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# Silent Spring—I

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Illustration by Emiliano Ponzi

There was once a town in the heart of America where all life seemed to be in harmony with its surroundings. The town lay in the midst of a checkerboard of prosperous farms, with fields of grain and hillsides of orchards, where white clouds of bloom drifted above the green land. In autumn, oak and maple and birch set up a blaze of color that flamed and flickered across a backdrop of pines. Then foxes barked in the hills and deer crossed the fields, half hidden in the mists of the mornings. Along the roads, laurel, viburnum, and alder, great ferns and wild flowers delighted the traveller's eye through much of the year. Even in winter, the roadsides were places of beauty, where countless birds came to feed on the berries and on the seed heads of the dried weeds rising above the snow. The countryside was, in fact, famous for the abundance and variety of its bird life, and when the flood of migrants was pouring through in spring and fall, people came from great distances to observe them. Other people came to fish streams, which flowed clear and cold out of the hills and contained shady pools where trout lay. So it had been from the days, many years ago, when the first settlers raised their houses, sank their wells, and built their barns.

Then, one spring, a strange blight crept over the area, and everything began to change. Some evil spell had settled on the community; mysterious maladies swept the flocks of chickens, and

the cattle and sheep sickened and died. Everywhere was the shadow of death. The farmers told of much illness among their families. In the town, the doctors were becoming more and more puzzled by new kinds of sickness that had appeared among their patients. There had been several sudden and unexplained deaths, not only among the adults but also among the children, who would be stricken while they were at play, and would die within a few hours. And there was a strange stillness. The birds, for example—where had they gone? Many people, baffled and disturbed, spoke of them. The feeding stations in the back yards were deserted. The few birds to be seen anywhere were moribund; they trembled violently and could not fly. It was a spring without voices. In the mornings, which had once throbbled with the dawn chorus of robins, catbirds, doves, jays, and wrens, and scores of other bird voices, there was now no sound; only silence lay over the fields and woods and marshes. On the farms, the hens brooded but no chicks hatched. The farmers complained that they were unable to raise any pigs; the litters were small, and the young survived only a few days. The apple trees were coming into bloom, but no bees droned among the blossoms, so there was no pollination and there would be no fruit. The roadsides were lined with brown and withered vegetation, and were silent, too, deserted by all living things. Even the streams were lifeless. Anglers no longer visited them, for all the fish had died. In the gutters under the eaves, and between the shingles of the roofs, a few patches of white granular powder could be seen; some weeks earlier this powder had been dropped, like snow, upon the roofs and the lawns, the fields and the streams. No witchcraft, no enemy action had snuffed out life in this stricken world. The people had done it themselves.

This town does not actually exist; I know of no community that has experienced all the misfortunes I describe. Yet every one of them has actually happened somewhere in the world, and many communities have already suffered a substantial number of them. A grim spectre has crept upon us almost unnoticed, and soon my imaginary town may have thousands of real counterparts. What is silencing the voices of spring in countless towns in America? I shall make an attempt to explain.

The history of life on earth is a history of the interaction of living things and their surroundings. To an overwhelming extent, the physical form and the habits of the earth's vegetation and its animal life have been molded and directed by the environment. Over the whole span of earthly time, the opposite effect, in which life modifies its surroundings, has been relatively slight. It is only within the moment of time represented by the twentieth century that one species—man—has acquired significant power to alter the nature of his world, and it is only within the past twenty-five years that this power has achieved such magnitude that it endangers the whole earth and its life. The most alarming of all man's assaults upon the environment is the contamination of the air, earth, rivers, and seas with dangerous, and even lethal, materials. This pollution has rapidly become almost universal, and it is for the most part irrecoverable; the

