

Topical issues: nature

<http://www.hese-project.org/hese-uk/en/issues/nature.php>

Our natural world is under assault from human activity. The trouble is, to recognise damage to nature reveals also the risk to ourselves. 'Progress' is in the hands not of individual people, nor their elected representatives and politicians. It is in the hands of the free market, the large corporates who set the direction of our world through creating profit streams however they can. We don't have to identify this as evil; rather it is almost inevitable. We are persuaded of the benefits of convenience and consumerism, and we are the source of the profits and the stimulant to corporate behaviour and the setters of social trends. What we must do is to observe, to ask questions, and be honest enough with ourselves to recognise that nothing we do is without consequence. If we are custodians of our children's futures, we must accept individual and joint responsibility for the condition of our planet.

Here is an example of honest concern over EM fields from telecoms affecting wildlife:

- [U.S. Fish & Wildlife Service](#). Concerns Over U.S. Fish & Wildlife Service Concerns Over Potential Radiation Impacts of Cellular Potential Radiation Impacts of Cellular Communication Towers on Migratory Birds and Communication Towers on Migratory Birds and Other Wildlife Other Wildlife – Research Opportunities Research Opportunities

Amphibians: eggs and tadpoles of common frog

A study is being carried out exposing eggs and tadpoles of the common frog (*Rana temporaria*) to several mobile (cell) phone antennas located at a distance of 80 meters (electromagnetic field intensity: 2,5 to 3,5 V/m (pictured below):



A low coordination of movements, an asynchronous growth, with big and small tadpoles, and a high mortality (90%) was observed. Regarding the control group (under the same conditions but inside a Faraday cage) the coordination of movements was normal, the development was synchronously and a mortality of 4,2% was obtained (Balmori, in prep.).

These video clips show (left) tadpoles exposed to the antenna radiation and (right) same-stage control tadpoles in a Faraday cage.

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Watch these clips simultaneously, or pause one and watch the other. The bowls containing the tadpoles are being struck to stimulate the tadpoles.

(Please note: each clip is approx 3Mb so may take a while to load, depending on your connection).

Birds, magnetic and electromagnetic fields

- [Mobile phone masts blamed over the vanishing sparrows](#)
- [Mobile Phones and Vanishing Birds](#) (Institute of Science in Society)
- [A Possible Effect of Electromagnetic Radiation from Mobile Phone Base Stations on the Number of Breeding House Sparrows \(*Passer domesticus*\)](#), Joris Everaert, Dirk Bauwens (Electromagnetic Biology and Medicine, Volume 26, Issue 1, January 2007)
- [The Urban Decline of the House Sparrow \(*Passer domesticus*\): A Possible Link with Electromagnetic Radiation](#), Alfonso Balmori, Örjan Hallberg (Electromagnetic Biology and Medicine, Volume 26, Issue 2, April 2007)

US and German scientists have shown that oscillating magnetic fields disrupt the magnetic orientation behaviour of migratory birds (Ritz T et al. 'Resonance effects indicate a radical-pair mechanism for avian magnetic compass', Nature 2004, May 13, Vol 429, p. 177). Migratory birds are known to use the geomagnetic field as a source of compass information and there are two competing hypotheses for the primary process underlying the avian magnetic compass, one involving magnetite, the other a magnetically sensitive, chemical reaction (see links below).

The researchers found that robins were disoriented when exposed to a vertically aligned, broadband (0.1-10 MHz) or a single-frequency (7-MHz) field in addition to the geomagnetic field. In the 7-MHz oscillating field, this effect depended on the angle between the oscillating and the geomagnetic fields. The birds exhibited seasonally appropriate, migratory orientation when the oscillating field was parallel to the geomagnetic field, but were disoriented when it was presented at a 24- or 48-degree angle.

