

# **Chapter 1.**

## **Introduction**

**History shows that it is difficult to persuade the established order to accept revolutionary design change. It is greeted first with humour, followed by anger until finally it is seen to be self-evidently correct.**

**A strategy of silence prevails from those who claim to be leaders of the beekeeping community and who have become guardians of past failures in hive design. They seek to confirm their own preconceptions rather than challenge them. This book does that.**

We accept that there is a crisis in honey bee health in which considerable numbers of bees die. We have a failed parasitic symbiotic relationship with them rather than a successful mutual one. We need to brush up our act starting with the hives that we use to put them in. We can provide accommodation that would not normally be available for them to choose and which can be better than what is naturally available.

We have been part of honeybee's lives for a long time, but need to develop this mutually beneficial symbiotic relationship with them. In return for honey when there is a surplus and pollination services at all times we need to carry out the following hive services for the bees.

1. Spring clean, which checks for diseases to treat and to move pollen blocks to the queen laying her eggs.
2. Provide an amicable hive environment for easy thermal and moisture regulation by the bees as well as disease suppression by hive design. Beekeepers have not been aware of this as a possibility and a priority. (The hives in common use are thin walled and have all the environmental integrity of a cardboard box).
3. Provide a small incrementally increasing and decreasing colony volume appropriate to the colony needs over the year.
4. Guard against predators and parasites.
5. Feed them when stores are low, for whatever reason
6. We can assist them to out-breed by taking queen cells in nukes to hatch and be mated in distant stud apiaries, because they have a tendency to in-breed locally.

The entire planets ecosystem is a symbiotic one. We deserve our place within it to foster life, support evolution and postpone deaths. No species is an island, but we are the only one that knows it. We are special now. There can be a no more comprehensive and mutual symbiotic relationship on the planet than ours with honeybees.

Much is made of the ambition to emulate the concept of "Natural" when it comes to bee habitats, but bees struggle to survive and thrive happily in many of them. We can be here to help them on this matter with the ZEST hive which, with our management is conducive to their needs.

At the end of 2015 it was established that feral bee colonies in London were 3 times less likely to die than those kept in hives. This seems to be positive proof that bees really do have a problem with the boxes that we use to keep them in. There can be no other reason. Few have suggested that traditional hives, used for 160 years

mostly unchanged, are the cause. This book does so, explaining that traditional hives are physiologically unfit for honey bees at an architectural level, yet we continue to look to science to solve the diseases they cause. An industry in bee palliatives caused by poor hive design has needlessly been born.

We look for strength in unity to our National Association. Its management structure is labyrinthine and undemocratic, yet its executive (against its own constitution clauses 3 and 5) sponsored (oxy-moronically) the policy of “bee friendly” insecticides,.....for money. The membership finally managed to overcome the pressures placed upon it and revolted against the BBKA policy when asked, yet without the benefit of seeing any resignations.

The National Association did not condemn the use of systemic neonicotinoids on the seeds of flowering crops (such as oil seed rape) that bees attend. It sat on the fence in the face of the dubious attractions and pressures of the crop protection industry. Neonicotinoids have now been banned in Europe. The U.K. government chose not to support the vote to ban, but (politically) reluctantly implemented it anyway. This failure to support the ban was apparently based upon a flawed interpretation of research results from FERA on the damage caused to bumble bees by neonicotinoids. In 2015 there was an “emergency” derogation of the ban in East Anglia (5% of the total UK OSR crop) in a year that went on to see a record 5yr.OSR crop generally,.....despite the continued ban on its use elsewhere in the UK. Neonicotinoids were finally banned by Michael Gove in November 2017. Good for him.

There is a highly profitable beekeeping supplies industry with catalogues that run to over a hundred pages. The contents are considered to embody the essential shopping experience for aspiring bee keepers and it all arrives on next day delivery. None of this is needed with a ZEST hive design approach, because “Doing More with Less” is the ZEST ambition for technical design improvements that will prevail and sustain. Science without design has no purpose. Design, without science is just good taste being the last resort of the uncreative. Design/Science is the method to achieve the ambition. The ZEST hive system and the associated range of ZEST equipment ruthlessly adopt these principles to enable bees to be healthy and productive with less input. This is not a book for the timid and faint hearted. If you believe in tradition and have high blood pressure it is better to look away now, because you are really not going to like this book. It is a book for the experienced beekeeper grown weary of their bees dying of disease and of the cost of keeping them. It is a hive design that is amenable to almost "let alone" beekeeping and for the beginner who is considering taking it up and does not wish to spend a lot of money buying last century's hives with their multiple design flaws.

There are many books about bees, beekeeping and how to do it. The number seems to grow weekly, but they fail to deal comprehensively with the three aspects essential to keeping any creature including honeybees. They are environment, management and breeding. There is a void the size of the Grand Canyon in the available literature on the bee hive environment. It is the elephant in the apiary. It is

for a technical design led approach to bee husbandry that is less costly and more sustainable, healthier for bees and which can be built by anyone without obtaining a mortgage. A ZEST hive is a cheaper and healthier environment for honeybees, being warm and dry rather than cold and damp. This has now been proven with no winter deaths for many years except from winter queen failure.

