia

Bees for Development Ethiopia is a local resident charity based in Bahir Dar. We work to increase the benefits of beekeeping towards supporting rural livelihoods, always integrated with wise management of natural resources and maintenance of habitat for bees.

Here a strip of lablab-bean is planted next to the crop to provide a habitat for natural enemies, such as ladybirds.

The beekeepers we work with tell us that pesticides are killing their bees and making it harder and harder to produce honey. On the one hand Ethiopia as a nation is determined to build its beekeeping sector, on the other hand bees are being unintentionally harmed by pesticides. It is against this background we joined together with Pesticide Action Nexus Ethiopia and other partners to start a new Project in 2022, More Bees: Supporting agro-biodiversity and livelihoods in Amhara, Ethiopia. We are working in Fogera and North Mecha.

Project aims and objectives

Project Outcome
Adoption of integrated pest management in 2 sites in Amhara, leading to restoration of beekeeping livelihoods, increased abundance of beneficial insects, and more income for smallholders.

Output 1
Smallholder farmers and government extension workers in Fogera and Mecha have a good understanding of their local agro-ecosystem.

Output 2
Integrated pest management approaches adopted by smallholders in Fogera and Mecha.

Output 3
Beekeeping enterprises established and re-established by smallholder farmers.

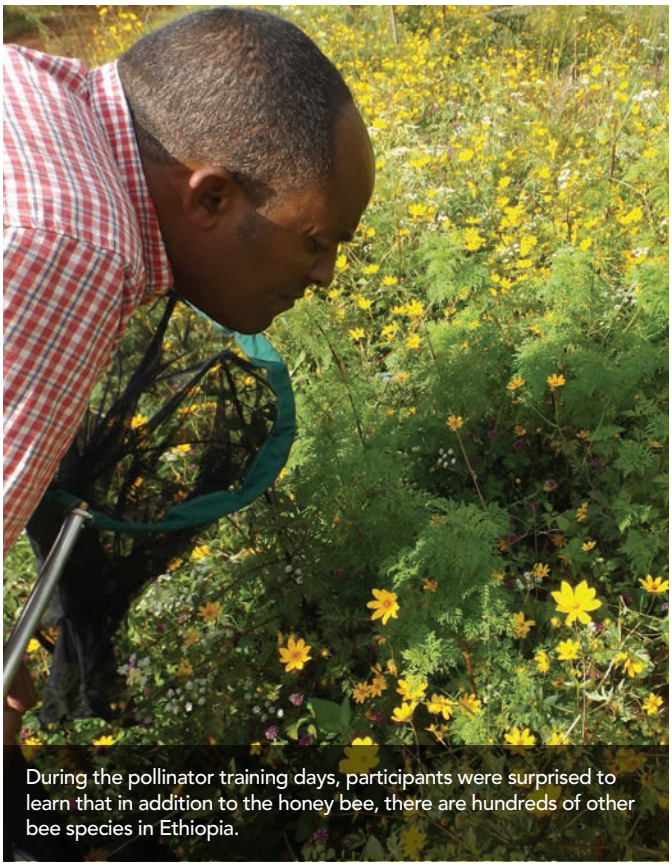
Output 4
Farmers, government extension workers and other stakeholders have good understanding about ways to support biodiversity-friendly agriculture.

BfD article

Project activities

Since starting the Project in June 2022 the team has delivered the following activities:

Hover fly larvae are 'Farmers' Friends' and eat aphids, yet the adult hover flies must consume pollen in order to reproduce.



During the pollinator training days, participants were surprised to learn that in addition to the honey bee, there are hundreds of other bee species in Ethiopia.

Learning about pollination

Pollination is the transfer of pollen from the anther of one flower to the stigma of another, and must occur for plants to produce seeds and fruits. Yet many farmers and extension workers are ill-informed about pollinators and their importance. To address this gap, pollination specialist, Mike Edwards from UK, provided training to agriculture experts and development agents, Bees for Development Ethiopia and PAN-Ethiopia staff, MSc. students from Bahir Dar University and beekeeping researchers. At the end of the training participants could identify different kinds of pollinators, including mining bees, carpenter bees and hover flies.

Participants learn how to observe and identify pollinators, as this is the first essential step towards their conservation.

Integrated Pest Management training

Before the Project farmers relied on chemicals only to control pests, having no knowledge of alternative approaches.
To begin to change practices, a training course on Integrated Pest Management was delivered to government agriculture and livestock extension workers and the field workers.
The trainees stated that, "*The use of different active learning methods made the training lively and engaging for everyone. The IPM training enhanced our understanding. It is very important to address farmers' real problems related to crop pest control*". The training course covered topics about plant health, soil health and the role of natural enemies.

Flower-filled habitats support diversity and abundance of beneficial insects, and must be encouraged.

Farmer Field Schools set-up

Farmers learn best through practical learning and by finding out for themselves. Theoretical training alone is not adequate. This Project is setting up and supporting Farmer Field Schools (FFS) and establishing IPM trials on vegetables and pulse crops. The FFS participant farmers attend weekly trainings on aspects of IPM and agroecology and they collect data about the number of pests and natural enemies they find in the trial crops. Currently, FFS trials are being conducted on onion and grass pea in six kebele. Farmers explained, "*We used to think that no insects, apart from honey bees, had any benefit. Now we understand the importance of maintaining habitat to support natural enemies. We are doing pest observations. We count insect numbers and work out the ratio between natural enemies and pests so we can make informed decisions about spraying*".

Farmer Field School members in Enguti, North Mecha; they meet regularly and learn new ways to control pests on this crop, without chemicals.

Beekeeping training

Beekeeping is a nature friendly business that can be started with local resources and low capital. However, the death of bee colonies is common, caused by pesticides. To counter this situation beekeeping trainings have been provided to 41 crop protection, horticulture and beekeeping experts, and development agents. The trainees explained that as many of them are crop protection and horticulture professionals they did not know a lot about beekeeping. "*This is the first beekeeping training we took. We now understand the link between crop protection and beekeeping. This kind of integrated thinking is not common and yet so important*".

Development agents and experts learn about the link between beekeeping and crop-protection.

BfD article

Baseline survey

To provide an evidence base against which we can measure positive change and project results we conducted a baseline survey by interviewing 369 farmers in the Project location:

We learned:

46%

46% of respondents said they could not read; this has implications for how able farmers are to follow correct guidelines about safe use of pesticides.

7.7

Across the seven crops included in the survey, farmers said they applied pesticides on average 7.7 times in a season, for each crop.

94%

94% of respondents said chemicals were their only means of managing pests.

31%

31% of respondents who said they were beekeepers had given up and no longer kept bees.

21

Only 21 farmers, out of 369, said that 'other' insects, apart from honey bees, had any benefit.

22

Only 22 farmers, said that honey bees were important for pollination.

341

341 respondents admitted that pesticides brought harm and unintended negative impacts.

This Project is supported by Darwin Initiative

The Darwin Initiative is a UK government grant scheme that helps protect biodiversity, the natural environment and the local communities that live alongside it in developing countries.

Project Partners

Bahir Dar University

Bees for Development

Pesticide Action Nexus Ethiopia

PESTICIDE ACTION NEXUS ASSOCIATION (PAN-Ethiopia)

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Elephants and Bees

Martin Kunz

I have spent most of my working life (since the mid 1970s) in or in contact with Asian countries. My interest in bees came comparatively late – only ten years ago, but the issue of Human Elephant Conflicts got onto my radar quickly. There are simply too many of us (humans), in ever growing numbers, and fewer areas left for a declining elephant population.

So when I learned about Dr. King's work with elephant fencing in Kenya, I was keen to find out if they might work in an Asian setting, too, and it was great to find out that Kylie had done a trial in Sri Lanka: Key parameters that differ from Kenya are, of course: The elephant species differ (African vs. Asian), the bee species differ …

When I read Kylie's article my first questions concerns the suitability of Langstroth Hives - for keeping the local *A. cerana*. From my limited experience with *A. cerana* these hives are too big for the smaller bees – making it hard for them to turn them into suitable homes – possibly increasing their (already fairly big) tendency to abscond.

However, I doubt that even with hives with a more appropriate size the results would have been different: It seems that *A. cerana* simply seem to be unsuitable for fences because of their tendency to abscond– which was also reported from another trial in Thailand, and of being non-aggressive…

Top: elephants at Weherasala Tank, outside of Wassamuwa;
Above: screen grab picture of an elephant avoiding a fence in Thailand.

The Thai project therefore used *A. mellifera* in their fencing trial which, too, seems to have had some limited success with the local Asian elephants, but not sufficient. So questions remain: Is this because the strain of *A. mellifera* in Thailand is less aggressive than the African *Apis mellifera scutellata*? Is it because of the Asian elephants? Either way the conclusion I draw is:

Bee fences do not seem to work sufficiently well in Asia – and people more competent than me have come to the same conclusion: Shany Dror et al. conclude in their Article "Are Asian elephants afraid of honeybees? Exper-

imental studies in northern Thailand" (where they actually tested *A. mellifera* and *A. cerana* next to each other) "neither … are likely to be effective in deterring wild Asian elephants from entering crop fields."

I would, however, hope for someone to do one more trial: Use stingless bees (*trigona*): They are easy to keep in (hanging) clay pots. They are great pollinators for nearby fields/crops. And while they don't sting, they definitely can be very annoying by going into small dark places like (possibly) ears, eyes, and trunks of elephants. But will they come out when disturbed at night and will it be enough to scare off the elephants? I hope someone takes on this 'final' challenge.

Bees and Elephants: the Buzz about Beehive Fences

Kylie M. Butler (MSP, MEnv)

Author's note: I would like to clarify that the opinions expressed here are mine, and do not necessarily reflect the opinions of those within collaborating organisations.

It was genuinely lovely to be asked to write a piece for this magazine, as the perspective I come from differs from most other authors and members of the audience. My experience with bees is via an unconventional path: that of elephant conservation. For over four years I led a research project in a remote village of Sri Lanka, looking at whether beehives fences could help protect families from wild elephants. I'm grateful for the insight I was allowed into the magical world of honeybees. But I won't insult anyone (or embarrass myself) by pretending to have a wealth of knowledge about beekeeping. Instead, I'm enthused about the opportunity to discuss some of the things I learned and challenges I faced, with more openness than is encouraged in the world of academia.

