

The international symposium Man...Health...Environment, held in Luxembourg 3-5 March 1988, was the closing event of the European Year of the Environment (EYE).

The official representative of the Luxembourg Ministry of the Environment for all EYE matters was Paul Weber. The organisation, coordination and secretariat of the one hundred Luxembourg EYE projects, including the symposium, was entrusted by the Ministry to E.J. Lorang (LUX CONFERENCE s.c.).

The Scientific Programme of the Conference was entrusted to the International Society for Research on Civilization Diseases and on Environment (SIRMCE).

This book, based on the conference, was organised, edited, translated, and produced by POPLAR s.c. of Brussels.

## Environment and Health: A Holistic Approach

*Edited by*  
ROBERT KRIEPS  
*Minister of the Environment*  
*Grand Duchy of Luxembourg*

*based on the conference*  
MAN . . . HEALTH . . . ENVIRONMENT

*sponsored by the*  
*Luxembourg Ministries of Environment and Health*  
*the Commission of the European Communities*  
*and the World Health Organization*

**Avebury**

Aldershot · Brookfield USA · Hong Kong · Singapore · Sydney



UV-B) significantly worsens skin ageing, while natural ageing during the same time (two years) has little effect. Thus, even in low doses, sunlight is an important factor in the skin ageing process.

It has now been shown that preventive action can be taken against the worsening of natural ageing through exposure to sunlight. Its purpose is to reduce the cumulative dose for radiation of all kinds. Skin protection by screening of the sun's rays should not be kept only for cases of occasional intense radiation, but should be practised permanently on those areas of the skin most exposed to damage. Moreover, it is hoped that UV-induced modifications might be treated by a local use of retinoids (vitamin A acid).

Thus, skin ageing is the result of many factors: genetic, metabolic, internal and environmental. And the development of skin cancers is now considered with certainty to be the consequence of a chronic exposure to ultra-violet rays.

## Electromagnetic pollution of the environment

by Wolfgang Volkrodt

People have known about electromagnetic waves for about a century. It was not until after World War II, however, that we started to use them extensively in technical applications. Over the last thirty years, transmission density has doubled every four years or so, which means that electromagnetic pollution has gone up around 100 times. In addition, the wavelengths used are getting shorter; we have now entered the microwave era where we are dealing with minuscule dimensions. Microwaves are used, for example, in air traffic control (5, 10 and 23 cm) and directional transmitters (1.5–20 cm).

Microwaves then, are nothing new. Microwaves measuring between approximately 1 cm and several metres reach the planet's surface through the 'window' in the radiological protection belt of the earth's atmosphere. The shorter the waves, the more energy they produce. At  $10^{-10}$  mW/cm<sup>2</sup> (milliwatt/square centimetre), performance capacity is low, but biological systems nevertheless use microwave energy to supplement light to meet their energy needs. For instance, we speak in microwave parlance when measuring leaf ribs and pine needles. If leaf ribs were really just 'plumbing' – tubes to transport moisture – they would be constructed in a different way. \*

## Microwaves: a grave risk

Microwaves cause cell destruction and are inimical to life, both from thermal effects on cell tissue and by interfering with normal cell processes, so they need to be carefully dosed for safety, like X-rays or gamma rays. Today, trees and other biological systems are being subjected to microwave radiation several billion times higher than naturally ordained.

In its own way, a tree is like a factory producing wood. Radar equipment or directional senders can interfere and put the 'factory' out of commission, and the tree does not know how to protect or cure itself. Small wonder that their 'biological antennae' burn out.

The Federal Republic of Germany has laid down maximum levels for artificial microwaves which only take account of the thermal effect on humans within the defined acceptable range of exposure.<sup>1</sup> This effectively means accepting exposure to radiation which is several billion times higher than that received from natural, cosmic sources. No account has been taken of non-thermal effects, to our deadly peril.

## Biological information systems: how do they work?

We need to know more about how biological information systems work to explain the extent of the damage done by microwaves.

All individual life functions according to a blueprint locked into the DNA molecules of the cell nucleus. Life cannot be sustained when the DNA information is lost or when it can no longer be copied and transmitted. The production of DNA copies is not a matter of chance: outside triggers are needed. Even a man-made megabit-chip will not release 'locked' information until it is told to do so. Biological instructions to copy DNA are usually triggered by chemically unstable molecules or by changing electromagnetic fields. In the process of replicating itself, the DNA molecule rotates every 1/1,000 of a second whereby electrical charges are transferred between the affected sequences of molecules. These charge transfers are necessarily coupled with electromagnetic waves. Currently, it is believed that the frequency lies in the range of micro-infrared wave lengths, depending on the speed of the replication.

