

Why do We Avoid the Obvious Explanations for Colony Losses?

In recent weeks, mobile phones have been back in the news as an explanation for colony losses. A retired biologist from Imperial College London, Andrew Goldsworthy, has recently provided a mechanism whereby mobile phones could cause colony losses. He believes that signals from mobile phones affect cryptochromes, which are magnetically sensitive pigments perhaps used by bees in navigation, and hence he believes that under the influence of radiation from mobile phones, bees could become disorientated and fail to return to their hives, resulting in the symptoms observed with Colony Collapse Disorder (CCD) of depleted hives.

This sounds very plausible, until one considers that there is no link, circumstantial or otherwise, between colony losses and mobile phones. Very early on in the CCD investigation, mobile phones were dismissed as an explanation, since many of the colony losses had occurred in remote areas such as isolated valleys in California where there are no mobile phone masts and no mobile phone signals. Conversely, in cities where mobile phone signals are powerful, few losses have occurred. So how did this story come about in the first place?

As briefly mentioned in an earlier article¹, on 15 April 2007 *The Independent* newspaper ran a story entitled: 'Are mobile phones wiping out our bees?' This eye catching headline was taken up by the world's press and repeated endlessly. The original article suggested that Dr Jochen Kuhn and colleagues from the University of Landau, Germany had implied that experiments that they had carried out could provide 'a hint' towards the causes of Colony Collapse Disorder. Examination of their experiments in fact suggested something very different. Kuhn and his colleagues were actually working on the possible effects of electromagnetic radiation from sources such as mobile phones on humans, and

had suggested that, given their known sensitivity to electromagnetic radiation, honey bees could perhaps be studied as a model organism.

Their experiments^{2,3,4} used sixteen small bee hives. Below the floor of eight of these were placed the base stations of cordless portable phones (not cellular mobile phones, as reported in the press). They collected bees at the hive entrances, carried them 500 metres from the hive and then released them. They found that although similar numbers of bees correctly returned to the hives with the base stations compared to the others, those with the base stations appeared to take longer to return. The study was however poorly designed, and given the very small sample size and the variability inherent in bee experiments, there are many possible explanations for the results. The study has still not been published in a peer reviewed scientific journal. The fundamental flaw with the whole argument is that although various experiments have demonstrated that honey bees are sensitive to electromagnetic radiation there is no clear evidence that they use such sensitivity in navigation¹. The story was, however, enthusiastically adopted by a single issue pressure group opposing mobile phones, and in the glare of the ensuing publicity, Kuhn and his colleagues were forced to distance themselves from claims that they had solved the problem of CCD. On 26 April 2007, only eleven days after the story originally broke, *The Guardian* newspaper ran a story entitled: 'A last word on bees and mobile phones 'we didn't say that' say researchers'. One of the team was quoted as saying: 'It is not my fault if people misinterpret our data. Ever since *The Independent* wrote their article, for which they never called or wrote to us, none of us have been able to do any of our work because all our time has been spent in phone calls and e-mails trying to set things straight. This is a horror story for every researcher to have your study reduced to this. Now we are

trying to force things back to normal.'

Since the furore, some American scientists have carried out some more carefully planned studies to determine the effects of mobile phones on honey bee behaviour⁶. They tested three subspecies of honey bees (*Apis mellifera carnica*, *caucasiaca* and *syriaca*) in a series of experiments. In laboratory experiments they found no effects of mobile phones on proboscis extension or feeding. They found no effects of mobile phones on navigation of free flying bees. Finally, they tested mobile phones on the aggression in bees, and found no effects. Strangely, the results of these studies did not make headlines around the world, so despite the total lack of evidence linking CCD and mobile phones, many beekeepers, many journalists, and presumably many members of the public believe that herein lies a plausible explanation for colony losses. But is this the first such story where an implausible explanation has become accepted 'fact'? Not at all.....

Ten years ago at the Royal Show, I picked up a 'Briefing Paper' produced by the Soil Association⁷ on 'Genetic Engineering and Wildlife'. Among other claims, it stated that: 'rapeseed engineered to produce a natural insecticide had also been shown to kill not only the target pests - caterpillars and beetles - but also bees'. This sounds unequivocal, but where did this particular story come from?

It actually derived from an article published in *New Scientist* magazine in 1997. The journalist who wrote it had attended a student seminar given by Dr Minh-Ha Pham DeLègue of INRA at Bures-sur-Yvette in France. She was discussing experiments that had been carried out as part of the EU Risk Assessment process to assess the possible adverse effects of GMOs on beneficial insects, including honey bees, before licences could be issued for the commercial planting of such crops. The oilseed rape variety in question contained a gene for a protease inhibitor, an insecticide

naturally found in other insect resistant plants. This toxin was contained in the sap of the plant, and was intended to control sap sucking insects such as aphids, thus reducing the need for the application of conventional insecticides, many of which are very toxic to bees, and have of course been responsible for much colony damage in the past. The concern was that since the toxin was present in the sap, it might pass in to the plant's nectar.

The series of experiments, amongst other things, tested the effect of the sap itself on bees. In the experiment reported in the article, caged bees were fed on sugar syrup containing the toxin at ten times the concentration found in sap, and over their lifetime, they were found on average to die fifteen days before control bees fed only on syrup. The results thus showed that the toxin, at ten times the concentration found in the plant, slightly shortened the life of the caged bees. The results did not show that bees if given a choice would choose the syrup containing the toxin, nor that the toxin at the concentration found in the sap is harmful to bees. These were preliminary results, and were not intended for publication until the complete picture was clear so that they could be placed in their full context. Above all, there was no evidence that the toxin would be found in the plant's nectar, and therefore no evidence that the bees could come into contact with it at all. Without consulting Dr Pham-DeLègue, the journalist filed his story under the headline 'GM crops kill bees'.

At the time, this particular variety of oilseed rape had not been grown in the field either in the UK or within the EU, and a licence for its commercial planting would not have been granted until the Risk Assessment exercise was completed satisfactorily. In fact no licences for the commercial growing of GM crops had been granted within the EU at all. Nonetheless, the BBKA Technical Committee soon received reports

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that honey bee colonies in the UK had been killed by GM crops, and such stories were repeated in the media, and became an accepted 'fact'.

Ten years on, and many studies later (e.g.⁵), there remains no evidence to support the suggestion that bees in the UK, or indeed anywhere else, have been harmed by GM crops, but again many beekeepers, journalists and the public still believe that there is an established link between GM crops and colony losses. But do such misconceptions really matter?

I think they do, for several reasons. Firstly if such implausible stories are believed, they can divert research effort away from vital areas that could actually help

beekeepers to reduce colony losses. If, on the other hand, such stories are dismissed, pressure groups can point to a lack of research effort in their pet areas, and suggest a government conspiracy, perhaps in conjunction with multinational corporations. The more plausible explanation that informed researchers do not see much point in carrying out such studies would of course be ignored.

Secondly, once such implausible ideas have entered the public domain, especially now in the era of the internet, lazy journalists will continue to dig up and revive these stories. Let us not forget that a century after the event, and half a century after the explanation was found to be scientifically

unsound, many beekeeping books and articles still perpetuate the myth that the Isle of Wight Disease was caused by the tracheal mite *Acarapis woodi*.

Finally, it is very easy to blame somebody else for one's problems. If we believe that mobile phones or GM crops are responsible for the loss of our colonies, there is little that we as beekeepers can do, so it takes away the need for us to worry about checking our colonies for signs of foulbrood or of varroa, and it makes our beekeeping so much easier.....

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