A link between honey bees and elephant conservation can seem a stretch, and perhaps it is. Put very simply, the premise is this: The survival of wild elephant populations is threatened by negative interactions between humans and elephants (termed human-elephant conflict or HEC). Crop-raiding, where elephants leave the safety of their 'natural habitats' to enter farms or villages in search of food (i.e., crops), is a major HEC challenge. Research has shown that elephants dislike and avoid bees, at least in some contexts. So, if honeybees can be utilised to 'scare' elephants away from crops, negative human-elephant interactions should decrease and local support for elephant conservation should increase.

The use of honey bees as an elephant deterrent, is a concept that has attracted many supporters and many critics. It's important to remember that no-one (at least that I know of) is suggesting that bee deterrents are the sole solution to HEC, although some critics have insinuated this (including a keynote speaker at a conference I once presented at). Rather, the idea is that bee deterrents are included in a 'toolbox' or 'suite' of mitigation strategies, that can be implemented independently or concurrently depending on local contexts.

Blind support for honeybee deterrents has also been problematic. I've seen many journalists, conservationists and researchers reporting incredible successes of honeybee deterrents with little evidence. Unwarranted positive reviews are not conducive to helping elephant or human communities affected by HEC (or the researchers trying to make balanced assessments!). And they leave our magical honeybees with an insurmountable task.

But let me go back to the beginning. What is a beehive fence? How did I find myself working in a remote village in Sri Lanka, building fences and introducing beekeeping with ten farming families? And did the bees convince the elephants to stay away?

What is a beehive fence?

The beehive fence was developed in the early 2000's after researchers from Save the Elephants (STE) in Kenya discovered the African elephants avoided resting under trees containing beehives. Following this discovery, Dr. Lucy King conducted a series of experiments, where audio of disturbed honeybees was played to elephant families who were resting under trees. Upon hearing the audio, most elephants would flee from the perceived presence of bees, and vocalised warnings about bees to nearby elephants: behaviours which indicate that African elephants see bees as threats.

In the communities adjacent to where these experiments were conducted, Kenyan farmers were experiencing serious problems with HEC. Elephants would leave the human-imposed boundaries of National Parks to enter villages and cause havoc: eating and trampling crops, damaging houses, and presenting safety concerns for people as they moved through their community.

Throughout locations such as described above, numerous HEC mitigation strategies, from large-scale government interventions to small-scale farm-based methods, have been trialled with varying levels of success. Examples of tested methods are hugely diverse: from electric fencing and translocating elephants, to banging on pots and pans, and shining bright torches.

In the last decade, there has been a trend towards promoting "eco-friendly" or "natural" deterrents. These methods aim to utilise locally sourced materials, be 'harmonious' with local environments, minimise harm to elephants, and reduce costs. Ideally, they should be strategies that communities can manage independently, but ongoing assistance from external NGO's is almost always required. Examples of "eco-deterrents" include planting crops that are unpalatable to elephants, or using chilis on fences or in dung briquettes that are burned along farm boundaries.

Based on the observed avoidance behaviour of elephants towards bees, Dr. Lucy King (Save the Elephants) wondered if bees could be added to this toolbox of "eco-friendly" deterrents. Elephants are notoriously clever and often find ways to overcome mitigation strategies or learn when something is an annoyance rather than a danger. This is especially so if a high value reward, such as tasty crops, is the trade-off. Even though the avoidance reaction to bee sounds was strong, it was thought that the sound of bees alone would not suffice. Elephants would likely learn that the sound represented no actual threat to them.

So how to use bees as an "eco-friendly" deterrent that would have more than just a novelty effect? Could live bees somehow be used? Would people be open to keeping bees on their farms, and perhaps

see multiple benefits through honey production, pollination services, and keeping elephants away from crops? The beehive fence was born.

Put simply, a bee hive fence is a series of beehives that surround an area, usually a small crop plot or garden, that needs protection from elephants. Beehives are hung between posts at approximately 10-m intervals and attached to neighbouring beehives with strong wire. The idea is that if an elephant attempts to enter the crop plot by walking in between two beehives, they will hit the wire and cause the beehives to swing. The movement of the hives will disturb the colonies inside, and the bees will exit the hives and swarm at the elephants. Although elephants are famously thick-skinned, bees are attracted to the warm, moist crevices of their ears, eyes, mouths, and trunks. The presence of bees flying near (or even into!) these sensitive areas is likely to elicit a flight response. Furthermore, any stings incurred – while not causing lasting harm, would reinforce a negative consequence of proximity to bees increasing the likelihood that elephants would learn to stay away.

Dr. King initiated a pilot beehive fence trial in northern Kenya that yielded positive results. A more permanent beehive fence site was established adjacent to Tsavo East National Park, another area of high HEC, and for many years now farmers using beehive fences have experienced significantly less crop raiding than neighbouring farmers.

Over time, the fence design has been tweaked to better suit local conditions. The original traditional log hives have been replaced by Kenyan Top-Bar hives, making beekeeping a lot easier, and a honey processing centre has been established. There is also a permanent research station in the community, and ongoing support is available for beekeeping and fence maintenance. Excited by the promise shown at these sites, beehive fence trials began in other African countries.

Top: the author and Lelantha by his bee hive fence; above: the author and Supan fixing our first fence.

How did I end up in Sri Lanka?

Following success stories in Africa, questions were raised about the potential of beehive fencing as an elephant deterrent in Asian locations experiencing similar HEC problems. In India and Sri Lanka especially, crop-raiding incidents were increasing, as were reports of injuries and deaths to both people and elephants. Similar to the African situation, impacts of HEC disproportionately fall upon poorer, more rural families who often feel unsupported or forgotten by governments, and are looking for mitigation methods they can implement themselves.

As manager of Save the Elephant's 'Elephants and Bees' program, Dr. King received numerous enquiries about whether beehive fencing would work to reduce crop-raiding in Asia, but the answers were unknown. Although there existed many similarities in the HEC situations: elephants wandering out of National Park boundaries to enter farming communities and consume or trample crops, there also existed differences. Most notably, a different species of elephant and a different species of bees. This latter point raised the most concerns.

The African honeybee (*Apis mellifera scutellata*) is known for aggressively defending their hives, swarming and chasing offenders, and eliciting painful stings. The Asian honeybee (*Apis cerana*) is a smaller, more docile species and honestly, a delight to work with. As a novice beekeeper, I was comfortable inspecting hives with bare hands and no more than a face net for protection. However, it was still possible that upon disturbance, their defensive behaviours would present enough of a threat to cause elephants to flee. And there was only one way to find out.

I had previously interned with Save the Elephants and Dr. King back in 2011, assisting with the audio playback experiments among other tasks. The three months I spent (comfortably) camped in Samburu National

Reserve remain three of the best months of my life: immersing myself in nature and learning from the incredibly talented Kenyan conservationists and researchers about the wildlife and ecosystems of the park. I was also fascinated by Dr. King's bee hive fence projects and the complex relationships between humans and wildlife in nearby communities. When the opportunity arose to lead a bee hive fence trial in Sri Lanka, as part of my postgraduate studies with the University of Newcastle (Australia) and under the supervision and guidance of Save the Elephants and Dr. King, I jumped at the chance.

On a recce trip to Sri Lanka, Dr. King and I visited several farming communities where HEC was prevalent. Crops and fruits highly palatable to elephants, such as rice and bananas, were commonly grown and families were reliant on these crops for subsistence. Crop plots and fruit or vegetable gardens were interspersed throughout villages, with little separation from modest family homes. Elephants bore the scars of projectiles thrown or shot by humans to scare them away, and farms and homes bore the scars of elephant-induced destruction.

One area in central Sri Lanka, just outside Wasgamuwa National Park, stood out as an appropriate site for a bee hive fence trial. A local NGO seemed interested in collaborating with us, and so plans were made for me to live in between Sri Lanka and Melbourne for the next four years where I would establish and monitor a beehive fence trial, study HEC patterns, and explore whether or not the Asian honeybees could be part of a solution for a more peaceful human-elephant co-existence.

Top: hanging new occupied hives on the fence; above: Mr. Guneris by his BHF.

What did the Sri Lanka bee hive fence project look like?

The beehive fence trial was established in Dewagiriya, a small community of around forty households. With few exceptions, families rely on rice paddy farming for food and to make a small income. Crop plots are spread throughout the village, adjacent to houses, and most families also have a small garden with fruits and vegetables.

Wasgamuwa National Park, which is home to more than 400 elephants, is only 10km from Dewagiriya. Elephants frequently leave park boundaries (despite electric fencing), hang out in forest areas on the periphery of villages, and drink from or bathe in local water tanks (reservoirs). As the sun dips down, elephants move from the forest to the villages. Here they cause havoc: trampling plants, gorging on crops, damaging houses, and charging at people who try to scare them away.

In Dewagiriya, farmers report encountering elephants all year round, often multiple times per week. Some households have given up farming because of the threats elephant pose, but there are few alternative income-generating options. During the paddy season, many farmers stay awake all night to guard their crops. People shine bright torches, shout, and bang on pots or throw government-issued firecrackers at elephants to scare them away. These methods often work but not before damage has been incurred and they require people to get dangerously close to the elephants. Many people report the big bull elephants have "no fear" and will run aggressively towards them instead of away.

I was introduced to Dewagiriya village through a local contact named Siriya who was (at the time) employed by the local NGO. Siriya's wife was from Dewagiriya and her family still lived there. Despite being a foreign, female student with no farming experience or Sinhalese language skills, I felt warmly welcomed. We organised two community meetings, where people shared their experiences of living with elephants and I introduced the beehive fence concept.

No one had heard about using bees to deter elephants from farms, and almost no one had any experience with beekeeping, aside from a couple of families who had kept bees in clay pots. People were familiar with the famously aggressive Bambara honeybee (*Apis*

dorsata), either through encountering them in forest or through stories of traditional honey-hunters in the Vedda communities, and wisely gave this species a wide berth. Some people, especially the women, expressed a fear of bees. Most people doubted that the Asian honeybee could present a threat to elephants. However, they were interested in the footage of African elephants fleeing from bee sounds and the beehive fence design. And people were definitely interested in the prospect of fresh honey. There was a sense of a real need for support in protecting crops and gardens from elephants. Many people were keen to try a new mitigation technique, no matter how outlandish it sounded, especially if it might bring additional benefits of pollination services and liquid gold.

The community nominated ten households to participate in the trial, based on the levels of crop-raiding experienced but also who needed extra support. My only additional criteria were that at least one adult in each participating household be interested and willing to learn basic beekeeping skills and assisting with fence building and maintenance. This posed the first of several headbuts with the academic system where pressure was put for a more "scientific" experimental design and random allocation of beehive fences. But my view was that if we were legitimately aiming to introduce something that would benefit the community and have a lifespan beyond a postgraduate study, the preferences of the community came first.

