

Is *Varroa* Treatment-free Beekeeping an Option for ALL Beekeepers?

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“The secret of change is to focus all of your energy not on fighting the old, but on building the new”

Socrates

Change is the key, and Socrates' words still ring true. Thirty years ago, when *Varroa* first arrived in the UK, beekeepers initially were very reluctant to put various chemicals into their hives to control *Varroa* populations. Naturally, putting an insecticide into a colony of insects, i.e. bees was against the entire ethos of beekeeping and this led to many beekeepers experimenting with a wide range of compounds and alternative treatment methods. Many beekeepers continued to ignore official advice on *Varroa* treatment and subsequently lost their colonies and gave up beekeeping.

It took many years until things settled down and *Varroa* treatment became universal. In 1997, the first officially UK-approved *Varroa* treatment, Apistan, became available. This product was very efficient at killing the phoretic mites i.e., those on the adult bees. However, in the late 1990s many of the feral colonies were succumbing to *Varroa* and unfortunately the workers from these collapsing feral colonies invaded other nearby colonies resulting in up to 1,000 mites arriving in a colony in a single day. This exacerbated the confusion around *Varroa* treatment and led beekeepers to treat twice per year. As *Varroa* treatments became accepted and the feral population largely disappeared, beekeeping entered a new stable period of beekeeping, where beekeepers were locked into long-term *Varroa* treatment, and that has lasted for over thirty years. In fact, the current generation of beekeepers may know of no other way to keep bees. However, things have slowly been changing in the background.

The first hidden change was the large drop in the number of mites circulating in the environment due to the combined loss of feral colonies and widespread use of very effective treatments. Many beekeepers say they never or rarely saw *Varroa* mites. Despite this change most beekeepers maintained the bi-annual treatment regime. Even today 40% of UK beekeepers treat twice a year. Is this necessary? Well, the 51% of UK beekeepers who treat annually or not at all would say two treatments are not necessary now.

The second largely hidden change is the slow rise of the treatment-free beekeeper. Ron Hoskins of Swindon honey bee conservation, is the UK's longest known treatment-free beekeeper having not treated for *Varroa* for over 25 years. The UK has numerous long-term (six years +) treatment-free beekeepers who are starting to discuss their personal journeys and challenge the status quo. In fact, the BBKA annual winter survey and the recent UK treatment survey by Alex Valentine both showed around 25% of British

beekeepers are currently not treating, although many of these beekeepers may be forced to treat within three years of stopping treatment due to increasing mite levels. However, Alex's survey also indicated that an estimated 3,000 UK beekeepers, that is approximately 10% of beekeepers registered to the four UK associations, have maintained their colonies treatment-free for six or more years and these colonies have developed natural resistance to the *Varroa* mite. Currently, most bee associations have long-term treatment-free beekeepers among their membership, quietly going about tending their bees.

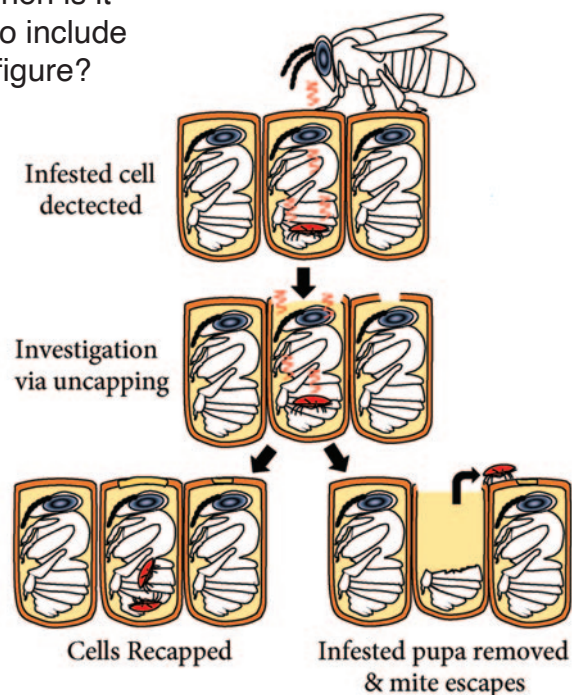
The final key change is that feral colonies have largely returned; this is likely to have happened at different speeds in various locations. As feral colonies lack any treatment, they either adapted or died. Once they become resistant they have a selective advantage over susceptible colonies and start to spread.

Currently, it is extremely difficult to determine the level of resistance in colonies where we cannot access their sealed brood. However, using feral colonies from regions where they are persisting is one of the quickest ways of becoming a treatment-free beekeeper. Clive and Shân Hudson in North Wales, Colin Rees from Cornwall and several beekeepers in Hawaii are just a few of the beekeepers using feral colonies as a source of *Varroa*-resistant populations.

