Towards Sustainable Beekeeping

I

"Usually, terrible things that are done with the excuse that progress requires them are not really progress at all, but just terrible things."

Russell Baker

It seems to me that beekeeping is no longer sustainable in its present form. We need to re-think our management methods from top to bottom, or face an unprecedented decline in the health and strength of the bee population and the end of honey – at least in the public perception - as a pure, healthy food.

Intensive beekeeping – especially on a commercial scale - generates massive amounts of time- and energy-consuming work in return for a variable and unpredictable honey crop. Copious quantities of power and water are consumed in manufacturing, cleaning and sterilising equipment, rendering wax and cleaning up the inevitable, intractable, sticky mess, while transporting our kit around the countryside burns carbon fuels by the tankful. Substantial buildings are required for storing mountains of woodwork and to house decapping machines, extractors, boilers, tanks and all the myriad bits and pieces that inevitably accumulate around a beekeeping operation. Hives, frames, supers, feeders and covers are manufactured using power-hungry, saws and planes, while human time and energy is spent nailing together bits of wood, fitting foundation and reparing broken parts.

Meanwhile, 'scientific' chemical treatments have resulted in fitter parasites and tougher bacteria. We artificially maintain strains of bee that are ill-equipped to deal with infections or infestations, despite their ancestors having done so, unaided, for at least 100 million years. Some beekeepers routinely use potentially dangerous and illegal chemicals - including antibiotics and organo-phosphates - risking prosecution and loss of reputation, as well as their own and their customers' health, while making little or no long-term impact on the bees' problems. Many of these chemicals are lipophilic and persist in wax, which is recycled into foundation and imparts a low-level dose of a cocktail of who-knows-what to the next generation of bees.

All this might be understandable if the consistent outcome was bumper crops of honey and happy, healthy bees. However, honey crops will forever depend more on the weather than any other single factor and, as I write, our bees are suffering from unprecedented levels of infestation by the varroa mite and endemic infection by viruses for which mites are the most likely vector. Thanks to those who persist in shipping bees around the world instead of breeding from local stocks, the Small Hive Beetle and the Tropilelaps mite will most probably arrive in Britain soon. So-called Africanised bees may not be far behind.

In our modern, western world, where relatively few people have a day-to-day, intimate relationship with nature, public appreciation and understanding of the pivotal importance of the honeybee in the greater scheme of things has been largely lost. Bees are regarded by many as a pest rather than a vital, natural resource. A surprising number of people cannot tell a honeybee from a wasp, as many swarm catchers will testify. Our government would rather cover the countryside with untested, genetically modified crops than invest in truly sustainable, organic farming or fund research into bee diseases. Even our (British) beekeeping association takes money from agrichemical companies in return for their patronage of poisonous sprays and passive acceptance of GM crops.

In practical terms, sutainability may mean accepting lower honey production per colony in return for healthier bees. It may mean, at least in the short term, accepting heavier winter losses in return for improved vigour in surviving colonies. It almost certainly means increased vigilance in

inspecting colonies and assessing desirable traits, which will mean that more beekeepers will need to educate themselves beyond a basic level in bee husbandry and breeding, which can be no bad thing.

The remedy, as well as the blame, for the current parlous state of beekeeping lies with beekeepers themselves: nobody else knows enough or cares enough to take the necessary action. We need to share more information with each other and make more effort to educate the public, especially the next generation.

We may need to re-think much of what we now take for granted, even if it means discarding protocols we have regarded as holy writ for the last 150 years. We may have to think the unthinkable: that commercial-scale beekeeping is inherently unsustainable. After all, keeping 50 or 100 or more beehives in an area that nature might furnish with only one or two colonies is very like cramming 10,000 chickens into a battery farm and has similar implications for aberrant behaviour and spread of diseases.

We must look more closely at our complicity in the over-use of agricultural chemicals and find better ways to achieve our goal of a fair honey crop than the propagation of poisons. We must accept that synthesized treatments for mites and brood diseases are ultimately doomed to failure, as they inevitably create dependency. The long-term answer lies with the bees themselves. Our job is to provide them with the best possible conditions in which they can solve their own problems, as they have always done.

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II

"Without husbandry, "soil science" too easily ignores the community of creatures that live in and from, that make and are made by, the soil. Similarly, "animal science" without husbandry forgets, almost as a requirement, the sympathy by which we recognize ourselves as fellow creatures of the animals." Wendell Berry

From the perspective of the early 21st century, one can look back over the last 150 years and see how commercial beekeeping developed from the Victorian desire to dominate the natural world and subjugate its inhabitants to the will of man. This was the dominant paradigm throughout the first two thirds of the twentieth century, until we began to wake up to what was happening to the planet as a result of our arrogant assumption that we could treat it as a bottomless waste pit. Some of us looked out at decimated forests, depleted soil and polluted water and realised that we had collectively to change our ways.

The subsequent and currently rapid growth of the organic food movement indicates the beginnings of a shift in public perception, while the global dominance of a handful of agri-chemical corporations, intent on covering the earth with their genetically mutated organisms and chemical-dependent crops, represents the old order, stubbornly clinging to outmoded, reductionist science as their gospel and taking their moral guidance and business model from drug pushers.

The big lesson of the last century was that the way we treat the natural world has repercussions beyond the immediately obvious. Our destruction of rainforests and other habitats in the name of 'progress' have instigated irrevocable, cumulative cycles of species loss, soil erosion and climate change that we are only beginning to understand and that will haunt us for generations.

