

BIOMASS CAN DO IT



The rock dust is there, by the billions of tons; the organic material is there in billions of tons of garbage and sludge; the U.S. population alone produces twelve thousand pounds of excrement per second, while, in that same second, U.S. livestock are producing another quarter million pounds; and there are 2 billion acres of unused or marginal land in the world, 62.5 million in the United States alone. What would it take to stop using poisonous chemicals, stop burning fossil fuels, reduce the danger of CO₂ and feed a world population increasing by the billion?

The answer is not the fantasy of some crackpot dreamer, but hard data spelled out by the U.S. Department of Agriculture's vast Beltsville Research Facility, a multi-million dollar outfit spread across miles of the Maryland landscape just north of Washington, D.C., designed, at taxpayer's expense, to improve the conditions of agriculture for the farmer.

Not that this particular approach hasn't been put forward before, time and again, over the past quarter century, by a series of experts writing in Charles Walters' *Acres U.S.A.* It is only that now the proposal comes from an official government agency, in serious form, through the lucid writing of one of its professionals, a tall, jovial Doctor of Botany and Taxonomy, James A. Duke, expert in the study of hallucinogenic plants, whose office looks out across the greensward at the enormous USDA library—an

institution that fails to carry a single book by either Steiner or Kolisko!

With just the acreage that now lies fallow, says Dr. Duke, we could be self-sufficient in energy and not have to burn another pound of fossil fuel. At the same time we could have a large surplus of proteins from legumes and grains; and we could remedy the nation's appalling balance of payments by some \$60 billion. All of this simply by planting our marginal soil, all 62.5 million acres of it, and imitating the American Indian method of intercropping legumes such as alfalfa with cereals such as corn to create "energy farms" on soil not presently exploited. Such farms could not only feed the nation, with a surplus, but produce abundant fuel from crops, eliminating the need to import crude oil from abroad. And all this without taking into account the 125



James A. Duke, Phi Beta Kappa, Ph.D. in Botany, has been for many years with the USDA at Beltsville, Maryland, and is responsible for over a hundred scientific publications and several books. He is holding an Australian chestnut that is being tested by the National Cancer Institute for its chemical—castanospermine—as a therapeutic hope for AIDS. (Photo by USDA)

million acres presently devoted to hay and corn, 90 percent of which is grown for livestock.

To make auto fuel from fresh plant tissue is just as easy as making it from the fossilized remains of plants and microorganisms. But plants have an enormous advantage: they are renewable, yearly, and indefinitely. From fresh plants low-pollution fuel is economically available for both gasoline and diesel fuel. This would greatly reduce the greenhouse effect by cutting down on the industrial proliferation of CO₂. At the same time it would create a great mass of vegetation to absorb the present surplus, further offsetting the greenhouse effect. Organic wastes from all this bonanza would help rebuild a degraded soil.

Alfalfa, says Duke, grows well in the cool months, producing enough vegetation to yield the energy equivalent of two to seven barrels of oil per acre. Basing estimates on average alfalfa yields, Duke concludes that we could get nearly a ton of edible leaf protein per acre of alfalfa (and that's only one-seventh of what Harold Aungst was able to get using Sonic Bloom).

"The trick," said Duke, "is to intercrop a legume with a cereal. True, if you grow grain alone, you'll get more grain; and if you grow legume alone you'll get more legume. But if you grow the two together you'll get a greater biomass, and that is what you're after."

Corn is one of the more productive plants, in a category known as C-4, which photosynthesize best in the heat of summer. With the aid of sunshine, its stalks and leaves produce the energy equivalent of twenty barrels of oil per acre, plus another six barrels from the grains if these are used for energy. To achieve this output requires only two barrels of oil per acre, nearly one barrel of which goes for nitrogen fertilizer. But alfalfa, like most legumes, takes nitrogen from the atmosphere and puts it into the soil at the rate of about two hundred pounds per acre, comfortably compensating for the one required barrel of oil. Other highly fuel productive C-4 plants include rice, sorghum, and the taller grasses, such as those that Wes Jackson is improving at "the Land."

The 55 million tons of protein derivable from the 62.5 million acres now lying fallow would be about ten times what Americans need for their diet. The residues remaining after protein extraction would yield the yearly equivalent of 250 million barrels of oil in the form of alcohol from the cellulose broken down to sugar. This alone could significantly cut oil imports from Persian Gulf countries, and eliminate the need for patrolling dangerous waters.

