

BRAIN POLLUTION

BY ROBERT O. BECKER

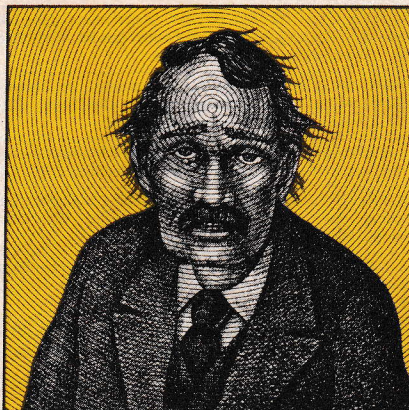
Since Thomas Edison threw the switch on the first commercial electric power plant in 1882, man has made ever-increasing use of electromagnetic energy for power and communications. As a result, we now live in a sea of electromagnetic radiation that we cannot sense and that never before existed on this earth. New evidence suggests that this massive radiation may be producing stress, disease, and other harmful effects all over the world by interfering with the most basic levels of brain functioning.

The electromagnetic spectrum consists of waves arranged on a scale of increasing frequency. The highest frequencies are visible light and ionizing radiation. The rest of the spectrum, ranging from less than one cycle per second—also known as Hertz—to billions of cycles per second, consists of nonionizing electromagnetic radiation. This portion of the spectrum is now filled with a wide variety of man-made radiation, from the 60-Hertz fields produced around home appliances and power transmission lines to the very high-frequency fields of microwave ovens (whose leakage has been widely discussed as a possible health hazard) and telephone channels. Radio and television frequencies fill the low remainder of the electromagnetic spectrum.

Before humans made such extensive use of the spectrum, the earth's electromagnetic environment was far simpler. There was a narrow band in the extra low-frequency (ELF) region, ranging from 1 to 30 Hertz, which was produced by resonance among the earth's surface, the magnetic field, and the ionosphere. The only other electromagnetic radiation of any magnitude was in the 1,000-Hertz range, produced by lightning discharges; the remainder of the spectrum was empty. All life began and has evolved in this relatively constant electromagnetic environment over the past three billion years.

Theoretical analysis of the electromagnetic field that existed during the Pre-Cambrian period (more than 570

million years ago) when life began indicates that enormous amounts of energy were present in the ELF region, particularly around the 10-Hertz frequency. Medical researchers E. R. Graf and F. E. Cole at Auburn University have suggested that that was the source of the energy required for the construction of the complex biological molecules that finally resulted in



life. It is interesting, in this regard, that the brain-wave pattern of all animals, from earth worms to humans, lies in this ELF range.

If basic brain functions are regulated by naturally occurring ELF radiation, how have they been affected by man's introduction of new, much stronger electromagnetic fields, at frequencies never found in the environment until recently? At the Upstate Medical Center in Syracuse, we have concentrated our research on the effects of the 60-Hertz range. In our first experiment, we exposed mice for 30 days to 60-Hertz electromagnetic fields of strengths approximating those found near high-voltage transmission lines. What emerged was a pattern of changes in hormones, body weight, and blood chemistries similar to those found in animals under chronic stress. More recently, we have raised three generations of mice who have lived continuously in such a field—with similar results. Most significantly, the infant mortality rate in the third generation was 50 percent, compared with the normal infant mortality rate of less than 5 percent.

These results suggest the stress-adaptation syndrome first described by stress authority Hans Selye. According to Selye, when a creature perceives it is in a stressful or threatening situation, it activates certain areas of the brain that prepare animals physiologically for maximum effort to meet the challenge. Obviously, the reaction has great survival value in short-term situations. However, Selye found, if the stress-producing situation is continued, the constant state of readiness gradually exhausts the body's defense mechanisms. The body is less able to defend itself against disease in general, and is commonly susceptible to certain specific diseases. One of those diseases is hypertension.

Our mice reached this exhaustion stage. Since we have no reason to believe that mice are any more capable of consciously perceiving electromagnetic fields than humans are, we believe that the stronger-than-normal 60-Hertz field acted directly upon the brain itself, without being consciously perceived, producing all of the signs of chronic stress.

In mice or humans, such stress can be expected to produce an increase in such conditions as hypertension and behavioral abnormalities. The degenerative diseases—particularly those related to a decreased competency of the immune system, such as cancer—would also steadily increase; and, finally, previously non-pathogenic organisms would begin to produce new maladies—Legionnaire's Disease and Reye's Syndrome may be examples.

We can't very well stop all our use of electromagnetic energy for power and communications. It would appear prudent, however, to declare a moratorium on any new source of electromagnetic pollution until we make a careful scientific evaluation of its hazards. □

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