The authors state that their results are consistent with a resonance effect on singlet-triplet transitions and suggest a magnetic compass based on a radical-pair mechanism. They comment:

'The magnetic compass of birds is light-dependent and exhibits strong lateralization with input coming primarily from the right eye. However, the primary biophysical process underlying this compass remains unexplained. Magnetite, as well as biochemical radical-pair reactions have been hypothesized to mediate sensitivity to Earth-strength, magnetic fields through fundamentally different physical mechanisms.'

In the magnetite-based mechanism, magnetic fields exert mechanical forces. In the radical-pair mechanism, the magnetic field alters the dynamics of transitions between spin states, after the creation of a radical pair through a light-induced electron transfer. These transitions in turn affect reaction rates and products. Although in most radical-pair reactions the effects of Earth-strength magnetic fields are masked by a living system's background 'noise', model calculations show that such effects can be amplified beyond the level of background 'noise' in specialized, radical-pair receptor systems.

Alasdair Philips (Powerwatch) comments:

'The support for a possible mechanism is interesting. However, medium- and short-wave frequencies have been used since the 1930s with little evidence of any effect on bird behaviour. But since the mobile phone networks went up there have been increasing reports of birds, especially homing pigeons, getting lost. Research now needs to look at the effects of base station signals, particularly in view of the disorientating effects of EMR 'noise' reported in this study.'

An early warning?

In 1956 a military radar engineer working on the Sussex Downs witness first hand the effect of 3GHz microwave radiation on migrating birds. Before leaving UK shores for other destinations, the birds would gather at high altitude, between 3 to 10 thousand feet, spend some time circling chosen landmarks for perhaps 20 minutes, then disperse. This was a well known and documented phenomenon amongst technical personnel at coastal radar stations.

One day, while testing a new form of radar with a very fast rise time and very short duration pulse (very much like pulses now used in digital communication systems) he noticed the echoes from the flock of birds (mainly swifts and house martins) suddenly disappear from all their radar displays. Some time later they had reports from veterinary sources and other concerned parties that thousands of birds had been found either dead or dying, spread over a wide area.

The fatalities, it seems, only occurred with the then 'new' radars being rapidly installed because of the Cold War situation with East Germany and the USSR. The specific frequencies and pulse widths in use then are no longer used – at least not by the military. However, what is of great concern is that they are being used by the mobile phone industry.

In the late 1980s and early 1990s, Simon Best and Cyril Smith attempted, via various publications, to caution the government, radio engineers and the public about possible biological hazards if similar frequencies and pulse widths became commonly used for civilian broadcasts and/or telecoms. However their sound advice was overruled by senior members of the then NRPB (now part of the Health Protection Agency).

- [A Visual Pathway Links Brain Structures Active during Magnetic Compass Orientation in Migratory Birds](#), (Heyers D et al., PLoS ONE 2(9), 2007)
- [Resonance effects indicate a radical-pair mechanism for avian magnetic compass](#), (*Nature*, May 2004)
- [On the use of magnets to disrupt the physiological compass of birds](#), (*Physical Biology*, 2006)
- [Research on the radical-pair theory of magnetic sensitivity](#); 'weak electromagnetic fields at appropriate frequencies in the radio frequency (RF) range should disrupt or change magnetic orientation behavior if the magnetic compass were based on radical pair reactions.'
- [A Model for Photoreceptor-Based Magnetoreception in Birds](#), (*Biophysics Journal*, 2000)

Other effects and observation on birds

Disappearing birds

The gardens around a football club in Worthing were well-tended, with hedges and ivy, and trees. And they were well-populated with birds as the residents fed them in the winter. The small birds nested in the hedges and (less popular) gulls nested every year on the chimney blocks. On one occasion a bird of prey devoured a pigeon in a garden. This was the pattern through to the 1990s. Then through the early 2000s mobile phone masts started going up around the ground. In February 2004 the fourth, TETRA went live.

During that year the small birds left. The nests were left empty, and the gardens silent. Only pigeons and seagulls would pass through and perch. That winter, for the first time, the gulls did not roost.