Revitalizing Pfeiffer's dream, Duke suggests that, if we were to fertilize with sewage sludge, our 62.5 million acres of corn and

alfalfa could probably reduce imports by *one million* barrels of oil *a day*, from our present daily import of nearly seven million barrels.

Already in 1979 Dan Carlson had submitted a proposal to the Department of Energy offering with his Sonic Bloom to increase the annual production of fuel derivable from an acre of corn grain alone (without the leaves or stalks) from a normal 250 gallons to a bumper 650, and possibly achieve two crops in a year, which would comfortably raise the flow to over 1,000 gallons, renewable annually.

But DOE, in the throes of nearly being aborted by the newly elected Ronald Reagan, never made an official assessment of this sanguine proposal.

Yet there still remains the patrimony of 125 million acres to work with, presently used, or misused, to grow hay and corn for livestock. Were these green acres to be made into "energy farms" of appropriate combinations of legumes and cereals, we could, according to Duke, after harvesting for local consumption and for export of 100 million tons of legume protein, produce more corn cereal than we have ever harvested before, and generate 3.5 billion barrels of oil from the residue.

This would take care of the country's entire energy requirements. And just as appealing are all the other benefits accrued. In becoming self-sufficient via organic energy farms, we could, says Duke, generate employment for the depressed farming, housing, and automotive industries. More hands would be needed to plant, cultivate, harvest, and process energy crops.

Small factories would be needed near the energy farms to convert energy crops into renewable fuels like ethanol (grain alcohol), methanol (wood alcohol), and methane gas, all of which generate less pollution than gasoline.

Detroit, says Duke, could reverse its slump by manufacturing converters needed to run our cars on renewable fuels. Decentralizing the fuel production process, eliminating the transport of fuel halfway around the world, would stimulate depressed local economies while conserving energy in fuel transport, to say nothing, adds Duke with a smile, of removing the oil producers' fingers from our economic throat.

By converting to organic renewable fuels, we would generate research and jobs for America rather than for OPEC. Price shifts following such a conversion might make it possible to fulfill the long-held dream of U.S. farmers of trading a bushel of corn for a barrel of oil.

Air in Los Angeles and Denver might once more be fit to breathe. And then there is the problem of water, becoming increasingly

scarce in such states as Arizona. Current efforts to deal with our energy problems call for massive use of western waters—water that will be needed by farmers to grow their crops.

The organic energy farm, says Duke, will alleviate both problems. Water removed during processing of crops for energy and protein can be piped back to the fields. In addition, the buildup of humus in dry western fields would help to hold the scanty rain. Another creative way of turning a disaster area to advantage is Duke's suggestion that strip miners convert the torn-up land into energy farms, interconnected by canals dug with their earth-gouging machinery. Stripped coal could then be barged out, and sewage sludge barged in to fertilize and rehabilitate the land. Before long, says Duke, barges would be hauling renewable fuels to urban centers and sludge back to the energy farms, bringing a knowing smile to Pfeiffer's ghost.

Already in the 1960s Donald Despain, a maverick economist and industrial-relations counsel, had proposed a fundamentally new industry to transform agriculture from only a source of food supply to a supplier of industrial products, which would create a degree of agrarian prosperity never before experienced in America.

"With agriculture entering a long depression," he told audiences in 1972, "and farmers getting the same prices they got nearly twenty years ago—while paying prices three times higher—their growing crops for power alcohol could pull them out of a slump and into prosperity."

Despain quoted a Dow Chemical Company executive, William S. Hale, as telling the U.S. Senate's Subcommittee on Agriculture: "Alcohol, which can be manufactured from any farm product containing sugar crystals is the only outlet in mass form we have for excess agricultural products."

So, why is it, if the fact has been known and proved for over half a century that internal combustion engines can run on alcohol as a sole fuel or on gasoline with an alcohol additive, either substituting for gasoline or stretching it by 100 percent, that this bonanza is not available to one and all?

In the 1930s Dr. Leo M. Christensen in a pamphlet, *Power Alcohol and Farm Relief*, dug deeply into the extensive scientific literature on the use of ethyl alcohol as a cheap fuel for all combustion engines. All the investigators agreed that from the standpoint of national economic welfare, alcohol was the best fuel because of its many established advantages plus the fact that it could be produced within each country, whereas petroleum has to be imported.