In addition to the life-sustaining processes in the multiplication and distribution of DNA, living systems also exchange information in other ways:

- the exchange between individual cells or cell groups (e.g. the immune system);

- the reciprocal exchange between cooperating organs (e.g. food ingestion and digestion);
- the nerve paths to the 'main computer' (neurons and transmitter signals to the brain where they become consciousness – e.g. sensual perception);
- the exchange between members of the same species (in humans this mostly takes the form of speech; in trees this might be UV light signals).

The signal frequency used will determine how vigorously these processes take place. In living creatures using magnetic field sensors to find their way through the earth's magnetic field, information exchange will be slow. But a stumble in a human being will provoke lightning exchange to prevent bones being broken. No computer can yet compete with nature in this respect.

All biological information systems use electromagnetic fields and waves in frequencies ranging from zero hertz (in electromagnetic field orientation) to 25 Hz (the sleeping brain) to gigahertz microwaves to the very high frequencies of light. Light is important not only to plants for photosynthesis, but to all living creatures because it regulates biological rhythms. Biological systems, however, have no use for the shortest wavelengths, such as X-rays or gamma-rays, because of their ionizing and cell destructive effects.

We now understand a little better how information is transmitted through the human nervous system. But only recently did we find out that plants have nervous systems that are similar to those of human beings. Not only are plants able to move, they even have feelings. A Heidelberg University team has discovered chemically unstable signalling materials which are to plants what neuro-transmitters are to the human brain. Known as 'turgorines', they regulate certain plant functions such as water distribution and the preparation for 'sleep' – the drooping or curling up of leaves at sundown.

Biological information and regulatory systems are surprisingly quiet performers. They emit no more than a thermo-molecular murmur, proportionately somewhat like the wind rustling through the forest. A 'word' spoken at less than that murmur will not be heard. All living species need such screening of extraneous noise. People would fall ill in body and mind if they constantly received impressions from the functioning of other biological systems. Take the rumbling of a hungry stomach as an example. A tree is no different.

Information transmission at this low noise level presupposes a range of special physical effects. In 1982, scientists suggested that superconductors and the Josephson Effect play a key role in life processes. Recent experiments with high-conductor organic molecular chains at relatively high temperatures tend to bear this out. The Josephson Effect enables a pair of electrons to 'bore through' the barrier of, for instance, a cell membrane

<sup>1</sup> Regulation DIN VDE 0848/2.

Josephson elements may function as detectors, generators, mixers and reinforcers, so that they are ideal links in the information chain.

While biological research has demonstrated the sensitivity of living systems to thermal noise, no such reactions have been measured at higher power densities in systems using Josephson effects. This lack of reaction could help to explain certain widespread errors in our thinking. Research into forest pollution for example has, of course, included work on the effects of microwaves on plant cells. The radiation values used were close to technically acceptable maximum levels and no evidence of damage was ever found. The researchers concluded that at lower radiation levels, such as those used in directional transmitters, microwaves could therefore not possibly do any harm (Bernhardt et al., 1983).

While the theory of biological information systems and the question of whether or not they make use of cosmic microwave radiation is still a matter of speculation, there is now clear evidence that man-made microwaves are harmful after all. Man-made microwaves are different from cosmic 'white noise' not only because of official sanction of a billion times the cosmic radiation intensity, but also because of their precise transmission frequencies, the polarization of the waves, and modulated digital and analogous signals. These special features make them highly suspect as producing typical interference with biological information systems. We also know that such 'scramblers' can make it impossible to understand important information - witness the whines and other noises which for decades have made gibberish of Western radio broadcasts to the Soviet Union.

## Is microwave pollution killing our forests?

We can differentiate between 'traditional' and 'modern' forms of forest pollution. Traditional forms of pollution, for example atmospheric pollution following volcanic eruptions and industrial processes, have been around for a long time. 'Modern' forest pollution, on the other hand, may occur in otherwise clean environments. In my opinion, a case in point is northern Canada, where the radar installations set up to monitor Soviet air movements are wreaking widespread havoc in the forests. Similar 'radar damage' is, I believe, evident in the oak forests north of Vienna, and in the FRG in the vicinity of the Wasserkuppe mountain and near major airports such as Frankfurt am Main. There is evidence that the military and radar equipment manufacturers have known of this for years, but have kept silent for fear of massive compensation payments to forest owners.<sup>2</sup>

<sup>2</sup> Personal contacts with the German military by the author

Meanwhile, the radio link systems, which have taken over from cable to keep us abreast of the news, have burnt such a swathe through our forests that even laymen can see what is happening. Trees die like flies in a straight line running between the transmitters. Fourteen instances of damage from transmitters under the control of the Federal Postal Authority and twenty instances of military transmitter damage were registered in the Hunsrück, FRG region alone.