Coincidence? If it wasn't for so many other similar reports during this time, one might suppose so. But in Bognor Regis, where TETRA had also caused the people a lot of problems, the birds returned, well out of season, when the illegally erected TETRA was removed.

- [Possible Effects of Electromagnetic Fields from Phone Masts on a Population of White Stork \(Ciconia ciconia\)](#), A Balmori [[full paper](#)]
- [Birds suffer from biological effects of GSM, 3G \(UMTS\), DECT, WIFI, TETRA.](#) We have many reports, particularly concerning songbirds, of departures following introduction of TETRA, and returns after its removal.
- [Cell, TV towers pose risk for birds](#)
- [Pulsed microwave radiation and wildlife.](#) Some discussion.
- [Birds suffer from biological effects of GSM, 3G \(UMTS\), DECT, WIFI, TETRA](#)
- [Cell, TV towers pose risk for birds.](#) Accounts of bird kills around transmission masts.
- [Pulsed microwave radiation and wildlife.](#) Some discussion.
- [Where have our friends the birds gone?](#)
- [Mystery as thousands of birds fall from sky](#) (January 2007)

Effects of electromagnetic fields on animals

- [Mobile antenna makes calves blind](#)

One of the most important things we can do is to observe animals and plants. If indeed the increased ambient and chronic exposure to low levels of especially digitally-structured electromagnetic fields does present a risk to health and well-being of people, then it is important to recognise and respond to this as soon as possible. Very many scientists worldwide have indeed found that this is the case, but such is the global impetus for the convenience of wireless communications, and such is the dependence of the global economy upon these industries, that it is infinitely preferable that all the perceived effects in human are just the result of techno-anxiety.

The psychosomatic response and the placebo and nocebo effects are well-known and powerful human traits. In fact it would be the greatest progress humankind has ever made, if these powerful capacities could be harnessed for good and for healing by all. (Though perhaps it is as well that we cannot, since there is nothing to prevent the harmful side being similarly used.) And so it is entirely likely that people do respond in these ways to things they feel uncomfortable, suspicious of, or threatened by. But there are no grounds whatsoever for then concluding that *all* observed effects on people attributed to EM fields are due to this psychological response. The same could be said of pesticides and chemicals or other environmental pollutants, including noise. On all these issues, solid scientific research does exist that biological mechanisms exist to explain the observed outcomes.

The reason nature observation is so important, is that we assume a lower cognitive awareness in plants, birds, fish, insects and animals. Without psychosomatic bias, these are the indicators of the effects of human activity on natural processes. We watch them for the effects of our activities on habitat, atmosphere, water, and on the climate and they are producing acutely useful warnings. What does nature tell us in this complex but unbiased way about the electromagnetic radiation environment that we have created and are daily increasing?

The objection to people claiming to observe effects in animals is that there is a lot of natural EM radiation, and man-made radiation is a minor addition. To the contrary, our addition is spectacularly different in terms of frequencies, structures and in completely filling the spectrum. It is not just the addition, but the interference this creates with natural EM fields and frequencies, such as the Schumann resonance and geo-electromagnetic fields.

Many studies on biological effects relate to animal experiments, as you will find in our [health links](#) pages. (Try putting 'animal' into the search box at the top of this page as well.) EM fields of various kinds are used routinely in regular human medicine (not just in complementary practice) so we do know that there are positive interactions. And they [work in animals too](#).

Here are some examples of studies on skin and thyroid that are actually important for human health investigation:

Rajkovic V, Matavulj M, Johansson O, 'Histological characteristics of cutaneous and thyroid mast cell populations in male rats exposed to power-frequency electromagnetic fields', Int J Radiat Biol 2005; 81: 491-499

Rajkovic V, Matavulj M, Johansson O, 'The effect of extremely low-frequency electromagnetic fields on skin and thyroid amine-and peptide-containing cells in rats: An immunohistochemical and morphometrical study', Environ Res 2005; 99: 369-377

Rajkovic V, Matavulj M, Johansson O, 'Light and electron microscopic study of the thyroid gland in rats exposed to power-frequency electromagnetic fields', J Exp Biol 2006; 209: 3322-3328

Clearly rats are not responding psychosomatically.