Over the ten months, we built ten beehive fences strategically encircling homes and home gardens where small amounts of rice, mung beans, fruits and vegetables were all grown at different times of the year. We used the 10-frame Langstroth hives, with a single honey super on top, on recommendation from a local beekeeping expert. We also selected ten comparable unfenced homes for comparison (control) data. We ran workshops with local and international beekeepers and also provided one-on-one beekeeping support. For the next four years, we monitored the experimental and control sites, collecting 'elephant' data (elephant approaches and incursions, additional methods used to keep elephants away, and damage incurred) and 'beehive fence' data (hive occupations and abscondments, fence maintenance requirements, other hive issues, and honey production).

Top: example of bee hive on a fence; middle: FHF to show the spacing of hives; bottom: whilst the hives can move in the wind or when touched by an elephant, they need very strong supports.

Were the bee hive fences successful?

This is a loaded question, with no simple answer. A lot depends on perspective and how one identifies "success" and the priorities of the project.

There were certainly some promising signs. From an academic perspective, the magical p-value of < 0.05 was achieved. Results showed significantly less elephant "breakthroughs" at beehive fenced gardens compared to gardens without beehive fences. The effectiveness of the deterrent also appeared to increase when fences contained higher numbers of occupied hives. On paper, at least, the beehive fences were working. But while these figures are nice to present in theses and funding reports, what does it mean on the ground?

There are many factors beyond a statistically significant difference in elephant visits and crop-raids between experimental and control sites that should be considered when determining whether beehive fencing is a practical mitigation strategy for communities affected by HEC. We looked not only at fence success in terms of deterring elephants but cost-effectiveness and community perceptions of beehive fencing. Below I discuss a few key things that I believe are important to making a holistic evaluation.

Did the benefits outweigh the challenges?

In short, no. From the early stages, the Sri Lankan beehive fence trial was fraught with challenges. This is to be expected with any technique attempting to address such a complex issue, but many challenges were ongoing and unresolved. Challenges related to beekeeping, community involvement, and the level of meaningful protection offered; with issues relating to time, money, expectations, and the need for (and lack of) ongoing external support for the community.

Beekeeping challenges

We encountered many practical challenges with beekeeping in Dewagiriya.

Initially, we had hoped to attract natural colonies to the beehive fence hives, as had been done in Kenya. To attract bees, we applied wax collected from naturally occurring colonies to the hive entrances and 1-2 top bars of multiple hives. On advice from Sri

Top: Mr. Somathilaka watching as his bees are transferred into hive; middle: the author and the Somathilaka family at their BHF; bottom: Supun and Mr. Sobana insepcting the hives.

Lankan beekeepers, we also strategically placed traditional log hives and clay pots in gardens hoping we could transfer bees attracted to these homes. But few natural colonies took up residence. In fact, throughout the entire 4-year trial, we had only 23 naturally occurring colonies inhabiting our hives.

To test the deterrent effect of bees, and tease apart whether any reductions in elephant activity were due to more than simply the fence structure, it was imperative that each fence had some occupied hives, so the decision was made to source colonies from outside the village. We were able to purchase colonies from Colombo and Kandy, and eventually bought 74 colonies over three introduction periods. This added considerable costs to fence establishment. There were also wait times for colonies to become available and it was a logistical challenge to transport the bees from the city to the village.

Other beekeeping challenges included frequent absconding and low honey production. There were periods of unseasonably low rainfall during our project, which didn't help hive health or food availability for our bees. Colonies were often weak, 63 colonies absconded, and only around 7 kg of honey was collected. Four families did not harvest any honey from their fences at all. This led to questions about how many colonies the local area could reasonably support and had we already exceeded a saturation point? If so, regardless of how successful the fences were at deterring elephants, it would be difficult – if not impossible – to expand the technique to protect more homes or larger crop plots. As it stood, we never achieved targets of 50% hive occupation per fence, so were already operating with less hive occupations than desired.

Fence maintenance and pests were other ongoing challenges. While it was important that the hives would swing if disturbed, Langstroth hives are not designed to be suspended from wires and it was difficult to secure the hive parts. We originally tied the parts together with coconut rope, a cheap material readily available in the village, but eventually imported "z" clips from Australia. To minimise pests, it was important that fence posts were straight, the grass underneath the hives was short, and shade roofs were not touching the hives. But households often failed to keep up with these basic tasks and inevitably hives would become home to mice, snakes, ants, and lizards. The idea was that households would take responsibility for fence maintenance, and we would support where necessary, but these tasks were often left to myself or my field team.

Overall expense of implementing and maintaining a beehive fence

A key "selling" point of the beehive fence mitigation strategy, is that it is relatively low-cost and therefore something that communities should be able to implement and maintain with little outside assistance. Relatively speaking, it is low-cost, especially when compared to other methods such as electric fencing. But crop-raiding disproportionately impacts some of the poorest communities in the countries where HEC occurs.

In Dewagiriya, the average cost of a beehive fence including hives, fence materials (posts, wire, nails), building equipment (hammers, diggers etc.), protective equipment (face nets, gloves, smokers etc), and purchasing colonies was USD 905. The average annual household income was USD 747. Even if an external agency financially supported the establishment of beehive fences, ongoing costs of replacing hive parts, fence posts, or purchasing colonies puts expenses out of reach for most families. It's often suggested that honey can help offset start-up or ongoing costs, but in Dewagiriya honey production was too low to have any financial benefit.

From a practical point of view, being a relatively low-cost method means little if those relative costs are still unaffordable for the community they are intended to help.

Did the beehive fences offer a meaningful level of protection for families?

That elephants entered gardens surrounded by beehive fences significantly less than gardens *not* surrounded by beehive fences is, of course, fantastic. But there were still numerous times (43% of approaches) where elephants did break through the beehive fence perimeter. In my opinion, this is not enough to call the mitigation technique successful. Elephants can do a considerable amount of damage in even just one crop-raiding event. It would take a much higher level of protection before families could feel confident to rely on a beehive fence to protect their homes and gardens, without having to still guard from watchtowers and have other deterrents at the ready. Combining beehive fences with other deterrent techniques is one way to combat this but it still needs to be a combination that works to reduce the effort required by the farmers.

How did the community feel about the beehive fence mitigation method?

In my thesis, I reported that farmer motivation fluctuated throughout the beehive fence trial. There was a lot of initial enthusiasm. We worked with members of all participating households to design the layout of fences at their properties and to build the fences. Beekeeping workshops seemed popular and were well-attended, including by community members who did not have a beehive fence. But during times

Above left: inspecting combs from one of our fence hives. NB - top bars used, bees building their comb naturally; left: Mr. Somathilaka's daughter showing off the first bee hive; above: elephant damage to a house.

of low hive occupations, when the farming seasons were busiest, or when fences had been broken through repeatedly, it was (understandably) difficult to encourage households to look after their fences and spend time on small repairs.

Two families dropped out of the trial partway through: one family was scared of the bees on their property (they did have a particularly aggressive colony but overall felt unable to manage beekeeping) and the other did not participate in any beekeeping or fence maintenance activities regardless of how often we offered support. At the other end of the spectrum, there were three super keen households, including one farmer who fell so in love with his bees we had to remind him *NOT* to check on them too often! The participation and motivation of the other five households ebbed and flowed, depending on their other priorities and how often we were able to work with them.

Although I framed this around 'farmer motivation' in my write-up, on reflection I wonder whether this was the appropriate lens. In part, I see challenges around motivation as relating to failures on our part to relay realistic expectations and to understand people's daily lives and desire to participate in beekeeping.

In the beginning, although I thought I had done my best to explain that we did not know if beehive fences would be helpful in Sri Lanka, people took the fact that I had travelled from across the world for the project, alongside the video footage of African elephants running from bees and stories of beehive fences in Kenya, to mean that it was likely to work. And although not intentional, I don't think it was conveyed how challenging beekeeping could be, or how

much time and patience it might take to generate honey and pollination benefits. After the initial excitement of setting up the trial and introducing colonies was over, there was a lull and for many people the fences became just another chore.

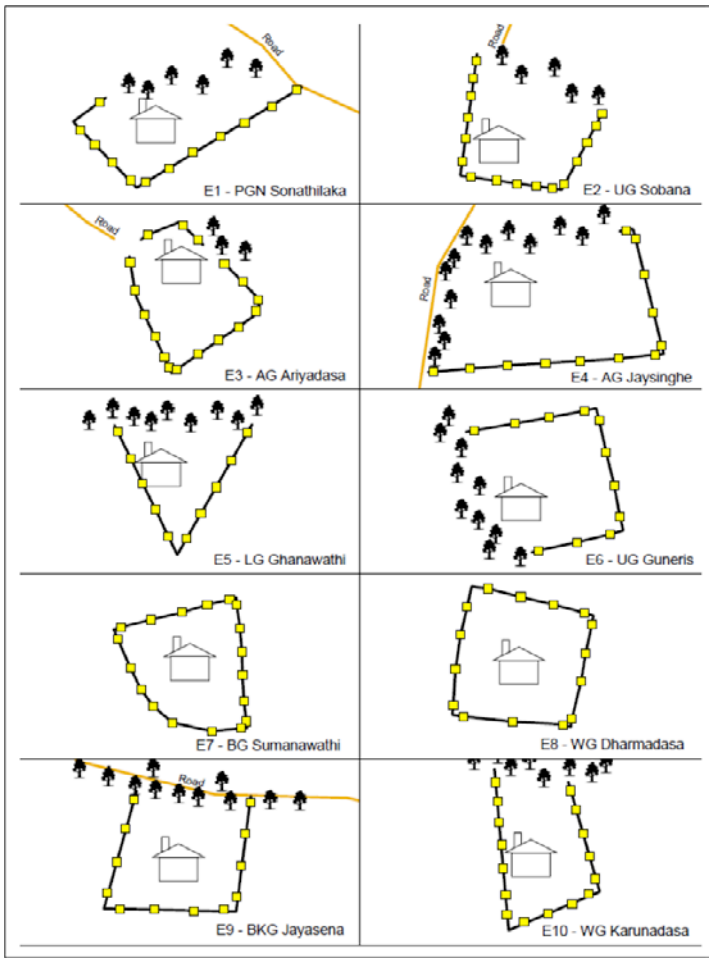
The lifespan of a postgraduate program is not conducive to facilitating a genuine, participatory, community-based program. It takes time to build relationships and, for me, these relationships were built over cups of sugary black tea, over time spent weaving grass shade roofs for the hives or sweating under the hot Sri Lankan sun digging holes for fence posts together. Friendships were formed through listening to stories about people's lives and families and sharing stories about my own life.

