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Topical issues: the electromagnetic environment

With our modern environment full of electromagnetic fields, fom power transmission through to all forms of communication, the issues of how this affects our well-being are urgent.

Decline of bees, UK and worldwide

Summary

Massive and sudden declines have occurred on bee populations across the world in 2006-2007. Honeybees sustain agriculture through pollination so human food supply depends on their well-being.

Sudden and wholesale loss of bee colonies is described as Colony Collapse Disorder, but does not explain the reason. Primary reasons suggested, and sometimes in the past confirmed, include parasitic mites and consequent viruses. More recently pesticides, GM crop use and climate change have been suggested. However, as this page seeks to demonstrate, the electromagnetic environment is also crucially influential on honeybees, and is undergoing rapid and enormous change from human communications systems.

- **Infestations** such as the varroa mite can be tested for quickly and easily, and could confirm this as the current cause, but this has not been reported this time.
- **Pesticide** use has not been suddenly altered across the world (Switzerland, Poland, Italy, Germany, Greece, the UK and 24 states of the USA).
- **GM crops** have been introduced, and not always as openly as some would

Nature in the news and electromagnetic fields

Mobile phones and driving: more than a distraction?

Three routes to mobile phone addiction: psychological, sociological and physiological.



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like. These indeed can affect insect balance, but again this has not been evenly building across all the affected areas and would be more localised.

- **Climate change** is undoubtedly altering plant diversity and honeybees can be very specific, but this would suggest more gradual population density movements rather than disappearance.

The sudden declines are marked by bee disappearance rather than just hives full of dead and diseased bees. The empty hives are not plundered by neighbouring colonies and other insects are not filling the pollination gap. This leaves two further possibilities:

- the hives are acting as a deterrent to bee return
- the bees are losing the ability to navigate or communicate.

Nothing in the bees, hives or honey is pointing to chemical toxicity or bio-predation. Since the studies lower down this page show that honeybees depend on natural electric and magnetic fields, and that they are frequency-specific in their communications, it is urgent that this line of enquiry is opened up.

Whilst the last bee species extinction in the UK occurred in 1988, there has been a steady [decline in the bee population](#).

It's a particularly bad time to cut funding on bee inspectors, but this is exactly what has happened in the UK: [Funding cuts threaten bee health](#) (2004).

Bees are not just nice to have around and make honey; they are crucial to crop pollination and a vital element in agriculture and food production. The global economic value of pollination may be as much as £50bn. In June 2006 it was reported that bee decline [may hit food crops](#) in Northern Ireland, and the [UK in general](#). The cause appears to be mites and late flowering losing synchronicity with the bees' nesting cycle. Farmers have been making efforts to restore habitat (eg field margins), and some decline appears to be restored.

Why this is not just interesting, but a critical issue: 'Approximately 80% of all insect pollination is accomplished by honey bees. According to the University of California at Davis publication "Don't Underestimate the Value of Honey Bees," the remaining 20% of other insect pollinators are drastically reduced in number as well,

making one wonder if the problem is the varroa mite or something else affecting the broader insect world.' [Source: [Suite 101](#)]

Then in February of 2007 the bad news arrived of massive colony collapses across the US:

Mystery killer silencing honeybees. If the die-off continues, it would be disastrous for U.S. crop yields.

Honeybees Vanish, Leaving Keepers in Peril

Species under threat: Honey, who shrunk the bee population?

Bee mystery buzzes area

Bee Alert survey with hive signs and symptoms

initial survey results: analysis of viruses

No-one knows why

Pesticides and habitat?

Pesticides and loss of habitat appear mostly to blame, but it isn't just farmers who can make a difference. Growing traditional plants in gardens would help, but we must remember that climate change is already visible, with the migration of many species (butterflies, insects, birds, fish etc.) all on the move, in a northerly direction. It may be worth considering therefore, the [predictions about domestic gardens](#) and the change to mediterranean plant varieties.

Another possibility is that agricultural methods, including bee-keeping is increasingly monocultural, reducing variety in both bee populations and the nectar they collect. See: [A surprising decline of pollination services in USA](#).

Some have pointed to GM crops, but this does not explain either the 20 year trend, the international aspect, or the suddenness of the 2006 USA event:

[Are GM Crops Killing Bees? \(Germany\)](#)

[Collapsing colonies: are GM crops killing bees? *Der Spiegel*, March 2007 \(Germany\)](#)

Furthermore the bees have not just been dying in the hives, or being found dead, they have just been disappearing in their millions.