So it is with the bees. For a century and a half, we have assumed that we know better than they do what living conditions they require, what size cells they prefer to build, how many colonies can live in close proximity - and every other detail of their lives down to the mating of their queens, we have sought to bring under our control. And now we are reaping the rewards of our arrogance: bees that are dependant for their survival on chemical inputs and human interventions.

Can this situation be reversed? Nobody can say for sure, but those who are experimenting with sustainable beekeeping systems believe that the answer lies in a low-tech approach, that allows bees to build comb according to their own design, eliminating the artificial constraints imposed on them by the use of frames and wax foundation.

Foundation was introduced as a way of 'helping' the bees - saving them some work and therefore redirecting their energy towards doing more work for us, i.e. making more honey. Because it is milled to what has been decreed is the 'correct' cell size for worker bees, then that is what the bees are more-or-less forced to build. Because the generally adopted cell size of worker foundation is 0.3-0.5mm larger than those that feral bees build un-aided, this has led to an overall increase in the size of the bees themselves, due to the fact that they grow to the capacity of the cells in which they pupate.

Larger bees were thought to be a good thing, as they would surely have longer probosces - enabling them to feed on formerly unreachable nectars - and a larger payload capacity for nectar and pollen. Unfortunately, enlargement appears also to have resulted in reduced flying efficiency, shorter lifespan and quite possibly an increased susceptibility to disease and parasites.

Proponents of 'small-cell' foundation claim that a significant decrease in varroa population results from its use, due - it is suggested - to there being less space in the cells for them to reproduce, combined with a roughly one-day reduction in the worker bee emergence date compared with 'large-cell' bees. But this is still a step short of full 'naturalization'. The fact is that, given the choice, bees do not build uniform worker cells, but vary the size according to factors we can only guess at. Foundation or artificial comb - of whatever size - is part of the old control-freak, we-know-best paradigm that has caused their current problems. Having seen the beautifully formed, naturally constructed comb that bees build in skeps and in my top bar hives, I would not go back to frames and foundation if Thornes were giving them away.

It seems to me that bees need to build comb. It is a part of their natural lifecycle and a part of their biochemical makeup to extrude wax and to work it, and they need the freedom to build it their way. If that means they raise 15% of their colony as drones, then so be it: that is what they need to do and we may never know the reason why, nor do we nned to. Our pre-occupation with drone culling cannot but affect the quality of queens, as many of the most important traits are passed down the drone line, according to the late Brother Adam and others. It would not surprise me if the many stories of poor quality queens I have heard and read about recently were caused by a local shortage of good drones.

I am now looking at beekeeping as more of a conservation and restoration project than a profitable hobby. Much as I love honey, I am more interested in breeding bees that can look after themselves. I don't know to what extent I will succeed, but I hope that others will take up the challenge and that, by sharing information, we can find a way to develop a balanced system of beekeeping that is genuinely sustainable. Then the bees will have a chance to re-establish feral colonies, which will form the all-important genetic pool for future generations.

My own experiments with natural comb on top bars are still at an early stage, but having seen the enthusiasm with which a swarm set about constructing its home from scratch and experienced the

simplicity of operation of this low-tech style of hive, I would like to invite all beekeepers to build and try one next season alongside their normal boxes. A TBH is easy to build – there are plenty of web sites showing plans – and I guarantee it will enrich your beekeeping experience.

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The quotation from Wendell Berry is taken from 'Renewing Husbandry', Orion magazine Sept/Oct 2005

The above articles appear in the Beekeeper's Annual 2007

Small Cell/Natural Cell References

CELL HEIGHT - Calis et al. (1993) and Beetsma et al. (1999) found that shortened cells became more infested [http://www.funpecrp.com.br/gmr/year2003/voll-2/gmr0057_full_text.htm - Accessed 4/7/05].

A study by Piccirillo and De Jong, published Mar 10, 2003, shows a positive correlation between cell width and cell infestation. [http://www.funpecrp.com.br/gmr/year2003/voll-2/gmr0057_full_text.htm - Accessed 4/7/05].

Varroa mites preferentially infest slightly larger cell sizes [BC, 11/04, p55].

Varroa preference for drone brood [Ref 16, p137].

a study by Message and Goncalves (1995) found more than twice as many mites in large cells compared to Africanized-sized brood cells [http://www.funpecrp.com.br/gmr/year2003/voll-2/gmr0057_full_text.htm - Accessed 4/7/05].

It appears that natural-sized comb is SUPERIOR to over-sized combs for disease resistance [http://www.funpecrp.com.br/gmr/year2003/voll-2/gmr0057_full_text.htm - Accessed 4/7/05].

Shorter bee development - (Calis et. al., 1996) [http://www.culturaapicola.com.ar/apuntes/sanidad/ecol%20monogr.pdf – p11, Accessed 11/9/05].

Steve Taber states that both queen and drones of Apis mellifera have genetic variation as to when their progeny will emerge. Bees hatch from daughter queens artificial inseminated (AI) w/ a single drone's semen (each from a different drone) in 19 to 22 days [Steve Taber, ABJ, 11/06, p938].

Attraction Distance - Piccirillo and De Jong (3/03) Shortened cells become more infested (Calis et al. (1993) and Beetsma et al. (1999)). [http://www.funpecrp.com.br/gmr/year2003/voll-2/gmr0057_full_text.htm - Accessed 4/7/05].