It was only once these connections were formed, that people began to feel comfortable sharing what they didn't like about the fences, whether they thought they were helpful, and how they were finding beekeeping. By this stage we were already multiple years into the trial. Interestingly, the formality of the 'informal' semi-structured interviews I conducted as part of my analysis, elicited overwhelmingly positive feedback about beehive fences: most people said they thought the fences were helping, they enjoyed beekeeping, and wanted to continue with the fences. But I believe Sri Lankan village tea is a truth elixir like no other, and it was at these times when people shared that they thought elephants had no fear of the fences, that the bees were too 'friendly', and that they couldn't afford the time or money to continue using their fences alone.

In a community with no prior experience of beekeeping, introducing a mitigation technique reliant upon keeping bees within the constraints of a postgraduate timeframe, was perhaps overly ambitious. It's my opinion, that taking things back to basics and starting a beekeeping project (nothing to do with elephants!) as a first step would have been beneficial. It would have provided opportunity to teach important beekeeping skills, to learn about whether the local natural environment was amenable to beekeeping and what challenges might need to be addressed, and for participants to decide if beekeeping was something they would like to practice ongoing. *IF* all those things were given a tick, it would have been a more natural, and potentially more successful, progression to trialling the beehive fences.

What happened to the beehive fence site: was it the eco-friendly, community-based technique we had hoped for?

Unfortunately, there are no longer any bee hive fences in Dewagiriya. It became clear over the four-year trial that the bee hive fences would not be sustainable in the longer term, without intensive ongoing support: for maintenance, beekeeping, and financial costs. We had partnered with a local NGO, in the hope that that relationship would support the Dewagiriya community and beehive fence program beyond our in-field involvement. But sadly, that did not work out. From a personal perspective, I did not find we were ethically aligned in terms of what meaningful community engagement and support entailed. Beyond the first year, I saw little genuine effort to engage with the project and multiple community members expressed concern about whether any support would be available once my field team left. We took a number of steps prior to completion of our final field season, to give the households who wanted to continue using their fences the best chance of success. Our team helped replace any posts, hive parts or roofs that weren't up-to-scratch; left beekeeping equipment (face nets, smokers, gloves etc.) with



Examples of fences and number of hives used.

community leaders; invited members of the local NGO to refresh on beekeeping and fence maintenance techniques and left extensive handover documents with them. We also made it clear that the participating families owned their beehives and if they decided not to continue with the fences but wanted to continue beekeeping, we were more than happy for them to do so. At that stage, four households had seemed keen to keep their fences and another two wanted to continue beekeeping with a couple of hives.

I revisited Dewagiriya in January 2020, approximately 18 months since our field team had left. And what a joy it was to be back: the beautiful forested landscape and paddy fields, the birds and lizards, the distinctive smoky aroma coming from home kitchens. And especially the warm smiles of old friends. After enquiring after each other's families and (from me) how the farms were going, talk turned to bees and beehive fences. I was told that no one was using their fences anymore and that the local NGO had visited only to take some beehives away. Problems with elephants persisted. A few of the farmers were still keeping active colonies and were getting small amounts of honey from time to time.

And so, life in Dewagiriya village goes on: not much different from before a slightly out-there student from Australia dropped in to talk about elephants and bees.

Would I recommend bee hive fencing? I think studies show it is working well in some African locations, particularly the Tsavo 'Elephants and Bees' research site began. I believe further investigation could be warranted in Asia, but best placed in a community where beekeeping was already practiced, with more time spent building relationships and listening to what the community really want in terms of helping live more peacefully alongside elephants.

The Charge of the Drone Brigade
With apologies to Alfred Lord Tennyson

Jeremy Barnes, USA

Half a league, half a league,
Half a league onward.
Into the DCA
Flew the six hundred.
"Forward, the Drone Brigade,
A flight for the future," they said.
Into the DCA
Flew the six hundred.

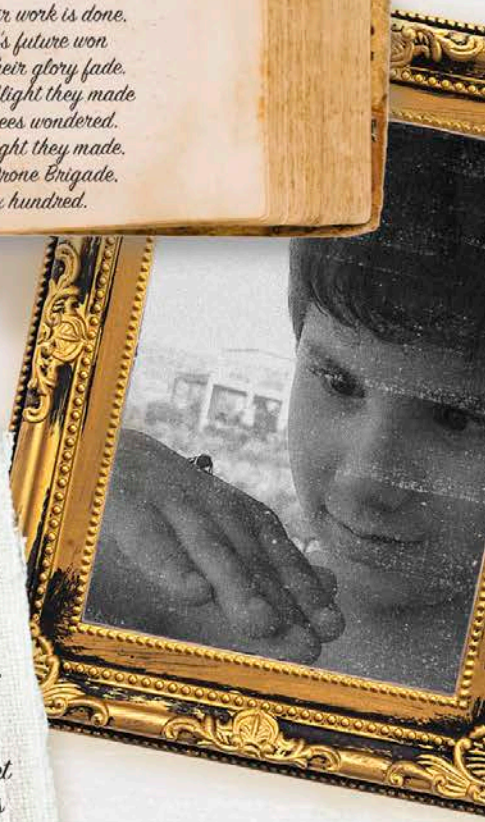
Forward the Drone Brigade.
Was there a drone delayed?
Even the young one's sure
They were their sisters' future.
Theirs not to wail and cry.
Theirs not to reason why.
Theirs but to mate and die.
Into the DCA
Flew the six hundred.

Drones to the left of them,
Drones to the right of them,
Rivals in front of them
Shimmied and faltered.
No queen would be denied
Nowhere to shirk or hide.
Boldly they flew, and well,
Drawn by the mating smell
Upward with every breath
Into the jaws of death,
Flew the six hundred.

Drones to the right of them,
Rivals in front of them
Shimmied and faltered.
No queen would be denied
Nowhere to shirk or hide.
Boldly they flew, and well,
Drawn by the mating smell
Upward with every breath
Into the jaws of death,
Flew the six hundred.

Flashed all their lances fair,
Flashed as they laid them bare
Sabring the queen bees there
While all the hive wondered.
High in the afternoon smoke
'Talians and Russians alike
Right through the line they broke
Escaping the saber stroke ...
... except a few drones who,
Shattered and sundered,
Were no longer part of
The dauntless six hundred.

Now that their work is done,
The colony's future won
Ne'er shall their glory fade.
Oh, the wild flight they made
As worker bees wondered.
Honor the flight they made,
Honor the Drone Brigade,
Noble six hundred.



The Drones
Too often maligned by beekeepers who view them only for their ability to mate with the queens - and whose production in the hive is viewed as costly in regard to the colony's resources. Thus, worker foundation is used in the hive to suppress the bees instinct to produce the right balance of drones in the colony. Yet drones perform many useful roles including their contribution to the climate within in the hive and, in times of shortage of food, it is their brood that can save the colony from starvation. Ruthlessly ripped from their cells as a natural control of varroa, they deserve a more friendly regard by beekeepers and full understanding of why they are produced in such numbers.

Learning from the Bees

Nicola Bradbear, Director at Bees for Development, UK

This two-day conference was held in early April in Sheepdrove, a beautiful organic farm venue in Berkshire, southern England. The organisers had intended a smaller, more local gathering – however they gave way to the enormous interest shown, with around 200 people, travelling even from as far as Tasmania. The Conference was organised by the Natural Beekeeping Trust: Jonathan Powell, Heidi Herman, Simon Kellum, and Joanna Powell. The Conference Manifesto included the following aspirations:

Learning from the Bees Conference Manifesto

- Beekeeping must be guided by sound principles of stewardship; of the bees and the land they subsist on. We advocate responsible, ecological bee guardianship. We seek to wrest control of the economic narrative from both agribusiness interests and the beekeepers who support unsustainable agricultural practices.
- For enduring change, the bees' prosperity must become the guiding principle for all our interactions with the natural world.
- We aim for positive support of wild bee colonies by improving their habitat, distribution and diversity of food sources in the interest of building strong, locally adapted genotypes. These colonies would be unconstrained by the very narrow aims of human selection - primarily focussed on honey production and temperament - which have weakened stocks to the point where in many regions bees now require human interventions to keep alive.
- The severe degradation of the natural world over decades and the alarming decline of insect populations must be our human society's chief concern in order to safeguard all life on earth. Helping people understand how critical insects are to their individual lives is of prime importance.
- Priority must be accorded to organic/biodynamic, systemic chemical-free farming practice as well as reforestation and large-scale conservation projects aimed at enhancing food supplies for all pollinators. Appropriate co-operations with NGOs and other relevant bodies will be sought.
- By bringing together for the first-time bee advocates of many different disciplines and from diverse regions of the world, the conference will lay the foundation for effective networking and strategic alliances to decisively move forward concerted action on behalf of the bees and other pollinators.

This is an excerpt - read the whole manifesto at www.learningfromthebees.org/manifesto

Top right: Learning from the Bees logo
Above right: left to right, Simon Kellam, Matt Sommerville, Ingo Scholler and Michiel Verspuij haul up a one of Matt's tree hives at the entrance to the Conference venue © Paul Honigmann.

This Conference delivered what it promised, i.e., learning from bees, and their lesson is that, as in many other world regions, populations of wild-living honey bee colonies are present, living successfully in nature in Europe and North America, wherever people are taking care to look for them.

We can see that populations of honey bees do not need human interventions to survive; this must surely inform our beekeeping practise. We can appreciate that when possible, honey bees nest, well insulated from heat and cold, in tree cavities. Safe within these protected cavities they build their natural nest, around which they use abundant propolis, and of course they swarm. They do not need human intervention or medication to survive, and apparently to thrive.

If you came to the Conference hoping to receive a simple prescription for how to do beekeeping, you may have left disappointed! However the research and talks presented, summarised here, will have much informed your thinking around bees and how you want to live with them.

Talks presented

Left: Dr Jovana Bila Dubaić; right: Matt Somerville of Bee Kind Hives, UK © Paul Honigmann.