A man-made electromagnetic environment?

One trend that also causes concern is the electromagnetic environment. Ironically, power line pylons provide agricultural margins that are a haven for bees. In the US, [it has been proposed that utilities do not mow the power line strips](#) in order to halt the US decline in bees. [Studies by Ulrich Warnke on bee behaviour in low frequency fields](#) have, however shown suppressed metabolic rates in bees, and a paper by J O Husing, 'Biene und Elektrizitat' in *Imkerfreund* (Beekeeper Friend) in 1965 noted effects of low frequencies on bee behaviour patterns. See also *Bee World*, 1976: [Effects of Electric Charges on Honeybees](#).

There has been a deal of research on other insects, some relating to dimensional aspects on insect antennae. T Jaski noted in 1960 ('Radio waves and life', *Radio Electronics*, 31. pp. 43), that orientational reactions were observed in large ants when exposed to a SHF field of 10,000 MHz. They oriented their antennas along this electric lines of force and lost their ability to communicate the location of food to others. It was noted that the antenna length of the ants used in these experiments was almost a quarter of the wavelength to which they were they were exposed.

High electric fields present a greater problem in conductive hives ([Bidokas et al., 1988](#)). But it may not be hives and electrical fields that add to bee problems, so much as magnetic fields. Bees have a magnetoreception system sensitive down to 26nT at 10 to 60Hz, according to [Kirschvink et al. \(1997\)](#), decreasing rapidly with increasing frequency. Maybe living under power lines isn't a completely good idea. Balmori 2006, '[Effects of the Electromagnetic Radiation emitted by Mobile Telephony on Insects; Ecosystems](#)' recounts the effect of mobile phone antennas on insects more generally.

Are EM fields to blame? This is one environmental burden that matches the decline of bees, and the rapid recent rise in universal infrastructures may explain more.

Explore the bee crisis more

[Millions of Bees Die – are Electromagnetic Signals to Blame?: 'tired bees' are also being reported in the UK](#)

[Flowers and fruit crops facing disaster as disease kills off bees \(UK\)](#)

[More on bee decline in the UK and Europe](#)

[bumble bees in crisis](#)

[Bee deaths \(German\)](#)

[Honey Bee Crisis extends from US to Britain and Netherlands \(UK and Netherlands\)](#)

[Scientists ask: Where are all the bees? \(USA\)](#)

[Devastating disease decimating hives \(USA\)](#)

[Honey bee die-off alarms beekeepers, crop growers and researchers \(US\)](#)

[Parallel Declines in Pollinators and Insect-Pollinated Plants in Britain and the Netherlands \(*Science* 21 July 2006\)](#)

[Wild bees and the flowers they pollinate are disappearing together, \(Leeds University\)](#)

[The Honey Bee Crisis of 2007. Escalating Honey Bee Decline Baffles Scientists \(US\)](#)

[Millions of bees dying, signalling woe for environment \(Italy\)](#)

[Honey bee die-off alarms beekeepers \(North America\)](#)

[Queens – Poor Mating and Laying – An update July 2006 \(UK\)](#)

[Plight of France's honey bee \(2003\)](#)

[Wikipedia: a starter on Colony Collapse Disorder](#)

[and the Varroa mite](#)

[a Google search on Russian Varroa-resistant bees, introduced into the US in the 1990s. So is the decline not due to Varroa?](#)

Bees are frequency-sensitive, like all living organisms:

It is interesting to reflect that many people complain of 'the hum', relating electromagnetic sources with an apparently acoustic phenomenon. There may indeed be more than one 'hum', but since bees are so sensitive to particular frequencies, this is a worthwhile route for research, especially if hives resonate in response to the now all-pervasive EM fields. GSM mobile phone systems produce a structural pulse frequency of 217Hz, DECT (cordless phones) 100Hz, TETRA 70.6Hz.

Measurement of the threshold sensitivity of honeybees to weak, extremely low-frequency magnetic fields, *The Journal of Experimental Biology* 200, 1363-1368 (1997) (PDF)

Transmission of vibration across honeycombs and its detection by bee leg receptors, *The Journal of Experimental Biology* 199, 2585-2594 (1996) (PDF). Key frequencies for the bee: 15Hz and 250Hz.

