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Negative-Ions and Computers Article #505

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Evidence seems to be mounting that ion concentrations in the air do affect how people feel. Further, there is evidence that the new trend toward using computerized equipment in offices may be creating a special problem.

Outdoor air contains about a thousand positive and negative charges (ions) within each cubic centimeter. Cosmic rays coming into the earth from the sun and elsewhere break apart air molecules and thereby create much of the ionization that exists in the air. Since more cosmic rays come in at the high latitudes, the high-latitude air normally has a higher proportion of ionized air molecules or molecular clusters. However, in cities and in confined spaces such as offices, processes take place to reduce the number of ions. One important process is attachment of charge-carrying molecular clusters to pollution particles in the air. When that happens both the ions and the pollution particles tend to be swept out of the air by the electric field that exists naturally near the earth's surface.

The loss of ion concentration is thought to be harmful because it does seem that high ion concentrations do make people feel better--just why, doesn't seem to be clearly understood. High ion concentrations also apparently inhibit bacterial growth and perhaps foster plant growth. The good effects seem to be attributed to high concentrations of negative ions rather than positive ones; generally, the concentration of both types go together, except in small volumes of air perhaps only a few feet across.

Now, a new problem arises according to an article in the August 1981 issue of *Mini-Micro Systems*, a publication for computer buffs. The problem has to do with CRTs, the cathode ray tubes contained in video terminals and the newfangled typing stations that seem to be sprouting on desktops all over the country. In the Geophysical Institute alone I counted 70 CRTs, not including cathode ray tubes in test equipment.

The electric field caused by the positive static charge that appears on a CRT in normal operation sweeps the nearby air of negative charges, thereby depleting the negative-ion concentration in the immediate vicinity. Apparently when the ion concentration is lowered by this or any other means--air conditioning does it too--workers complain of headaches, lethargy, dizziness and nausea.

One experiment performed in England on 54 individuals at a computer site seems rather convincing. Negative-ion generators were installed, but, unknown to the persons being tested, the generators were not turned on for four weeks. During that period the negative-ion concentration was about 550 per cubic cm. A secret switching on the generators during the next eight weeks of the test raised the ion concentration to 3,500 per cubic cm, several times that found in normal outside air. After the experimenters turned on the ion generators, they found that the tested persons had fewer headaches and other complaints than before. Only five percent then said they had headaches, whereas 20 percent of the workers complained of headaches before the ion generators were turned on. The number reporting dizziness and nausea dropped by more than half, down to less than one percent.

Other English tests indicate that the more complex the task a person tries, the more the individual is affected by negative-ion levels. Also females are more responsive than males to negative-ion depletion or enrichment.

Fraudulent or questionable claims made some years ago about the benefits of ion generators muddy the issue of how important ion concentrations are in air around workers. Consequently, there now probably will have to be overwhelming evidence that ion levels do affect people before widespread attempts are made to ensure that proper levels are maintained. But if that comes to pass, we may see regulations requiring installation of ion generators in rooms where air conditioning and CRTs are used.

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