Animals and the EM environment

As well as our pages on birds and bees, there are plenty of concerns about animals, for example:

- [Transmission tower emissions cripple farm operation in Germany](#)
- [Transmission tower emissions cripple farm operation in Germany: part 2 – a follow up report](#)
- [Birth defects in animals and humans on a US mid-west dairy farm](#)
- [Radio collars upset vole sex life](#)
- [Mobile antenna makes calves blind](#)
- ['got emf?'](#) – over-dramatised, perhaps, and requires careful judgement, but there are accounts here that need sound investigation.

Power transmission and supply

Whilst these links concern wireless sources, there are profound concerns about 'stray voltages' and 'dirty electricity'. This is about more than the bio-effects of powerlines, and includes the complexities of where mains voltages flow, the creation of net currents, and what radio-frequency signals are induced or injected into circuits that then flow around premises. Accounts of farms devastated by imbalanced power lines, bad localised grounding and combinations of RF transmitters with power lines, abound. Similarly, accounts of the fixes through proper grounding and filtering show that there are remedies. The problems will differ between countries, depending on wiring standards, transmission line design etc. But the bottom line is that we have to be extremely careful with this magic stuff called electricity, because it is more complex in use than we ever imagined by lighting the first bulb.

Here are some links to expand on the subject.

- [Stray Voltage from Stray Currents](#)
- [Dirty electricity](#)
- [Researchers look to 'dirty electricity' as a potential cause of unexplained illnesses](#)
- [Graham-Stetzer research \(filters\)](#)
- [Powerwatch on dirty electricity](#)

Decline of bees, UK and worldwide

- [Honeybees may be wiped out in 10 years](#), Sunday Telegraph, 20 January 2008

'Honeybees will die out in Britain within a decade as virulent diseases and parasites spread through the nation's hives, experts have warned. Whole colonies of bees are already being wiped out, with current methods of pest control unable to stop the problem.

'The British Beekeepers Association (BBKA) said that if the crisis continued, honeybees would disappear completely from Britain by 2018, causing "calamitous" economic and environmental problems. ... Last year, more than 11 per cent of all beehives inspected were wiped out, although losses were higher in some areas. **In London, about 4,000 hives – two-thirds of the bee colonies in the capital – were estimated to have died over last winter.** Of the eight colonies inspected so far this year, all have been wiped out. ...'

Summary

Massive and sudden declines have occurred in 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).
- **Agricultural methods** are more intensive: hives may be fumigated, electric fan-ventilated, permanently illuminated, bees fed on the wrong sugar solutions over winter, and grown to be over-sized.
- **GM crops** have been introduced, and not always as openly as some would 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](#).

- [a timeline of bees in trouble and investigations](#)

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](#)

In **Austria**, an enquiry was made via the beekeepers' newspaper. 25 replied that they encountered problems after mast installations in the proximity:

- 37.5% reported an elevated bees aggressiveness
- 25.0% reported a tendency of bees to leave the hive
- 62.5% reported the collapse of the bee population.

No-one knows why

Pesticides and habitat?

Central to the argument of pesticide use has been [Imidacloprid](#) [[more](#)], a systemic nicotinoid agent that accumulated across harvest seasons and becomes available to pollinators. It attacks the nervous system, affecting learning and memory. See: [Honey Bee Disappearances: Could Pesticides Play A Role?](#). Apparently after nicotinoids were withdrawn in France in 1994, bee colonies have still not yet fully recovered.

