

Rachel's Environment & Health News

#70 - Destruction Of Ozone Will Cause Vast Damage To Life On Earth

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"Vast increases" in melanomas (deadly human skin cancers) will result from thinning that has already occurred in the earth's ozone shield, and there's nothing that can be done about it; the damage has already been done. Worse yet, some farm crops, and populations of some ocean creatures will be "devastated" early in the 21st century (10 to 40 years from now). Nothing can be done about that either; it's too late. This was the message from a panel of 100 atmospheric scientists convened by the government last week. "We're going to have to live with our past mistakes, and the situation will get worse," said Irving Mintzer of the World Resources Institute in Washington, DC. "We've dug ourselves a real hole here," Mr. Mintzer said.

The earth's ozone "shield" is actually a flimsy parasol, a gossamer canopy of ozone molecules wafting in the upper atmosphere (6 to 30 miles above the earth's surface); it averages only 3 parts per million (ppm) in concentration, yet it intercepts dangerous ultraviolet radiation from the sun, protecting earth's inhabitants. Before the earth's ozone shield developed, eons ago, life as we know it could not develop on the planet.

Ultraviolet radiation (UV) burns human skin, but more importantly it damages human eyes (and presumably the eyes of other animals). Even more importantly, it harms the human immune system (and perhaps the immune systems of other animals). UV also damages DNA, the genetic material of life, and it damages proteins. UV is not visible to mammals so we do not know when we are being subjected to its deadly rays. As UV increases, the earth will look the same to us, but it will be deadly dangerous.

Among the most sensitive creatures to UV damage are phytoplankton, the tiny floating plants that inhabit the top two or three feet of the ocean surface, converting (through photosynthesis) inorganic minerals and water into living tissue. Phyto plankton are the bottom-most level of the oceans' food chains. As the NEW YORK TIMES, editorialized, "Damage to plankton would quickly reverberate through ocean food chains." [March 24, 1988, pg. A34.]

The damage is already measurable; the earth's ozone shield thinned by 3% between 1969 and 1987. Unfortunately, the worst is yet to come because CFCs rise into the atmosphere only slowly, so large quantities of already-released CFCs are drifting upward now; they will do their damage later. Worst of all, a single CFC molecule stays in the stratosphere 50 to 200 years, destroying thousand of ozone molecules all the while. Early in the 21st century, UV reaching the heavily-populated portions of the earth may rise 5% to 20%--a very large increase, by any measure.

How did this global disaster occur and why did humans not act to prevent it earlier?

The culprit is a group of chemicals developed in the 1930s by DuPont and by General Motors. These chemicals are called chlorofluorocarbons, or CFCs. They are very useful as refrigerants (your home refrigerator and your automobile air conditioner probably contain them). They are also used in some foam insulation, and they serve as solvents in the computer chip industry.

No one doubts that safe substitutes can be developed. In other words, this was a preventable disaster. DuPont and friends are now racing to create substitutes because they see a huge market developing as the awful truth about CFCs begins to dawn.

Why didn't anyone act earlier?

In 1974 two scientists from the University of California at Irvine published the first paper saying CFCs (being lighter than air) would slowly rise into the atmosphere, where they would interact destructively with ozone. Chemistry is an exact science, so this was an ominous warning and it was taken seriously by thousands of scientists and even a few policy makers. Unfortunately, the people selling CFCs argued persuasively that a chemical is innocent until

proven guilty.

This was back in the days before all federal environmental policy makers were doormats for industry, and President Carter's Council on Environmental Quality (CEQ) took the ozone problem seriously. The 1977 Report from CEQ quoted the National Science Foundation and the National Research Council: "All the evidence we have examined indicates that the long term release of F 11 and F 12 [two of DuPont's most popular CFC products] at present rates will cause an appreciable reduction in stratospheric ozone."

The 1977 CEQ Report quantified the problem: every 1% reduction in ozone will cause a 2% increase in UV on earth's surface. It said, "Because human health effects and damage to crops, livestock, and natural systems may result from long-term UV increases of only a few percent, predicted ozone decreases are clearly significant." [pg. 194]

The National Cancer Institute identified melanoma (a particularly deadly form of human skin cancer) as a major effect of UV irradiation. The National Academy of Sciences said "the relation of solar UV radiation to melanoma ought to be taken as a likely health hazard of significant size and responded to accordingly."

Still no significant reduction in CFC use occurred; each year humans continued to dump about one million tons of CFCs into the environment-- all of it eventually released into the atmosphere as old refrigerators rot in landfills and old McDonald's hamburger cartons get pulverized by natural causes. Industry continued to argue that--despite widespread recognition of the problem by scientists--a chemical is innocent until proven guilty and no one had actually measured a decrease in stratospheric ozone, so let's ignore the problem and continue making money.

DuPont did make one significant change. They shortened their corporate slogan from "Better Things for Better Living Through Chemistry" to "Better Things for Better Living."

A lone scientist, Joseph Farman, has been measuring ozone in the earth's atmosphere at the south pole since 1957. Starting in 1977 he began recording a measurable reduction in atmospheric ozone. However, Mr. Farman did not trust his own results. After all, NASA's Nimbus 7 satellite was not reporting similar results. Finally in 1985 Mr. Farman could hold his peace no longer and he published his findings. NASA scientists then discovered that their computer that analyzed Nimbus 7 data had been programmed to discard readings as low as those Mr. Farman was recording, on the assumption that readings that low represented instrument errors, not ozone losses. Mr. Farman's data turned the scientific world on its ear; here were the "dead bodies" all lined up; indisputably, earth's ozone shield was being depleted.

Still industry fought on, arguing that a chemical is innocent until proven guilty. For three more years they maintained this cruel posture, each year consigning us and our children to a bleaker and bleaker future.

The lesson is crystal clear: all human created chemicals must be considered guilty until proven innocent. New chemicals should be assumed dangerous from the start. Politicians' attitudes toward the modern chemical industry are demonstrably a major menace to life on earth. Our past national policies have proven destructive on a global scale and must be abandoned forthwith.

--Peter Montague

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