POLLUTION

Rain by inadvertence

Man is achieving the ability to manipulate the weather in certain limited ways. Seeding a suitable cumulus cloud, for example, can cause it to release more or less precipitation, depending on conditions, than it normally would (SN: 4/11, p. 365).

But man's unintentional modification of the weather with pollutants may be dwarfing his deliberate efforts. The effects of pollution on the weather are difficult to sort out. Clear cut, unequivocal demonstrations are rare, but a handful of recent studies is beginning to point an accusing finger at particulates put into the air by automobiles, incinerators, power generators, industrial plants and agricultural activity. Each seems to have had a role in modifying precipitation at a number of locations in the United States.

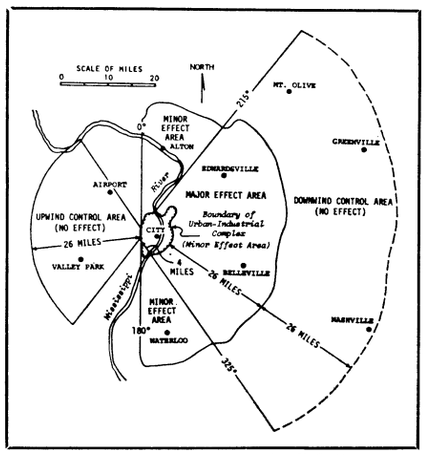
"Little attention has been given to the possibility that submicroscopic particulates from manmade pollution may in fact be initiating and controlling precipitation in a primary manner," says Dr. Vincent J. Schaefer of the State University of New York at Albany.

For several years Dr. Schaefer, who launched the field of weather modification in 1946 with his discovery of the effectiveness of using dry ice to seed clouds, has been observing a number of strange snow and rain storms in the east-central part of New York State. These storms consist of rain or snow particles so tiny they sometimes drift rather than fall to earth. When he collects these misty rains and light snows on a clean plastic sheet he gets badly polluted water. Twenty cases of such misty precipitation have occurred near Schenectady since November.

He believes this type of rainfall is a consequence of automobile pollution.

On the basis of his field studies, he expects that the frequency of such unusual weather phenomena may increase as air pollution increases. The culprit here is not visible industrial effluents but particles smaller than one micron. There is a danger, he feels, that the public will be lured into a false sense of security by the reduction of visible pollution while the invisible pollutants continue to increase.

A scientific group from the state of Washington has reported that areas downwind from pulp and paper mills have shown marked increases in rainfall and streamflow in recent years (SN: 2/28, p. 224). These inadvertent changes in precipitation, they say, might be considerably greater than those aspired to in deliberate cloud seeding projects to produce rain.



Huff & Changnon

Industry effects on St. Louis rain.

Two new studies of possible urban effects on precipitation in St. Louis and Chicago have shown a substantial increase in the frequency of heavy rainstorms downwind of the two cities' industrial complexes. In the Chicago area, the downwind increase in heavy rainstorms was greatest in the vicinity of La Porte, Ind., where earlier studies indicated maximum urban-induced increases in thunderstorms and hail days.

Areas downwind from industrial complexes near Chicago and St. Louis have up to 23 percent more rainy days than do upwind areas or other areas where industrial effects are not predicted.

In St. Louis none of the rain-day increases were on weekends. "This strongly indicates an urban-industrial effect related to increased human and industrial activities on weekdays," Drs. F. A. Huff and S. A. Changnon Jr. of the Illinois State Water Survey reported at last week's meeting on weather modification of the American Meteorological Society. "Certainly all these various findings indicate that industrial effects are the principal cause of the rain increases."

A study of precipitation by days of the week during the last half century at 22 Weather Bureau stations in cities in the eastern United States surprisingly reveals a clear distinction between weekdays and weekends. More rain falls on Tuesdays through Fridays than on Saturdays and Sundays, reports Dr. Ralph H. Frederick of the Environmental Science Services Administration. Mondays appear to be an in-between transition day.

"I know of no seven-day cycle in nature," says Dr. Frederick. The implication is that particulates from workday human activities serve as nuclei to cause increased rainfall. The work is a strong suggestion, if not proof, of such an effect.

FOR MANIC DEPRESSIVES

Controversial drug approved

Lithium carbonate, a 20-year-old psychotherapeutic drug, was finally approved last week by the Food and Drug Administration for treating the manic state of manic-depressive psychosis.

Lithium has been widely used throughout Europe over the past 15 years, and has been under study in the United States for at least five years. One reason approval of the drug has been held up in this country is concern over its toxic levels, which are reportedly only three times the therapeutic level. But the major problem may be simply that no company has actually wanted to market the drug because the chemical cannot be patented.

Many psychiatrists consider the drug to be the most effective treatment available for manic-depressive psychosis. Dr. Nathan Kline, research director of the New York State Rockland Hospital, Orangeburg, N.Y., calls licensing of the drug "the greatest thing to hit psychiatry in years." Dr. Kline feels that lithium is a new and different key for dealing with other psychiatric disorders.

Drugs that have been approved for marketing by the FDA include those by Chas. Pfizer & Co., Inc., Rowell Laboratories, Inc., and Smith Kline and French Laboratories.

One of the major psychoses, manic-depressive disease is marked by alternating extremes of excitement and depression, with periods of normal behavior in between. In the past it has been treated with either electroshock or heavy doses of tranquilizers, neither of which has been satisfactory.

Although the mode of action for lithium has not been confirmed, Rowell Laboratories suggests it may act by interfering with the metabolism of the catecholamines, which are involved in all brain activity. Unlike the tranquilizers, lithium does not depress the central nervous system; unlike electroshock, it does not impair memory. Dr. B. E. Greenwell, Rowell research vice president, reports the drug produces no chronic toxicity, addiction or withdrawal symptoms.

FDA recommends the drug for the manic state alone, but some psychiatrists feel the drug is effective in the depressive state as well. Dr. Paul Blachly, professor of psychiatry at the University of Oregon Medical School in Portland, who has worked with lithium since 1964, claims the drug is effective during the depressive state when administered in conjunction with antidepressants. "Indicating the drug for the manic state alone," he contends, "is myopic on the part of the FDA." □