Whilst pesticides and loss of habitat appear mostly to blame, 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](#). One factor in agricultural methods is **bee size**, and this does appear to make a difference in their resilient to mites. By pushing cell sizes up, commercial beekeepers develop bees up to 50% larger, that ostensibly are more productive. However, pushing this boundary has led to greater varroa problems that organic, natural-sized bees just do not suffer. [[Opinions from an organic beekeeper.](#)]

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.

April 07, [Palm Beach News](#) reported: ‘Troy Fore [executive secretary of the American Beekeeping Federation] and other bee industry figures and scientists said the phenomenon resembles many of the ways bees have always died, but for one notable exception: the empty hive is shunned by other bees and also by insect scavengers.

‘‘I was very much a skeptic about this thing when I first heard of it,’’ said Danny Weaver, a Novosota, Texas, bee breeder who is president of Fore’s group.

‘He said his skepticism vanished when he obtained honeycomb from a collapsed hive and put it in an area heavily populated with bees and bee parasites, including wax moths.

‘‘Nothing would go near it,’’ Weaver said. ‘‘Ordinarily, other bees would be robbing that honey, moths would be all over it. But nothing.’’

Urgent investigation required

This observation must be tested further. A comb from a deserted hive and a comb from a thriving hive must be placed together where other species are plentiful.

- If the ‘affected’ comb is rejected but the ‘control’ is robbed, then this indicates the issue is embedded in the comb, not with the bees.
- If the comb and honey are then separated, each could similarly be tested for its influence on bees.
- If neither comb attracts other than opportunistic attention, then either the environment is disturbing normal activity or the bees and moths are being affected by something in the environment around the combs.

- The combs could then be tested separately to determine if one is itself influencing the environment of the other.

Since this is easily repeatable in many sites, it would quickly focus attention where it is due: comb, honey, pollinators or surrounding environment. (See below on bees, EM fields and their sense of smell.)

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.

- [Orientation and Navigation of Bees may be disturbed by man-made electric, magnetic and electromagnetic fields](#): a six-point statement by Dr. rer. nat. Ulrich Warnke, University of Saarland

Bees that vanished when a house went wireless

There was only one snag with Ryan Ferguson's new home, a three-storey Georgian house in Bath. When the 29-year-old digital sales director moved in three years ago, he found 30 nests of bees in his attic. 'They got everywhere', he says. 'In the shower,

the windows, the light fittings. It used to be quite dangerous. You would walk about at night without shoes on and they'd be all over the floor.'

He twice called in exterminators, but the bees just came back. Then, last summer, he installed a WiFi system. They left and never returned.

reported Independent on Sunday, 22/04/07

Explore the bee crisis more

As the months have gone by, the expected confirmations of mites or other parasites have not been forthcoming. Autopsies on bees show totally destroyed immune systems. Correlation with GM crops does not appear to be true, and whilst originally organic bees appeared immune, now it seems they are not. Beekeepers say that the stresses of breeding, transport, winter syrup nutrients are nothing new. Historical 'dwindles' or disappearances have always been due to known pathogens.

One beekeeper in the US has imported Australian bees and placed them in untreated, sterilised and irradiated abandoned hives. In the latter the bees thrived, suggesting a biological factor. However, with still so much uncertainty and no identified single pathogen, a combination of factors may well be the best explanation: the 'perfect storm' where all the wrong things come together at the same time with a catastrophic result.