chain of evil it initiates, not only in the world that must support life but in living tissues, is for the most part irreversible. It is widely known that radiation has done much to change the very nature of the world, the very nature of its life; strontium 90, released into the air through nuclear explosions, comes to earth in rain or drifts down as fallout, lodges in soil, enters into the grass or corn or wheat grown there, and, in time, takes up its abode in the bones of a human being, there to remain until his death. It is less well known that many man-made chemicals act in much the same way as radiation; they lie long in the soil, and enter into living organisms, passing from one to another. Or they may travel mysteriously by underground streams, emerging to combine, through the alchemy of air and sunlight, into new forms, which kill vegetation, sicken cattle, and work unknown harm on those who drink from once pure wells. As Albert Schweitzer has said, "Man can hardly even recognize the devils of his own creation." It took hundreds of millions of years to produce the life that now inhabits the earth—aeons of time, in which that developing and evolving and diversifying life reached a state of adjustment to its surroundings. To be sure, the environment, rigorously shaping and directing the life it supported, contained hostile elements. Certain rocks gave out dangerous radiation; even within the light of the sun, from which all life draws its energy, there were short-wave radiations with power to injure. But given time—time not in years but in millennia—life adjusted, and a balance was reached. Time was the essential ingredient. Now, in the modern world, there is no time. The speed with which new hazards are created reflects the impetuous and heedless pace of man, rather than the deliberate pace of nature. Radiation is no longer merely the background radiation of rocks, the bombardment of cosmic rays, the ultraviolet of the sun, which existed before there was any life on earth; radiation is now also the unnatural creation of man's tampering with the atom. The chemicals to which life is asked to make its adjustment are no longer merely the calcium and silica and copper and the rest of the minerals washed out of the rocks and carried in rivers to the sea; they are also the synthetic creations of man's inventive mind, brewed in his laboratories and having no counterparts in nature. To adjust to these chemicals would require time on the scale that is nature's; it would require not merely the years of a man's life but the life of generations. And even this would be futile, for the new chemicals come in an endless stream; almost five hundred annually find their way into actual use in the United States alone. The figure is staggering and its implications are not easily grasped: five hundred new chemicals to which the bodies of men and all other living things are required somehow to adapt each year—chemicals totally outside the limits of biological experience.

Among the new chemicals are many that are used in man's war against nature. In the past decade and a half, some six hundred basic chemicals have been created for the purpose of killing insects, weeds, rodents, and other organisms described in the modern vernacular as "pests." In the form of sprays, dusts, and aerosols, these basic chemicals are offered for sale

under several thousand different brand names—a highly bewildering array of poisons, confusing even to the chemist, which have the power to kill every insect, the “good” as well as the “bad,” to still the song of birds and to stop the leaping of fish in the streams, to coat the leaves with poison and to linger on in soil. It may prove to be impossible to lay down such a barrage of dangerous poisons on the surface of the earth without making it unfit for all life. Indeed, the term “biocide” would be more appropriate than “insecticide”—all the more appropriate because the whole process of spraying poisons on the earth seems to have been caught up in an endless spiral. Since the late nineteen-forties, when DDT began to be used widely, a process of escalation has been going on in which ever more toxic chemicals must be found. This has happened because insects, in a triumphant vindication of Darwin’s principle of the survival of the fittest, have consistently evolved super-races immune to the particular insecticide used, and hence a deadlier one has always had to be developed—and then a deadlier one than that. It has happened also that destructive insects often undergo a “flareback,” or resurgence, after spraying, in numbers greater than before. The chemical war is never won, and all life is caught in its cross fire.

Along with the possibility of the extinction of mankind by nuclear war, a central problem of our age is the contamination of man’s total environment with substances of incredible potential for harm—substances that accumulate in the tissues of plants and animals, and even penetrate the germ cells, to shatter or alter the very material of heredity, upon which the shape of the future depends. Some would-be architects of our future look toward a time when we will be able to alter the human germ plasm by design. But we may easily be altering it now by inadvertence, for many chemicals, like radiation, bring about gene mutations. It is ironic to think that man may determine his own future by something so seemingly trivial as the choice of his insect spray. The results, of course, will not be apparent for decades or centuries. All this has been risked—for what? Future historians may well be amazed by our distorted sense of proportion. How could intelligent beings seek to control a few unwanted species of weeds and insects by a method that brought the threat of disease and death even to their own kind?