This treatise is intended to establish the ZEST hive and its range of supplementary equipment in the beekeeping world. They have, in use, improved the life and productivity of bees and beekeepers, raising the fertility of the eco system in which they are placed and encouraged more people to keep bees. A virtuous circle can be established where let alone beekeeping is again possible. 21 ZEST hive colonies were taken into the winter of 2012/13 and 21 came out, all in good health and with surplus stores. 3 of those were queen less, but after the mating conditions of the 2012 summer this was not surprising. Similar results occurred during the winter of 2013/2014. 3 queens failed out of 34 colonies before Christmas, but there were no further losses due to disease in the remaining 31. They are also proving resilient to bad temper and swarming, superseding being preferred. These are the intended consequences of the ZEST design for the honeybee.

In the spring of 2015 Dave Durrant carried out the icing sugar test on a cup full of bees from each of his 9 ZEST hives. The eight strong ones had a zero varroa count and the ninth weak one had a few. In traditional hives the opposite is true. The strong ones have more varroa.

For the latest position and analysis on varroa and the ZEST hive refer to Chapter 3.3 part D where the matter of the ZEST hive and varroa is discussed.

The development of the ZEST hive began in 2008 and has proven to be a better environment for housing the biological system of honeybees. This is not to forget the other aspects of management and the breeding of honeybee queens that are also dealt with here. An unintended consequence of the ZEST hive is that it is varroa free. Our best assessment of why is shown in "The ZEST varroa extinction/survival diagram" in the Research chapter. This was arrived at as a result of comparative environmental data logging of B.S. National and ZEST hive types though 2016 and 2017. It showed the importance of a hive as an environmental control device for a biological system. This has not received the attention that it deserves in the battle to improve honeybee welfare.

The original ZEST ambition was to design a hive suitable for beekeeping in developing countries where resources are few, but which did include concrete blocks, discarded metal roof sheets, bamboo for making frames, and fishing line to hold them together. Examples were built and tested as proof of concept. Modifications were made with reservations about the fishing line, which stretched. This was discarded and replaced with paper clips.

The ZEST hive design then focussed on developed (cold) country use incorporating loose laid lightweight aerated concrete blocks for walls, floors and roofs. (These aerated concrete blocks are not available in the USA, but the same environmental effect of both insulation and thermal weight can be obtained by using the 2 disparate

materials of heavy concrete blocks that are wrapped externally with foil faced insulation boards. They accommodated double depth British Standard National width brood frames fixed one above the other with ply strips joining them at the sides. Conversion for beekeepers from wood hives to insulating block ones is now a natural progression shown in “The ZEST Transition and Management Diagram” and deploys plastic ZEST components or DIY double depth wood frames.

Larger frames such as in a Langstroth hive can also be used by simply increasing the internal width of the ZEST by 90mm. to receive them. A set of ZEST plastic equipment is not yet available in plastic for Langstroth, but they can all be made as DIY items.

The natural habitat of for honeybees is a cave or a large hollow tree. The thermal mass serves to moderate the temperature as with a storage heater (or cooler). With traditional hives we have not improved on this habitat of choice for the bees, but have made matters worse for them by deploying thin walled hives which are not appropriate to their designated task of enabling bees their health and beekeepers their wealth. With the ZEST hive as a bee habitation that is adjustable in size we have improved on a cave which is too big and not common enough, a hole in a tree which is usually too small and fragile internally and all other hives which are cold, damp and difficult to thermo-regulate.

The single and double walled traditional hives are the housing equivalent of a cardboard box under Waterloo Bridge used by the homeless. It is furthermore made from shockingly expensive cardboard with high maintenance needs and with the functional over-design of Heath Robinson on steroids. The Victorians bequeathed them to us. Beekeepers have clung tenaciously to them despite their obvious failings. That's good taste at work again.

The ambient temperature in which traditional wood hives exist is constantly changing over the seasons, from day to night and over the day caused by weather. The bees need to constantly thermo-regulate the brood temperature at 35°C if the brood is to survive and thrive. This not only stresses the bees, but is costly in honey, both to heat the hive and to collect water to cool it. The bees do not succeed in maintaining the ideal 35 degrees, but can go down to 29C.deg. Below 35C. deg. the pupation period rises giving the varroa mite its perfect conditions for breeding with an increased maturation time.

Bees can just survive if they are wet or cold, but not both. Thermo-regulation results in the constant variation in the relative humidity in the hive causing condensation on cold surfaces. This condensation is the same as that which we would experience from a hot shower on a cold bathroom surface. Condensation is particularly noticeable in winter when the temperature difference between the brood nest and the outside can be 40°C. It is a measure of bee resilience and a true wonder that any bees at all survive the winter in the boxes that we give them to live in.

Hunter gathering of honey was replaced by the keeping of honeybees in straw skeps hundreds of years ago. In mid Victorian times the Rev. Langstroth, while not in church, invented the movable frame hive and patented it. He placed them in a wood brood box based on a champagne crate. The first was a sensible concept, because we could then manage the bees without killing them. The champagne crate

was not so smart, since it bore none of the natural thermo-regulation capabilities of a cave or large hollow tree or indeed a straw skep. We are no longer restrained by the need to drink champagne in order to have somewhere to keep bees, but by using ZEST hives you will be able to afford the odd bottle of it.