- [Honeybees may be wiped out in 10 years](#), Sunday Telegraph, 20 January 2008
- [Are British Columbia's bee colonies the latest to die off?](#)
- [Condemned cells](#), Daily Telegraph Magazine, August 2007.
- [Environmental Emergency Updates: Part 1 – Spreading Honey Bee Disappearances – Nosema ceranae Not the Answer?](#) (US, with global reports)
- [Australian bees in high demand](#) (transcript and (as at May 2007) audio. Story: Australian bees shipped over to North America do not survive there: their immune systems are destroyed. Just the journey?
- [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)
- [Hives left 'like Marie Celeste' as bees mysteriously vanish](#) (Scotland)
- [More on bee decline in the UK and Europe](#)
- [bumble bees in crisis](#) (UK)
- [Why are Niagara's bees dying?](#) (Canada)
- [Bee deaths](#) (German)
- [Honey Bee Crisis extends from US to Britain and Netherlands](#) (UK and Netherlands)
- [Scientists ask: Where are all the bees?](#) (USA)
- [Where are the birds and bees?](#), Milt Bowling, Canada
- [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)
- [The Bees Who Flew Too High](#), nuclear magnetic resonance, bees, quantum effects and the relationship with sunspots. Bees are tuned to the whole of nature, not just flowers.
- [Quantum Honeybees](#). Read the story of Barbara Shipman and the quantum field honeybee dance.

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

Harst W, Kuhn J, Stever H (2006), [Can Electromagnetic Exposure Cause a Change in Behaviour? Studying Possible Non-Thermal Influences on Honey Bees – An Approach within the Framework of Educational Informatics](#) (English)

Kimmel S, Kuhn J, Harst W, Stever H (2007), [Electromagnetic Radiation: Influences on Honeybees \(*Apis mellifera*\)](#)

Research 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?](#)

Bibliography

Altmann G, Warnke U, ‘Einfluß unipolar geladener Luftionen auf die motorische Aktivität der Honigbienen’, *Apidologie* 2 (4), 309-17 (1971)
‘The Influence of air ions with a unipolar charge on the motoric activity of bees’, *Apiology*

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- [see also bibliography of Prof. Hermann Stever](#)

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More related bee sources

- [Honey Bee Quiet](#)
- [Mobile Phones and Vanishing Bees](#), from Institute of Science in Society
- [Entomology professor and department head, May Berenbaum on the latest bee collapse](#)
- [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:

- [The Big Bee Death](#) from diagnose-funk, Zürich
- [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](#)

Electromagnetic fields and trees

There are some very interesting pieces of research and anecdotal evidence related to possible physiological effects of EMFs.

Research indicates that microwave radiation may be partially responsible for some cases of partial deforestation:

- Hertel HU, Wattenwil S: 'Der Wald stirbt und Politiker sehen zu', raum&zeit, Nr. 51/91, Ehlers-Verlagpp. 3-11 (The forest dies and politicians watch)
- Volkrodt W, Bad Neustadt: 'Mikrowellensmog und Waldschäden – Tut sich doch was in Bonn?', raum&zeit, Nr. 52/91, Ehlers-Verlag 51/93 (Microwave smog and forest damage – is Bonn reacting after all?)
- Volkrodt W: 'Droht den Mikrowellen ein ähnliches Fiasko wie der Atomenergie?' (Are microwaves threatened by a fiasco similar to that of nuclear energy?)

Dr Hertel's work also includes photographs and maps of an apparently effected areas, with the photos showing what is alleged to be damage to tree growth caused by microwaves – with markedly different ring profiles noted on different sides of the cross-sections taken through the trunks. Lines of deforestation followed line of transmission. Though there are other possible explanations for some noted occurrences such as the light and shade the trees have been exposed to in the past and geoelectromagnetic anomalies affecting growth patterns and die-back, the research seems highly competent and worthy of further investigation.

- [Damage to trees – forest dying](#) Observations and pictures. With bibliography. [Translation of the above page](#)
- [Are Electromagnetic Waves the Culprit? Warning from deformed plants.](#) Japan
- [400MHz EMR reduces chlorophyll production.](#) (Hungary)
- [Studies on the effects of radio-frequency fields on conifers](#) (380MHz, includes chlorophyll effect). Germany
- [Volkrodt: Microwave smog and forest damage](#)
- [Tree damage from chronic high frequency exposure?](#) 'The three lime trees' that speak for themselves. Requires a lot more observation, and observation relating to onset of transmission and onset of die-back needs to be done.