The problem whose attempted solution has touched off such a train of disaster is an accompaniment of our modern way of life. Long before the age of man, insects inhabited the earth—a group of extraordinarily varied and adaptable beings. Since man’s advent, a small percentage of the more than half a million species of insects have come into conflict with human welfare, principally in two ways—as competitors for the food supply and as carriers of human disease. Disease-carrying insects become important where human beings are crowded together, especially when sanitation is poor, as in times of natural disaster or war, or in situations of extreme poverty and deprivation. As for insects that compete with man for food, they become important with the intensification of agriculture—the devotion of immense

acreages to the production of a single crop. Such a system sets the stage for explosive increases in specific insect populations. Single-crop farming does not take advantage of the principles by which nature works; it is agriculture as an engineer might conceive it to be. Nature has introduced great variety into the landscape, but man has displayed a passion for simplifying it. Thus he undoes the built-in checks and balances by which nature holds the various species within bounds. One important natural check is a limit on the amount of suitable habitat for each species. Obviously, an insect that lives on wheat can build up its population to much higher levels on a farm devoted solely to wheat than on a farm where wheat is intermingled with crops to which the insect is not adapted. In all such circumstances, insect control of some sort is necessary and proper. But in the case of both types of insect—the disease-carrying and the crop-consuming—it is a sobering fact that massive chemical control has had only limited success, and even threatens to worsen the very conditions it is intended to curb.

Another aspect of the insect problem is one that must be viewed against a background of geological and human history—the spreading of thousands of different kinds of organisms from their native homes into new territories. This worldwide migration has been studied and graphically described by the British ecologist Charles Elton in his recent book “The Ecology of Invasions by Animals and Plants.” During the Cretaceous period, some hundred million years ago, flooding seas created many islands within continents, and living things found themselves confined in what Elton calls “colossal separate nature reserves.” There, isolated from others of their kind, they developed large numbers of new species. When some of the land masses were joined again, about fifteen million years ago, these species began to move out into new territories—a movement that not only is still in progress but is now receiving considerable assistance from man. The importation of plants is the primary agent in the modern spread of species, for animals have almost invariably gone along with the plants—quarantine being a comparatively recent and never completely effective innovation. The United States government itself has imported approximately two hundred thousand species or varieties of plants from all over the world. Nearly half of the hundred and eighty-odd major insect enemies of plants in the United States are accidental imports from abroad, and most of them have come as hitchhikers on plants. In new territory, out of reach of the natural enemies that kept down its numbers in its native land, an invading plant or animal is able to increase its numbers enormously. Realistically speaking, it would seem that insect invasions, both those occurring naturally and those dependent on human assistance, are likely to continue indefinitely. We are faced, according to Dr. Elton, “with a life-and-death need not just to find new technological means of suppressing this plant or that animal” but to acquire the basic knowledge of animal populations and their relations to their surroundings that will “promote an even balance and damp down the explosive power of outbreaks and new invasions.” Much of the necessary knowledge is now available, but we do not use it. Have we fallen into a mesmerized state that makes us accept as

inevitable that which is inferior or detrimental, as though we had lost the will or the vision to demand that which is good? Such thinking, in the words of the American ecologist Paul Shepard, “idealizes life with only its head out of water, inches above the limits of toleration of the corruption of its own environment,” and he goes on to ask, “Why should we tolerate a diet of weak poisons, a home in insipid surroundings, a circle of acquaintances who are not quite our enemies, the noise of motors with just enough relief to prevent insanity? Who would want to live in a world which is just not quite fatal?”

Yet such a world is pressed upon us...

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