Bursts of magnetic fields induce jumps of misdirection in bees by a mechanism of magnetic resonance, Korall H, Leucht T, Martin H. *Journal of comparative physiology. A sensory neural and behavioral physiology*, 1988, vol. 162, no.3, pp. 279-284

How Electromagnetic Exposure can Influence Learning Processes. See 'Honey bees as possible bioindicator for non-thermal effects' (p.7)

Bursts of magnetic fields induce jumps of misdirection in bees by a mechanism of magnetic resonance, Korall H et al., *Jnl of Comparative Physiology A*, 162, 279-84, 1988

[Steuer H et al., 'Verhaltensänderung unter elektromagnetischer Exposition', 2005 'Behavioural Changes under Exposure to Electromagnetic Fields'](#)

Summary:

- 2 beehives were unexposed and 2 beehives were exposed to a DECT phone.
- 25 bees were selected from each beehive and released 800 meters away.
- Unexposed beehives: 16 and 17 bees returned after respectively 28 and 32 minutes.
- DECT-exposed ones: 6 bees returned after 38 minutes to one hive. The other hive remained deserted.
- In the exposed beehives, there were 21 per cent fewer cells constructed in the hive frames after 9 days.

Bees rely on key enzyme for their sense of 'smell' in their antennal lobes:

It is interesting that the interpretation given in the February 2007 US news (above), is

that the bees left in the hive being so diseased is due to immuno-suppression. If you take a look at our [health pages under EM Fields](#) you will see the evidence that electromagnetic fields (EMF) affect the behaviour of key enzymes that produce and regulate nitric oxide in living organisms, and why this is so important. If this is true of insects, then this avenue of research is also vital.

[Impairment of olfactory discrimination by blockade of GABA and nitric oxide activity in the honey bee antennal lobes](#), Hosler JS, Buxton KL, Smith BH, *Journal of Behavioural Neuroscience* 2000 Jun;114(3):514-25

[The Nitric Oxide System in Insects](#); 'In the honeybee, the NO/cGMP system in the antennal lobes is implicated in the processing of adaptive mechanisms during chemosensory processing, and recent findings support a specific role of the NO system in memory formation.'

[Fireflies seen in a new light. The secret of their flashes is a gas \(nitric oxide turns down the use of oxygen in the mitochondria, allowing oxygen to power chemical lights\).](#) **Hypothesis:** if man-made EM fields affect nitric oxide in fireflies, their communication will be impaired and populations will decline.

[Where have all the fireflies gone?](#)

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'The Physical and Physiological Foundations of the Meteorosensitivity of Honey Bees caused by Electrically Charged Air'
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'Bees under High Voltage', Review 75
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'The Effect of High Voltage Fields on the Behaviour of Bee Societies', Journal for Applied Entomology

More related bee sources

[Mid-Atlantic Apiculture Research and Extension Consortium \(MAAREC\)](#)

[MAAREC Colony Collapse Disorder Working Group](#)

[European Community Biodiversity Clearing House Mechanism](#)

[Frequency of Bee Wings](#)

More useful links:

[Bee Mites Suppress Bee Immunity, Open Door For Viruses And Bacteria](#)

[The Plight of the Bumble Bee Affecting Plants Too \(problem in Antigua too\)](#)

[Mystery illness devastates honeybee colonies \(14 Feb 07\)](#)

[Bee and Flower Diversity Decline in Tandem \(2006\)](#)

[The Minnesota Honey Bee Battle MN Supreme Court protects pollinators from pesticides](#)

[Useful PowerPoint on the issues; mites and pesticides](#)

[Pollinator Diversity Declining in Europe \(since 1980s\)](#)

[Homing instinct of bees surprises. Britain and Ireland have 25 native species of bumblebee. Five are currently listed in the UK Biodiversity Action Plan because of their precarious status. Many of the other bee species have undergone major range contractions. Habitat? Sudden housing changes??](#)

[Bee Decline May Spell End of Some Fruits, Vegetables \(2004\) – cause: viruses and parasites?](#)

[Our Forgotten Pollinators: Protecting the Birds and Bees \(1996\) includes pesticides as a major factor, and Africanized bees](#)

[The Russian bee import that went wrong](#)

[Pollinators in decline](#)

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