The German Postal Authority knows about the fatal damage done to our forests by directional radio. It has decided to refuse to supply information about the location and direction of these transmitters on the grounds that this is privileged information. Nature protection organisations are now searching for the country's 'fleet' of directional transmitters and the corresponding paths of destruction. In a letter dated March 30, 1987 the Ministry of Telecommunications asked the Ministry of Environment, Nature Protection and Nuclear Safety to study the following question: 'How do the performance, frequency, modulation and pulse rates of modulated microwave fields affect radiated tissue and plant cells?'<sup>3</sup>

Furthermore, according to the media, some seventy per cent of German citizens suffer pains, thirty per cent are the victims of allergies and fifteen per cent have to put up with constant noises in the ear (tinnitus). These are mostly disorders for which there is no discernable organic cause. Something has gone wrong with the human nervous system, we say. The environment is to blame.

But I believe, much as with our forests, that such disorders are closely connected with radiation from radio and directional transmitters. We have no conclusive proof of this as yet. To find it, we need the work of interdisciplinary research teams including high frequency experts, radiation physicists, doctors and biologists.

The FRG government has calculated that forest die-back is costing the country 5.5-8.8 billion Deutschmarks (DM) a year (some US\$ 3-5 billion). By the year 2010, we shall not only have sustained a financial loss of over DM 200 billion, our forests and no doubt large numbers of people will likewise have been irreversibly damaged.

## Putting an end to microwave technology

But the future looks brighter. We can easily get rid of microwave technology. The FRG and industries have agreed that by the year 2010, communications transmissions will be achieved through a national network

<sup>3</sup> Letter from the Federal Minister for Post and Communications to the Petitions Committee of the Federal Parliament (Bundestag) of 30 March 1987

of modulated fibre optic conductor cables. After that the surfeit of microwave transmitters, in particular directional transmitters, will no longer be necessary. Military radar installations need to be dismantled just as missiles do. Until they are, testing should be at greater intervals and for shorter periods, just as is the case for civil air-raid sirens.

As we switch to modulated fibre optic cables, we will put an end to the interference with biological antenna currently caused by massive microwave radiation, and so steadily prevent more and more environmental damage.

We need to pull ourselves together and work flat out to speed up the transition from microwave technology to fibre optic technology. We are waging war on environmental damage and we must win the battle against the consequences of inexcusable technical shortsightedness.

## References

- Baranski, S., Czarski, P., *Biological effects of microwaves*, Dowden, Hutchinson & Ross, Stroudsburg (Pa.), 1976.
- Bernhardt, J.H., 'Biologisch-technische Grundlagen der Schutzbestimmungen für hochfrequente elektromagnetische Felder', in G. Newi (ed.), *Biologische Wirkungen elektrischer, magnetischer und elektromagnetischer Felder*, Expert, Grafenau, 1983.
- Bernhardt, J.H., Dahme, M. and Raabe, F.K., *Gefährdung von Personen durch elektromagnetische Felder*, Reimer, Berlin, 1983.
- Calle, E.E., et al., 'Leukaemia in occupational groups with presumed exposure to electrical and magnetic fields', *The New England Journal of Medicine*, vol. 313, no. 23, 1985, pp. 1476-7.
- Frucht, A.H., et al., *Die Wirkung hochfrequenter elektromagnetischer Felder auf den Menschen*, Institut zur Erforschung elektrischer Unfälle der Berufsgenossenschaft der Feinmechanik und Elektrotechnik, Cologne, 1984.
- Microwave News*, 'A Report on Non-Ionizing Radiation', vol. 6, no. 2, 1986.
- NCRP-Report No. 86, *Biological effects and exposure criteria for radio-frequency electromagnetic fields*, NCRP, Bethesda (Md.), 1986.
- Pearce, N.E., et al., 'Leukaemia in electrical workers in New Zealand', *Lancet*, no. 1, 1985, pp. 811-12.
- Roberts, N.J., et al., 'Epidemiological Studies of Human Exposures to Radiofrequency Radiation', *Int. Arch. Occup. Environ. Health*, vol. 56, 1985, pp. 169-78.

## Chapter 9

# Electromagnetic and ideological pollution of the brain

by José M.R. Delgado

Our group has been investigating the sources, consequences, prevention and treatment of two main aspects of pollution which in general have been neglected: a) *Biological Effects* determined by electromagnetic radiation; and b) *Neuronal Modifications* determined by cultural indoctrination.

Life has evolved under the influence of two omnipresent forces, gravity and electromagnetic interactions, and it is assumed that both play significant roles in biological activities.

We should remember that most organisms are structured by chemical dipoles, including amino acids which have both negatively charged carboxylic groups and positively charged aminic groups. It should be expected that these electrically charged particles can be modified by the application of electromagnetic fields (EMF).

The biological importance of EMF has been well substantiated in numerous publications and meetings, but our understanding about mechanisms of action is still poor. This knowledge is essential for possible beneficial effects, for adequate preventive measures and for legislation to control private and public use of electricity.

Unfortunately, the modern proliferation of electric plants, high power lines, and electrically mechanised homes are sources of artificial magnetic fields which may influence biological activities. A summary of legal standards has been published by Romero-Sierra (1981) and additional