1. Quoting a wide range of scholars from Latin author Gaius Julius Hyginus to American novelist Wendell Berry, Jeremy Naydler encouraged us to step back, to align with nature and enable bees to find their own way towards healing and health. What gifts, if any, do we humans really bring to bees? Jeremy noted the number of apps that now exist for beekeepers: how do these help? All they can do is collect data about a honey bee colony – yet what else is there to be measured? Can they really assess the well-being of the colony? Surely collecting data is only part of our caring relationship with bees, and what may be the effect of the collection device - there is plenty of research evidence that bees can detect electric fields. Jeremy showed a picture of recently invented robot machinery that can manage frame hives of bees: surely an indication that we are falling away from care and from our humanity. If robots can do beekeeping, then why not just go the final step – as is already happening, and create a honey-identical product in a factory? Jeremy considered how much of the earth we must set aside to enable nature to recover: Edward Wilson has suggested it should be half the earth - is this the way we want to go, with half of the earth rewilded, and the other half fully technologized? We surely do not want to remove ourselves from nature - to quote Goethe '*wonder is the summit of human attainment*'. Jeremy's conclusion was that bees have a healing effect and fully appreciate the care and attention we give them: respectful care for bees can bring transforming and healing effects for the world.

2. Dr Jovana Bila Dubaić from the University of Belgrade described her wonderful work mapping free-living honey bee colonies across Belgrade city. She recommended citizen science as the most effective way to discover and monitor free-living colonies, and presented an amazing map of the city and the large numbers of free-living honey bee colonies she has recorded - where there are blank areas on the map, it is not that they are without honey bees, simply that nobody is living there to notice them! This presentation would inspire anybody living in Europe to assume that their own area must have similarly high numbers of free-living honey bee colonies. Collecting this data on honey bee colonies has enabled Jovana to hear many unpredictable stories of peoples' lives, and she gave interesting anecdotes of people's appreciation of the bees they had begun to notice. One of the most frequent places for wild living honey bee colonies to find home is in the wooden window shutter boxes that are a common feature of Belgrade houses. An interesting research finding is that the wild colonies contain genetic haplotypes no longer found in managed colonies – research data shows that managed honey bees in North and South Serbia are similar, whereas the wild living bees are most definitely not. Therefore, Belgrade's wild honey bees are a genetic reservoir with greater genetic diversity than present within managed honey bee colonies.

3. What unites Matt Somerville from UK, Michiel Verspuij from Ireland, and Michael Thiele from USA, is that in recent years, each in their home region, has pioneered beekeeping in trees, termed *arboreal apiculture*. Readers of *Bees for Development Journal* know that beekeeping in trees is the norm in many nations – however in recent times it has not been so in western Europe and North America, and the work of these three pioneers is enabling many more people to become close to honey bees and to understand their environmental role. All of these three experts are keen for younger generations of bee enthusiasts to continue this work.

4. Yossi Aud from Israel described his initiative using beekeeping as a natural way to build bridges between Israeli and Palestinian Jews, and other communities in conflict. He mainly focuses on supporting women in traditional communities and described his beekeeping work as a wonderful way to create personal, family, community and social resilience.

5. Gareth John provided a thoughtful talk, arguing that rather than participating in nature, our aim is increasingly to control and dominate nature and, echoing the first speaker, lamented our increasingly mechanistic and reductionist approach – as if all we have to do is to understand '*how the cogs work*'. But nature is not like this. And when it comes to bees, in English at least, we are not helped by our limited vocabulary – for example a 'colony' of honey bees is one single entity, while the term superorganism does not quite capture it either. For this reason, Gareth prefers to use the German word *Bien* – to describe the whole organism, the bees, the comb, and everything else that fills their nest. The *Bien* is porous, and permeable to the surrounding landscape, as foragers return with water, pollen, nectar and propolis. Gareth went on to give examples of unexpected honey bee behaviours that become fully explicable when we carefully and closely observe and consider: his message being that rather than interrogating, we must respect and learn from nature.

6. Following on well from Gareth's plea to respect nature, Helen Leaf gave a wondrous talk describing her careful and purposeful observation and appreciation of woodland. She showed us the forest kit that she takes into the woods, enabling her to most carefully listen and witness woodland life, respectfully and non-intrusively. Using this approach Helen has discovered many more honey bee colonies than would a casual observer – if she sees a honey bee on the bark of a tree, it is a signal to her that bees will be nesting in that tree

or another nearby, and patiently she finds them. Helen considers clearings between trees as 'paths of plenty' – rich habitat for so many species including the fungi, insects, mammals and birds that she quietly observes and records.

7. Mārcis Bauze-Krastiņš is an artist in Latvia, working to bring attention to the nation's beautiful log hives and forests. He has designed a new metal fixing (see picture below), making it easier to place hives in trees. Mārcis and his colleague Marvis brought with them beautiful examples of Latvian log hives - they currently have a large exhibition in Riga and their motto is *Let us all plant trees and keep bees in this coming spring*!

8. Alexandra Valentine from the University of Galway gave an interesting talk *Thinking Outside The Box*. Alexandra has identified populations of *Apis mellifera mellifera* amongst free-living bees in Ireland: starting in 2018

Tree hive from Latvia - with metal fixing for easy attachment.

when 108 nests were identified, now 400 nesting sites are recorded. Alex's research objectives are to find out how many wild colonies there are; to know more about the genetic identity of Irish *Apis mellifera mellifera*; and to work out how Irish honey bee populations are related to one another. Alex hopes her research will help to protect this uniquely adapted subspecies across the island of Ireland.

9. Peter Kindersley, owner of this beautiful farm venue, described his involvement with campaigning against pesticides and, in particular, the *Stand By Bees* campaign www.standbybees.co.uk. The UK Govt has this year issued another emergency authorisation for the use of banned neonicotinoid pesticides to treat sugar beet in 2023. This marks the third year when the UK Govt has acted against the advice of its own Expert Committee on Pesticides, who again reiterated that:

> "The potential adverse effects to honey bees and other pollinators outweigh the likely benefits".

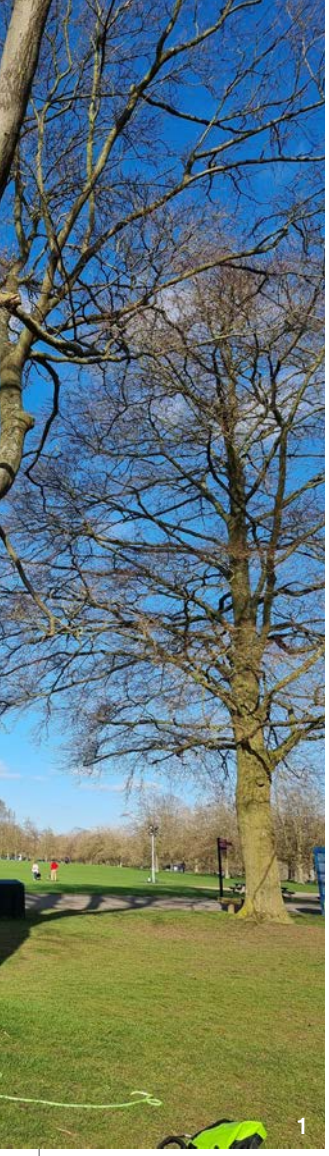
The UK has historically earned a reputation for strong environmental standards - yet once again is again falling behind."

10. Jonathan Powell gave a brief summary of recent centuries of beekeeping. If we assume that free-living colonies are living the way they most want to live, then this way of life must be the *gold standard*. Thus, when we look at beehives, we should be thinking how they support the life of the bees *before* their convenience for the beekeeper. Jonathan described his own beekeeping journey, from using UK national frame hives, via golden hives, Warré and sun hives, and now content to know about and appreciate free-living wild honey bee colonies. Jonathan also quoted from Wendell Berry:

> "If we will have the wisdom to survive, to stand like slow-growing trees on a ruined place, renewing, enriching it, if we will make our seasons welcome here, asking not too much of earth or heaven, then a long time after we are dead the lives our lives prepare will live here, their houses strongly placed upon the valley sides. The river will run clear, as we never knew it, and over it, birdsong like a canopy."

11. Next Johannes Wirz spoke engagingly, first about queens: we know that the queen is not the leader of the colony, but as we see from a swarm without a queen, she somehow holds the colony together. Johannes talked about how the brood nest is always a sphere and if we are using frame hives, then the frame should be deep enough to properly accommodate this spherical shape - so deep frames are always going to be better for bees than a rectangular frame that is wider horizontally than it is deep. Similarly, bees

own-built comb is very different from the comb we force them to build on wide, wired foundation, which is fixed to the sides of the frame - free edges of comb are important because the queen needs to lay eggs on both sides of the comb, and she needs to be able to go easily around to the other side of the comb. Combs hanging freely also have resonance - something else that is lost in a wide, wired, rectangular and fixed frame. Roundness is very important in the life of the bee - a colony's aim all the time is for a spherical shaped nest. A colony that makes its own queen will always be much better than one with an introduced queen, because the original queen and her genetics are adapted to the locality. Bees inspire us to work together, and without anyone having overall control. Of course, the colony shows us that some queen presence is needed, but important decisions should not be made alone. As Tom Seeley has shown us - in the honey bee colony, every honest opinion makes a decision better, and similarly we humans should pay regard to every individual's opinion.



12. Filipe Salbany has been working with bees for fifty years, originally in southern Africa and now as the bee expert for Blenheim Estate in Oxfordshire - which has 12,500 acres of highly precious, ancient woodland. Filipe's lecture was emotional and packed with enthusiasm and interesting knowledge about wild-living bees – far more than can be summarised here! The history of Blenheim means that the woodland has been better protected than surrounding areas, and today it contains ancient forest with veteran trees - more than 850 oak trees aged between 300 and 1,000 years. Filipe spoke about his careful and passionate observation of 76 free-living honey bee colonies within this special woodland. Most of these nests are in tree cavities 23 - 25 metres above ground, and are hard to find in summer, though in spring - before leaves open on trees - they are easier to see. Filipe has been making careful observations of these wild-living honey bee colonies over many years, and the audience were privileged to see short films he has made of the life of these bees, for example of honey bees living on very old comb (contrary to what we often tell!) and of a colony shimmering to protect itself from hornets. Filipe spoke against moving honey bee colonies around without knowledge and with total disregard for the existing bee colonies that may be already established within that area. Filipe reminded us that we are living during the *United Nations Decade of Ecosystem Restoration* and urged everyone to take far more care of our precious environments.

13. Matt Somerville of Bee Kind Hives UK, and Michiel Verspuij of Boomtree Bees in Ireland gave the final talk. Matt and Michiel described their work to address loss of biodiversity by teaching a wider community - beyond beekeepers - about the important role of honey bees and their need for cavities of suitable sizes to build their nests. A well housed honey bee colony is of huge educational value and interest for many people, and Matt and Michiel are keen for more people to continue this work: there is huge demand from the wider population to be involved with caring for honey bees, and indeed all bees and wildlife.