Further aspects

- Growth stimulation in *Vicius fabus* at power density of 0.000000027 $\mu\text{W}/\text{cm}^2$, Growth inhibition noted at 0.0027 $\mu\text{W}/\text{cm}^2$ (Brauer, (1950), 'Experimental studies on the effect of meter waves of various field intensities on the growth of plants by division', *Chromosoma*, Vol. 3 pp. 483-509)
- Premature aging of pine needles at power density of 0.000027 $\mu\text{W}/\text{cm}^2$ (Selga T, Selga M (1996), 'Response of *Pinus sylvestris* L. needles to electromagnetic

fields. Cytological and ultrastructural aspects', *The Science of the Total Environment* Vol. 180, pp. 65-73, Elsevier Science BV)

- Smaller tree growth rings at power densities of 0.0027 to 0.065 $\mu\text{W}/\text{cm}^2$ (Balodis V, et al. (1996), 'Does the Skrunda Radio Location Station diminish the radial growth of pine trees?' *The Science of the Total Environment* 180:57-64.)
- Damage to trees – 'Oak Die Back'. In the book *Electromagnetic Environments and Health in Buildings* (2004) edited by Derek Clements-Croome (p. 263), Anne Silk noted in that in work she did for the Forestry Commission on very rare conditions of oak trees, 'Oak Die Back', where 'the tree dies from the top down, instead of from the roots upwards as is usual. ... [She] was given over 100 sites in the UK and was able to pinpoint the common distance between sick trees and high multi-mast user. This would appear to indicate that such (modulated) fields interfere with plant hydraulics and the electroosmotic processes taking place within the trees themselves by masking natural electrical fields, particularly those experienced under 'fair weather' conditions. Alternating or inverted fields have already been shown to have biological effects on humans and animals – see Jamieson KS, Bell NB, 'Distorted current flow – the forgotten factor in EMF research? Part 1.', *European Biology and Bioelectromagnetics*, 2005;1(1):1-5
- Radial Growth of Pine Trees: Balodis V, Brumelis G, Kalviskis K, Nikodemus O, Tjarve D, Znotina V, (1996), 'Does the Skrunda Radio Location Station diminish the radial growth of pine trees', [The Science of the Total Environment](#), Vol. 180, No. 1, 2 February 1996, pp. 57-64(8). Abstract: The Skrunda Radio Location Station (RLS), which has operated continuously for more than 20 years, has created a unique area for the study of pulse radio-frequency electromagnetic field effects. Trees were chosen to assess these effects. Since 1990, permanent plots have been established in pine forest stands around the Skrunda RLS and in control areas. The dynamics of tree growth changes were analysed using retrospective tree ring data. There is a statistically significant ($P < 0.01$) negative correlation between the relative additional increment in tree growth and the intensity of the electric field. The radial growth of pine trees has diminished in all plots that received electromagnetic radiation. This decrease in growth began after 1970, which coincided with the start of operation of the Skrunda RLS, and was subsequently observed throughout the period of study. The effects of many other environmental and anthropogenic factors were evaluated, but no significant effects on tree growth were observed.

Leylandii are notable for their ability to screen EM fields, but a long time ago the antenna properties of trees were known:

- [Tree antennas](#), *Scientific American*, July 14, 1919, p. 624

Charles Claessens, [Verband Baubiologie](#), notes: 'I have screwed a screw in some trees in my garden. On them I placed a contact antenne and recorded the signals coming from them. I have to place them on my website shortly. I am told, that some 15 years ago, somebody in Germany has a tree dying. He placed a screw in the tree, placed a

thick wire on it and connected the other end to a ground rod placed farther away. The received signals now did not go through the roots of the tree, but landed in the ground rod. This tree got healthy again. Yes, trees absorb a lot of radiation.'