This increase in treatment-free beekeeping has preceded the mechanism of resistance. However, in 2018 a key breakthrough in understanding *Varroa* resistance was discovered by a Norwegian PhD student, Melissa Oddie. Although, it had been known for decades that poor mite reproduction was present in resistant African and Africanised bee populations, how this came about was unknown. Melissa opened that door by showing that a behaviour called cell recapping was consistently elevated in resistant colonies relative to susceptible (treated) honey bee populations in Norway, Sweden, and France. During the last four years, my team have supported Melissa's original idea and found elevated recapping levels in all resistant populations. Izzy Grindrod, my PhD student, was able to link together all the key *Varroa* traits found in resistant honey bee populations to finally explain *Varroa*-resistance. Simply

“Using feral colonies from regions where they are persisting is one of the quickest ways of becoming a treatment-free beekeeper.”

Stephen is it OK to include this figure?



The three key hygienic behavioural stages involved in natural *Varroa* resistance. Taken from: *BBKA News Special Issue Series: Natural Varroa-Resistant Honey Bees, 2020*.

put, given the opportunity, any honey bee population, anywhere in the world, maintained by any type of beekeeper in any type of hive has the potential to develop *Varroa*-resistance. This is because the workers can learn to detect *Varroa*-infested cells using odours produced by the mite offspring. This leads to increased removal (cannibalisation) of infested cells. This prevents *Varroa* from reproducing and caused a decrease in the growth of the *Varroa* population. The recapping behaviour is a key behaviour to prevent mistakes from happening e.g., the removal of non-infested pupa, but is error-prone, so not all infested cells are removed, but a very high proportion are investigated, as seen by the high recapping rates of infested cells in mite-resistant colonies.

The science now backs up what the beekeepers already know, resistant colonies can control the *Varroa* population without the help from the beekeeper. Furthermore, investigation of UK resistant colonies finds the same traits as other resistant populations, be it in, Hawaii, Brazil, South Africa, Cuba, Norway, Sweden, or France. What are your options?

“Melissa Oddie showed that a behaviour called cell recapping was consistently elevated in resistant colonies relative to susceptible (treated) honey bee populations in Norway, Sweden, and France. My team supports this finding in all resistant populations.”

Firstly, think about your long-term *Varroa* treatment plan. Do you always want to be reliant on *Varroa* treatment or do you want to start to wean yourself off it? Change is difficult as we saw when *Varroa* first arrived, but now the consequences of not changing i.e., still treating, will not cause your colonies to die. However, the benefits of not having to treat are: saving money and time. Although the journey to treatment-free beekeeping requires work and knowledge. In this issue of *BBKA News* (pages 238 to 240) are four different journeys by which long-term treatment-free beekeeping was achieved. Over the coming year the aim is to start putting together information on best practice for the various options available, based on the pooled expertise of UK treatment-free beekeepers. In the meantime ask yourself a simple question: is it time to change or not?

Chronological list for further reading

All scientific papers are free to download.

Oddie M, Büchler R, Dahle B *et al*. Rapid parallel evolution overcomes global honey bee parasite 2018; *Scientific Reports* 8: 7704. <https://doi.org/10.1038/s41598-018-26001-7>

Martin SJ, Hawkins GP, Brettell LE, Reece N, Correia-Oliveira ME, Allsopp MH. *Varroa destructor* reproduction and cell re-capping in mite-resistant *Apis mellifera* populations. *Apidologie* 2019; 51(3): 369–381. <https://doi.org/10.1007/s13592-019-00721-9>

Grindrod I. Honey bees are becoming resistant to *Varroa*. *The British Bee Journal* published in conjunction with *BBKA News* 2021; 7:1–3.

Grindrod I, Martin SJ. Natural *Varroa* resistant bees in the UK. *Bee Craft* 2021; 103(1): 9–11. ISSN: 0005-7703.

Webb G, Grindrod I, Martin SJ. *Varroa*-resistance: a team update. *BBKA News* October 2021; 228: 331–332.

Hawkins GP, Martin SJ. Elevated recapping behaviour and reduced *Varroa destructor* reproduction in mite-resistant *Apis mellifera* honey bees from the UK. *Apidologie* 2021; 52: 647–657. doi.org/10.1007/s13592-021-00852-y

Heaf D. *Treatment-free beekeeping*. IBRA & Northen Bee Books, 2021. ISBN 978-1-913811-00-6

Grindrod I, Martin SJ. Spatial distribution of recapping behaviour indicates clustering around *Varroa* infested cells. *Journal of Apicultural Research* 2021; 60: 707–716. <https://doi.org/10.1080/00218839.2021.1890419>

Grindrod I, Martin SJ. Parallel evolution of *Varroa* resistance in honey bees: a common mechanism across continents? *Proceedings of the Royal Society B* 2021; 288: 20211375. doi.org/10.1098/rspb.2021.1375

An instructional video on how to measure recapping and mite removal is also available at <https://www.youtube.com/watch?v=Hfa9C1xvtcc>