14. Heidi Hermann gave an eloquent and moving conclusion to the lecture programme. After this there was opportunity to investigate the woodland area on this farm: of course, a tree-nesting honey bee colony was soon identified, to the great delight of everyone present! A perfect way to conclude the Conference.

1. Filipe Salbany demonstrated his arboreal skills; 2. Filipe with tree-climbing gear in Blenheim woodland; 3. An ancient oak in Blenheim woodland.

Learning from Bees: a Delegate from Holland

Deborah Richmond

With beautiful honey bee friends gathering at Matt Somerville log hive workshop post the Learning from the Bees conference. Our post party was at Blenheim palace with the ancient trees that host many wild hives. I learnt so much from the days together as a global community... what stood out:

- It takes two weeks for honey bees to recover after a hive is opened. A scientist has measured the sound of bees and the disharmony caused from a beekeeper entering their sanctuary.
- The Holland honey bee community has come together: the natural/ wild bee conservationists, the biodynamic community and the commercial beekeepers to work together to influence political decisions. This for me is amazing bridge building to bring about change. All love the bees and hold different perspectives and are listening to each other.
- More and more scientists are researching wild bees, looking at genetic diversity and understanding bees for their natural ways rather then as domesticated honey producers in square boxes. This is incredible as we have had insufficient data to influence change.
- Hearing many stories that beekeepers bees are dying without human intervention now. The different bee keeping communities and environmental organisations need to come together on this topic and explore the research available... it's time to go to the root causes, and not keep addressing the symptoms.
- The picture here is an ancient tree growing a new root from within to create a new tree. Never knew this is what they did. Wow!!

Thank you to the Natural Beekeeping Trust for once again bringing us together.

The Hardest Thing of All to See is What is Really There

Gareth John, Spring 2023

At the Learning from the Bees conference in the Netherlands, I spoke about how bees see the world. I talked about the relationship between the physical world and the inner worlds as reflected in the behaviour of the bee. Today, I want to talk about a practical question which is "how can we learn to see the natural world differently?". People ask this question because they feel they are missing something about the natural world but they are not quite sure how to see what they are missing. I was recently reading a book by a naturalist that contained the phrase "the hardest thing of all to see is what is really there". The writer was referring to the fact that it is easy to see something from a human perspective, but much more difficult to see from the perspective of the thing itself. I want to explore why this is and whether we can make it a little easier to see what is really there. When I say "see" you should take that to mean perceive, in the broadest sense of the term, using all our perceptions, and paying heed to our intuitions.

We express our perceptions and intuitions in thoughts and, in expressing those thoughts, we use words. So, one of the things we bump up against in attempting to see Nature, or the earth, differently is our use of words.

Words have embed within them cultural norms and particular ways of thinking. If we go back far enough in history, we find the language used to describe our relationship with Nature was participative. We participated in Nature and she participated in us. But she was in charge. Over time, our culture and the words we use have gradually shifted. The idea of participation in Nature has now gone. As a result, Nature has less agency, is less alive, is no longer in charge. In our minds she has become objectified and we stand above her, separate and dominant. As an example, look no further than the phrase "man conquers nature".

Hand in hand with the change in the way we use words, there has been a change in the way we think. Our thinking has become increasingly mechanistic, reductionist and linear. Everything is a machine, even ourselves. All we have to do is understand the cogs. But this way of thinking severely restricts our ability to see Nature in her own terms. Nature is not mechanistic, reductionist or linear. She is alive and vital. Her various elements are not cogs. Cogs are discrete and separate. Nature is not like this. In other words, the very way we think, and the very words we use to think, serve to obscure what is really there, and this is especially true with honey bees.

In what follows, I want to concentrate not on the individual bees but on the whole. For it seems to me that this is where things become interesting.

We all know that individual bees are part of a greater whole. But how do we conceive of that wholeness? It is often referred to as a colony. But is it really a colony? A penguin colony is a colony, in the sense of being a collection of individuals that come together in the breeding season to conserve warmth. The rest of the year they live separately. Bees have to be together all year round. They are quite different from a penguin colony.

Another description is social or communal. The corals in a reef are communal. They could live separately but do better together. By contrast, honeybees are obligated to live together. Queens, workers of different ages, drones and the comb itself are physically separable but must function together to form a viable whole. Bumble bees are quite different. Queen bumbles start each season as solitary individuals, before gradually building up a nest of daughters. Honey bees cannot do that.

At this point one might turn to another term: superorganism, a higher level of organisation that emerges from the lower level of its individual elements. The term fits neatly with the reductionist idea of different elements coming together for mutual benefit. It also introduces a handy element of hierarchy. It makes things simple.But, applied to bees, I wonder. Does it risk seeing the bees but missing the whole. I sometimes get that feeling when reading scientific books about bees. As I said, the very words we use are tricky. At the level of the whole, the Bee is a bit like the Cheshire Cat: there and yet not there. Evanescent, permeable.

This bothers our simple, binary way of thinking, where things either are or are not. Apart from the world of quantum physics, things don't have both an existence and a non-existence. But the rule that existence is discrete, on or off, bounded, permanent is a creation of our way of thinking. It is not a creation of Nature. The wind is none of these things.

The difficulty in conception that we have with bees is not helped by the fact that there is no word in English for the whole. I shall, therefore, borrow the German word Bien to refer to the whole organism, the bees, the comb and everything else that fills the hive. We see clearly that the various parts that make up the Bien - the bees, the comb - are separable and each has a discrete boundary. But consider this: where is the boundary that marks the edge of the whole, the edge of the Bien? Does the whole even have a boundary?

We know from the work of Günther Mancke that the comb built by the unconstrained Bien is in the shape of an egg. This is reflected in the Sun Hive. Does this egg shape mark the boundary of the Bien, the edge of the whole? Or is there more? If one uses projective geometry to model the egg shape, one discovers that the egg archetype is rather wonderful and ubiquitous. It occurs not just in eggs and the Bien but in plant buds. And even in the human heart. The geometric forms that give rise to the shape are rhythmic spirals. The geometry of these spirals is such that they have their origins in a plane that sits at infinity. So consider this: is the Bien -or the human heart- really just a local condensation of a rhythmic form whose boundary stretches to infinity?As an aside, I might say that the Sufis would have something to say about that. The connection between the heart and infinity being mediated by the rhythm of the breath.

Staying with bees, in contrast to the egg shape in the unfettered state, when the Bien is constrained within a borrowed shelter, such as a hollow tree or a hive, it conforms to the inner shape of that vessel. We realise that plasticity is a characteristic of the Bien. From the Bien's borrowed shelter individual bees fly out, as tentacles connecting with the landscape. They navigate using senses that humans do not posses. That landscape in turn penetrates the Bien. It is carried there by the bees as pollen, nectar, water, propolis, and fanned in as air. Within the shelter, the spaces between and around the combs are filled with air and permeated with scent and warmth. These internal spaces are integral to the organism, they allow the Bien to be porous, to breathe. The

Wild bees' nest in Blenheim Wood. (Deborah Richmond)

scents that fill the pores arise from the adult bees, from the larvae, from the comb and from propolis, which is one of the most important. It is a major part of the immune system of the Bien. This part of the immune system is external to the bodies of the individual bees yet internal to the Bien. External and, at the same time, internal. That's another challenge to our simplistic, binary way of thinking.

What happens when the organism, the Bien, reproduces as a swarm? Its boundary, that was at best semi-permeable, now dissolves completely as tens of thousands of individual bees swirl in the air. The fog of the bees condenses into a whole as the swarm settles on a branch. That temporary whole evaporates once more when the swarm takes off to fly to its new abode in a new shelter. Once there it again condenses and builds bones for its new body. Soft, white, glistening, waxen comb, created in the becoming of a new Bien.

Can we gain an understanding of the experience and needs of this creature? I believe we can, but it is not by making reductionist, mechanical assumptions. Rather it is by allowing the Bien, the whole, to talk to us in its own terms. How do we do that? We do it simply by witnessing. By this I mean observing without judging, without trying to categorize. Rather, we open all our senses. We allow the phenomenon to enter our imagination and there, through gentle contemplation, we allow it to display its true self. This is the approach of Goethean science and is the opposite of the standard reductionist method which constantly asks predetermined, narrow questions. Narrow questions give rise to narrow answers and narrow answers stifle insights.

In the alternative approach we are a vessel in which observations come into being. They settle in us and we allow our imagination to become familiar with them. We do not rush to interpret them. Questions and, eventually, answers will come, all in good time. When questions do arise, we honour them, allowing them to exist and come to fruition in their own terms. Often they birth further questions and thus are we led down a path of discovery. Who knows where it will lead? Many paths exist. There is no right one. So we need not fret on that account.

This is the difference between interrogating Nature as an object and respecting Nature as an existence with her own mode of being; a mode of being that includes us. When we truly participate in Nature we become Nature and we are participating in ourselves. A virtuous circle of reflexivity develops: us in Nature and Nature in us.If we allow a space to open within ourselves, the existence that is Nature can come into that space. She will do so as a subject and will exhibit herself on her terms. This is very different from us seeing Nature as an object to interrogate and analyse on our terms. In many ways, the approach is unconscious. It can often feel accidental or serendipitous. This is a good feeling. It means we have entered the dance floor and Nature is in charge of the orchestra. Her tunes are more subtle than any we can imagine. It may take a while for the dance to become clear. That's fine. There's no rush.

I'll illustrate with some examples from my own experience. Some years ago I had twenty or more single-walled Warré hives, which were several boxes tall. One had some damage, a small hole, between two of the upper boxes. This hole wasn't quite big enough for a bee to pass through. I thought the bees would fill it with propolis, because that's what bees do with small holes. But they didn't. They chewed it more open. After a few months bees were coming and going through the little hole. "They'll close it come the winter", I thought. They didn't. They chewed it more.

By spring there was a round hole large enough to put a finger in. Bees were coming and going as much from this hole as from the entrance at the base of the hive. Chewing out this hole was not a small enterprise. The damaged wood was long gone. The bees were now removing firm wood.

I give this as an example of accident giving insight. The accidental hive damage allowed the coming into being of a new entrance arrangement. A question thus forms: is this what the bees in my hives really want? (Of course, other bees may differ.)

The next hives I made (double walled this time) had two entrances, both round, an inch or so in diameter, one at floor level and one two thirds the way up, the same configuration as the bees had made. What happened?

The bees used the upper entrance for flying far more than the lower one. Which was interesting in itself. But there was something else.

During nectar flows, I noticed the breath of the hive goes in through the top entrance and out through the bottom one. You can feel the warm breath coming out with the back of a hand. It feels like human breath, warm and moist. At the top entrance you feel a gentle stream of cool fresh air going in. So another question begins to form: what is going on?

I've shown the airflow to friends who are engineers, the reaction is always the same. "That's the wrong way round!", they say. "Warm air rises, so warm air in the hive will rise and

flow out of the top entrance and cool fresh air will flow in at the bottom. Doing it the other way is not energetically efficient." At the macro level engineers understand the physics of airflow, but bees also understand the physics of air. They are masters both of flying and ventilating hives. They've been doing it for millions of years. What the bees are doing can't be energetically inefficient, because energetically inefficient strategies don't survive in Nature. The bees, however, are operating at a different scale, one that is much smaller and more intimate than that of engineers. I'll illustrate the point.

There used to be a joke that, according to the physics of airflow, bumble bees cannot fly, but no one has told them, so they fly anyway. A few years ago, an engineer managed to show that the physics of flight for a bumblebee is much more subtle and complex than it is for airplanes. Once properly understood, the equations show bumble bees can fly after all. It's just that bumble bees don't bother with equations. I suspect honey bees don't bother with equations either!

I'll share two other observations from my hives that have to do with airflow. If the junction between the entrance tunnel and the face of the hive is a sharp edge, the bees chew the wood to make the junction a smooth curve. If you give the bees entrances with edges that are already round and smooth, the bees don't chew them. Could it be that entrances with sharp edges create turbulent airflow and the bees want smooth airflow?

The second observation is that, in deep hives, I often see nectar being stored at the bottom of the hive. This happens even though the bees are flying mainly from the upper entrance. In a two entrance hive, the brood area roughly coincides with the top entrance, so when nectar is stored at the bottom of the hive it is stored below the brood area. The air flow in the hive is this as follows: fresh air drawn in at the top entrance passes down through the brood, where it picks up warmth and is then fanned down over the nectar at the base of the hive. The warm air absorbs moisture from the nectar, and the hot humid air is fanned out through the bottom entrance. If the engineers had their way and air flowed in at the bottom and out at the top, the air passing over the nectar at the base of the hive would not be pre-warmed, and cool air absorbs markedly less moisture than warm air.

Hence, at this point, I was beginning to think that the airflow pattern I was seeing was all about ripening nectar. Then, on a sunny day in late January this year, I noticed on several hives that the airflow was still inwards at the top and outwards at the bottom. Was there still unripe honey from the late autumn ivy flow or are other things to do with airflow also going on? We should never forget that Nature often creates multi-layered solutions.

Also, when it comes to air, I suspect the Bien may experience air in a very different manner to us. Individual bees are very small and far more sensitive to air movement than we are with our lumbering earth-bound bodies. Maybe the air feels much thicker to a bee than it does to us. When bees fly maybe it feels somewhat akin to swimming. Airflow through the hive entrance perhaps feels more viscous than a mere draught. Like the flight of a bumble bee, maybe the equations would make sense if only we were smart enough to solve them.

Turning to other aspects of air, I have already mentioned that the whole body of the Bien is permeated with air. Throughout the Bien there is air, warmed, moistened and perfumed, intimately interfacing with the bees, the larvae, the comb. How does this feel? Do the linings of our human lungs feel the same way? Air, kissing, moving, dissolving, flux. Oxygen, moisture, carbon dioxide, warmth. Different seasons, different feelings.

In a hive, that air also carries propolis vapour. Plants use resins for protection and healing. The Bien draws those resins into itself and modifies them to form its own extended immune system. As you will all know, pro polis means in front of the town or in front of the city. It is not surprising that the Bien pays particular attention to the nest entrance. Protection from intruders and hygiene here are vital. Air that is drawn in through a well-propolised entrance will pick up propolis vapour, becoming conditioned with anti-microbials before it reaches the brood area.

Propolis is also used to close cracks and crannies. Although one suspects its usefulness in this regards may almost be a side benefit. It's available and it works. As I said, Nature frequently stacks solutions one on another.Interestingly, Wikipedia gives only this last, filling cracks, as the function of propolis; no mention of anything else. The multi-dimensional, multi-functional relationship the Bien has with propolis is reduced to a mechanistic singularity. Propolis is putty, sticky putty.

Thus the question "what is the function of propolis?" has not so much been answered as killed. Its life has been removed. This precludes all future learning and development that would come from allowing the question to exist. In contrast, when we go down the path of becoming comfortable with unknowns, the Bien begins to reveal itself on its terms. We find that boundaries and distinctions become porous and blurred, just as the boundary of the Bien itself is porous and blurred. As boundaries blur, we find ourselves becoming less separate both from the Bien and from wider Nature.

Their light becomes our light. It illuminates a space that is more participative, holistic and intuitive. Should we be so inclined, this is the point where we can become more esoteric in our approach. We can meditate if we wish, and go very deeply into matters through that route. But simply by entering a more intuitive space, we will already find that we pause our rush to analyse, our rush to categorize. We pause our rush to arrange things as we think they should be. We start to let go and just witness. We find the courage to suspend judgement, to allow questions to hang in the air without the need to kill them with answers. We experience new concepts as they blossom in our imagination. We start once again to experience the whole rather than just the parts. We rediscover that the whole includes everything; the bees, Nature, the earth, the sun and, very importantly, us. We are an essential part of the whole.

It doesn't matter whether we are engaging with a hive in our garden, a bee nest in a tree, a woodland or an entire landscape, if we open ourselves fully, move beyond mechanical, straight line thinking, we can rediscover our trust in the complexity and continuum that is Nature.

Thus can we allow the earth to show herself, not as we think she is, or think she should be, but as she really is. We can begin to see what is really there, as a whole, alive, creative, dynamic, productive. We can begin to see in Nature a being that is ready and willing to love us, to nurture us and to support us and all who swim with us in her.

In the words of Günther Mancke, a man who truly saw the earth as she really is:

> *For the healing of the bees*
> *For the healing of the earth*
> *For the healing of humankind*

Permapiculture, the Nicarao, the Japanese and the Ciociaro beehives

Alessandro Ardovini, Sweden

About me

Italian, wanderer, philologist.
I taught Italian as a second language in Australia, Italy, Spain, Canada. While in Canada I got in contact with permaculture.

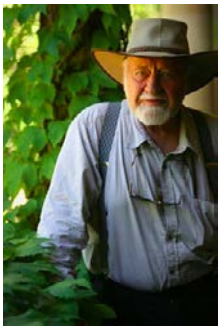
I moved to Galicia (northwestern Spain) and I taught Italian, English, Spanish and Galician, besides permaculture.

I then moved to Catalonia (northeastern Spain) where I lived for 10 years and I dedicated myself mostly to permaculture. Apiculture has always been a great interest of mine, but I never focused on it.

In 2021 I moved back to Italy where I started a permapiculture project together with a friend.

I then moved to Southern Sweden where I will start a permapiculture project, guided by experienced alternative beekeeper Marcus Nilsson.

1. David Holmgren



2. Bill Mollison

3. Masanobu Fukuoka

4. Beekeeping Lessons

1. Antecedents

1.1 Permaculture

- Concept developed by Australians David Holmgren [1] and Bill Mollison [2] and first published in their 1978 book Permaculture One.
- Contraction of Permanent agriculture, first, and Permanent culture, then.
- It can be summarized as ecology applied to design.
  - Ecology, from the Greek oikos, home, and logos, study, is the study, the observation, of our home: the natural world.
  - Design means putting the elements of a system in relation between each other by following what we have learned from observing nature so that:
    - The needs of each element are covered by at least two other elements.
    - Each element covers the needs of at least two other elements.

1.2 Wu-wei (doing effortlessly; not doing)

- Daoist concept popularized by the Chinese philosopher Laozi (6th century BC)
- Used by the Japanese botanist and farmer Masanobu Fukuoka [3] in the creation of natural agriculture, a concept that first appeared in his 1975 book The One Straw Revolution.
- Natural agriculture consists in letting everything in the agricultural-environmental system go according to nature. In this context, the farmer's work is limited to sowing and harvesting.

1.3 Natural beekeeping by the Argentinian Don Manuel Oksman

- It gives back to the bees some of the tasks they perform in nature and which beekeepers usually do
- He was the teacher of Oscar Perone, who digitized Oksman's book Beekeeping Lessons – Apiary Practice (Lecciones de apicultura – Práctica del

2. Introduction

2.1 Oscar Perone

- Argentinian permabeekeeper who died on October 6th 2019.
- He practiced permapiculture, of which he lived, since 1964.

2.2 Permapiculture

- Concept created by Oscar Perone that appears in his free book, Permapiculture Manual (Manual de Permapicultura) published in 2010.
- Based on permaculture, natural agriculture and natural beekeeping.
- For Oscar Perone, beekeeping practices are harmful to bees and beekeepers, just as agricultural practices are harmful to nature and farmers for Bill Mollison, David Holmgren and Masanobu Fukuoka.
- Some of the main ideas Perone and his Permapiculture advocate:
  - Bees feed on pollen, nectar and honey. Never on sugar. NEVER feed them sugar since they don't digest it well and they can get diseases and die. Leave them abundant honey reserves, instead.
  - Worker bees go through a series of stages in their life. When they are young, they stay in the beehive, produce wax and use it to build more hives. If this wax is not used, it will be lost.
  - NEVER USE PRINTED WAX (paraffin), since you're introducing a potentially harmful, infected element into the hive. Also, bees don't need it at all.
  - NEVER open the hive to control the bees or the queen, since you stress the bees. Also, they'll have to repair what you broke. There are scientific studies that show that every time a hive is opened, 5 (five) kilos of honey are lost from the harvest.
  - NEVER use a queen exclusion grid: It's a huge piece of metal you put into the hive and bees are very sensitive to electromagnetic fields.
  - If the bees can build the way they want and know, they will be able to treat varroa by themselves. Therefore there is no need to treat them.
  - Amateur beekeeping is dedicated to the breeding of bees. Professional beekeeping is dedicated to making money with bees. Nonetheless, many professional beekeepers use amateurs' techniques.

    Intensive beekeeping (common professional beekeeping) seeks maximum production per hive, without taking into account the number of times each unit is worked on.

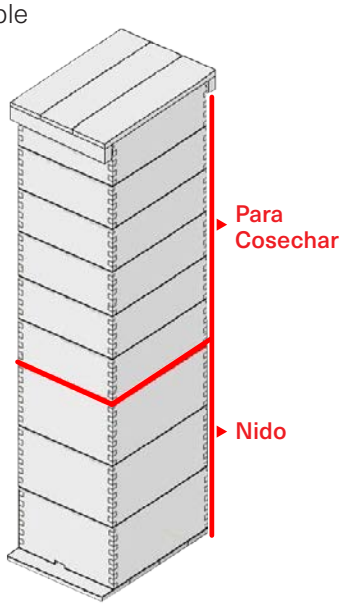
    Extensive beekeeping (Permapiculture) seeks maximum production for the beekeeper. We intervene less and less in each hive in order to minimize the amount of energy (time and money) we put into beekeeping. We can, then, have an always greater number of units in production.

    The natural extensive technique of Permapiculture respects the animal hive as an individual and gives back to it ALL the tasks that bees perform better on their own than with the intervention of the beekeeper, providing them in abundance with what they need to express their maximum potential: Space, Reserves and Peace.

    Following the teachings of nature, we capture wild swarms and then use feral, treatment free bees. The colonies that die are not worth saving, since we would be reproducing weak genetics. The strongest swarms are thus selected, avoiding the economic cost of treating diseases, TOTALLY eliminating the risk of introducing impurities into the products.

2.3 Perone beehive

- In his 2010 book Permapiculture Manual, Oscar Perone says that the main solution to the problems of beekeeping lies in the hive he designed.
- The "Perone" hive is a huge hive in which the lower part, with a minimum height of 80 cm and where the bees' nest is located, is NEVER opened.
- The upper part, of a further 80 cm, minimum, in height and to which bees can freely access, will be used for harvesting by the beekeeper. This happens once a year, at night and with red light invisible to bees. To move the bees, no smoke is used, since it alters the taste of honey, but a battery operated leaf blower.
- In the 2016 2 days permapiculture course, which appeared on the YouTube channel El Pintor Gris in February 2022, Perone explains that although the Perone hive is better than conventional ones, it is too big and often bees can't fill it. According to him, bees have become weaker due to human intervention.
- Faithful to the principle learned from his teacher Don Manuel Oksman according to which "professional beekeeping is dedicated to making money with bees", in the 10th video Oscar Perone goes on to explain how to build the new hive he has created: the Nicarao hive.



3. The Nicarao beehive

3.1 The idea of the Nicarao hive

The main idea of Perone with his previous hive was to give the bees all the possible space, honey reserves and tranquility. However, he noticed that:

- Often the bees could not fill such a large hive, even after a first year in which there was no harvest.
- Sometimes the honeycombs fell as melted wax was put on the rods of the grate from which the bees built the honeycombs, while in nature the bees use a very powerful glue (propolis?) to attach the honeycombs to the structure from which they hang.
- In his hive, as well as in the Langstroth (the most common in the world) and many others, there was a gap between the nest and the box for collecting honey, so that the bees have to build on top of the nest to store more honey. That is, they have to cross wooden separations and sometimes metal nets to get to the part where "the beekeeper's honey" is found while in nature bees always build going down.
- The hive, with a square plan, did not respect the golden ratio (fi), constantly present both in nature and in art.

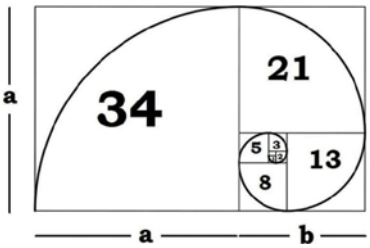
3.2 Schemes









3.3 Peron saw that in nature bees do not build on separate rods, but from a compact block of cells. He also came across these photos where you can clearly see that bees build from a compact block and had the idea of the Nicarao hive.

3.4 The name

Oscar Perone was called to give a permapiculture course in Nicaragua and there he presented the new beehive he created. It didn't have a name and the group decided to call it Nicarao, from the name of the most powerful monarch of the Pacific of Nicaragua and Costa Rica upon the arrival of the Spaniards in the 16th century AD.

To strengthen the structure of the boxes, wooden sticks with a diameter of 8 mm are used; they are placed as close as possible to the upper edge of the crate (higher than in this scheme).

The roof and the bottom are two equal flat elements. At the bottom there is a 1cm high edge of the same width as the boards with which we make the crates. On one side of the edge we will leave a 5cm wide space from which the bees will access the hive, since Perone observed that that's the space bees leave for entering the hive and feel protected, both in nature and in human-made beehives.

News

Rodrigues

At the Care-Co Rehabilitation workshop, the economic and financial challenges following the Covid pandemic remain a pre-occupation as the sales of our goods and services slowly recover and gain momentum with the arrival of visitors to the island once again.

The beekeeping and honey department has been hit further by weather events. The island has suffered from drought conditions since September and the summer rain did not start until January with heavy downpours in various parts of the island.

This relief was too late for the honey flow, and we suffered a dearth again on the much needed, and sought after, Care-Co 'Miel la Caz'.

There is honey on the island from other beekeepers, but the general situation cannot be compared to the plentiful honey harvests that we saw in past years. The weather is a factor, there is no doubt, but there must be other reasons why the bees are finding difficulty in producing honey.

Paul Draper, Care-Co & the Trevor Huddleston Association for the Disabled (Rodrigues), Camp du Roi

India

As a part of our collaboration with the UN FAO Mountain Partnership, we are releasing a special set of honeys and lip balms with tags that share information and stories about why Nilgiri mountain producers—and their montane forest honey and beeswax—are so special. Mountains are crucial hotspots for climate and conservation action. More than half of humanity relies on mountain water for everyday life, the Nilgiris included. With these tags we hope to highlight the significance and stories of mountains and the communities that belong to them. Many thanks to UN Mountains Matter and FAO for collaborating with us to promote education on mountain climates, mountain environmental labour, and mountain traditions. These editions can be found exclusively in our Green Shops. *Source: Last Forest Newsletter, March 2023 (Last Forest - garner.nurture.conserve)*

Bees for Development Resource Centre and Distribution Hubs

Vincent has been advised to sign up to our Resource Centre to have access to all editions of *BfD Journal* digitally, directly online, accessible via low-bandwidth connections and downloadable as a pdf – **all completely free of charge.**

Bees for Development Resource Centre - BfD Resource Centre

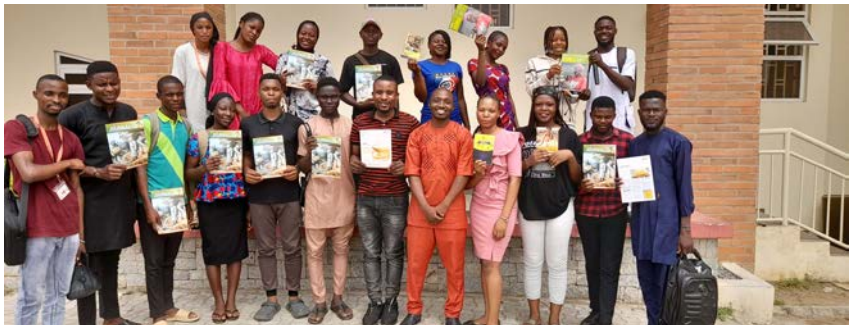
We appreciate that not everyone can access the internet and are establishing a network of international Distribution Hubs in co-operation with organisations that actively promote sustainable beekeeping, where paper copies are available, free of charge.

Ethiopia	**Bees for Development Ethiopia**, Bahir Dar
Ghana	**Bees for Development Ghana**, Saltpond
India	**Keystone Foundation**, Kotagiri, Tamil Nadu
	Under the Mango Tree (UTMT) Society, Mumbai
Nigeria	**Modern Beekeeping Extension**, Kano State
Trinidad & Tobago	**BfDJ T&T Hub,** Mesopotamia
Uganda	**The Uganda National Apicultural Development Organisation (TUNADO),** Kampala
Zimbabwe	**Working for Bees**, Rusape

Copies of *BfD Journal* are handed out at local and national beekeeping events and are freely available for pick-up.

If you are in any of these countries and would like printed copies of *BfD Journal*, email info@beesfordevelopment.org

We continue to work with our partners in other countries and regions to establish more Hubs and will provide details as these are confirmed. Please contact us if you wish to help with distributing the Journal by becoming a Hub.



Far left: Ayoade Akande; left: Nigeria Conference where copies of BfD were distributed.

Nigeria

On April 11 Akande Ayoade from Nigeria wrote to tell us that his colleagues in Nigeria held a conference at the start of the month where students were introduced to beekeeping and BfD Journals were distributed – please see picture above.

Zambia

I run a small farm in Serenje. I have twenty local-style bark hives. My wife and I run a project for orphans who have lost their parents from HIV AIDS. We teach them beekeeping. Receiving *Bees for Development Journal* would help us with this. *Vincent Kalunga*

Happy World Beekeeping Day!

World Bee Day is on 20 May, with beekeeping events to educate the public about the importance of bees and beekeeping. With special emphasis on the role of bees as pollinators and how they help to revive forest cover. World Bee Day informs how to protect bees and other insect pollinators.

The Slovenian Beekeepers' Association took the initiative for establishing World Beekeeping Day, now celebrated by environmentalists all over the world.

Do tell us about the events you organise to celebrate World Bee Day! *info@beesfordevelopment.org*

BfD article

Look Ahead

Chile
APIMONDIA: 48th International Apicultural Congress
4-8 September 2023, Santiago
Further details www.apimondia2023.com

Estonia
EurBee 10 (European Congress of Apidology)
16-19 September 2024, Tallinn
Further details www.EurBee10(onlineexpo.com)

Japan
XXVII Congress of Entomology
25-30 August 2024, Kyoto
Further details www.ice2024.org

Slovenia
12th International Meeting of Young Beekeepers
5-9 July 2023 (*Dates to be confirmed*), Ivančna Gorica
Further details www.icyb.cz

Sweden
XXVI IUFRO World Congress
23-29 June 2024, Stockholm
Further details www.iufro2024.com

UK
Conwy Honey Fair
13 September 2023, Conwy
Further details www.conwybeekeepers.org.uk
92nd National Honey Show
26-28 October 2023, Sandown Park Race Course
Further details www.honeyshow.co.uk

If you want notice of your conference, workshop or meeting to be included here and on our website, please send us details.

Events and Courses

Bees for Development Bee Garden Party Fundraiser
14 June 2023, Marlborough House, London

Skep hackles and floors with Chris Park and Bees for Development
10 June 2023, Yew Tree Inn, Ross on Wye HR9 6JZ

Introduction to Skep Beekeeping with Chris Park and Bees for Development
5 August 2023, Westmill Farm, Watchfield (Swindon)

Bees for Development Sustainable Beekeeping Course
16-17 September 2023, Ragman's Farm, Gloucestershire

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BfD article