Most attractive to farmers was the chance to distill their own fuel on their own farms, or make larger amounts—as much as

ten thousand gallons a day—in a community distiller, which could process any crop containing sugar or starch.

Opposition of the oil companies, says Christensen, was organized and brutal: they went about distributing to filling-station operators across the nation cost-free mimeographed material to scare the public into believing that alcohol was inefficient or dangerous. The Petroleum Institute, with branches in every state, went into action, and in the nation's capital money gushed like oil to lobby senators and congressmen.

Intrepidly fighting for the "Farmer's Alcohol," Charles Walters Jr., carefully documented in a series of articles in *Acres U.S.A.*, the cynical attitude of the "Big Oil" cartel members before, during, and since World War II, as they fought bitterly against the distillation of grain, even grain so spoiled as to prevent its consumption by humans, and even when survival of America and its Allies was at stake in World War II. Only on orders from FDR's "no red-tape" Baruch Committee, did B-29 bombers eventually fly on a mixture of high octane 100 proof alcohol. But right after the war the government closed down its alcohol refineries, even though Dr. G.E. Hilbert, Chief of the USDA's Bureau of Agricultural and Industrial Chemistry, reported, on the basis of extensive testing, that "farm alcohol makes low-octane fuel equal to regular gasoline," emphasizing that it could economically provide a vast market for surplus grains. To distill a billion bushels of surplus grain, he said, cost only \$30 million—a small amount compared to the \$200 million required to build increased storage facilities, "which in no way solve the problem."

While grain was being stored in bins, elevators, vacant lots, tents, ships, and even on the main streets of towns, each bushel of grain containing better than 2 1/2 gallons of ethyl alcohol, superior to premium gasoline, the farmer was being subsidized to retire land from use.

The move to alcohol was even supported by Truman's Secretary of Agriculture, Charles F. Brannan; and a USDA expert told one U.S. Senator there was no reason why all damaged grain could not be used for producing industrial alcohol. But, when Dwight D. Eisenhower was elected in 1952—as doyen of the military-industrial establishment, the machinations of which he warned against just before leaving office—a special commission was formed to look at American post-war agriculture. Blatantly ignoring seventy-five years of alcohol experience in Russia, Poland, Italy, France, and England, the commission concluded that it had found "no encouragement for believing that, in the present state of knowledge and under present economic conditions, the use of industrial alcohol for motor fuel can be justified." It was a

specious statement predicated on oil being available at 4.6 cents a barrel at Ras Tanura and other Saudi Arabian oil refineries, *ad infinitum*. And whereas the commission used the excuse that alcohol was not efficient as a fuel, Walters pointed out that it is equivalent to gasoline in power, burns cleaner, produces lower emissions, and causes no unusual engine wear. Cars in the Indianapolis 500 use 40 to 75 percent alcohol in their engines, and the world's speedboat record was made with 100 percent alcohol fuel.

So perfidious are the petrochemical companies, now faced with imminent depletion of their oil reserves, they are looking to control the source of biomass as is evident from the manipulation of farmers into debt and expropriation by foreclosure. A straw in the windy politics of the nation's capital was seized by Vice-President George Bush as he girded himself to carry the chemical banner into the presidential race of 1988. In *Chemical Marketing Reporter* of August 10, 1987, he was quoted as touting ethanol and methanol as a step toward "energy independence, less smog in cities, and more American jobs."

Already in 1983 Duke was commissioned by the Northern Agricultural Energy Center of the USDA in Peoria, Illinois, to prepare an unbiased comparison of two hundred of the more promising renewable energy species of plants. Included, along with such common energy grasses as sugar cane and the all-too-familiar oilseed, the peanut, were more exotic specimens such as the "petroleum plant" euphorbia, and the "gopher" plant, whose milk, according to Nobel Laureate Melvin Calvin, can produce fifty barrels of oil per acre per year; or diesel trees like the huge *Copaifera*, which bleeds like a rubber tree to give fifty barrels of diesel per acre per year; or the kerosene tree *Sindora*, another large tropical tree which is bled for its resin; and petroleum nuts like *Pittosporum*, a fast-growing tropical legume tree grown for firewood to burn for electricity; and the fast-growing fuel-wood species like *Leucaena*, the Philippine tree from whose fruit kerosene is readily derived.

In Hawaii, says Duke, it is economically feasible to produce electricity from *Leucaena*. In the Philippines *Pittosporum resiniferum* bushes could satisfy the kerosene needs of every Philippine family. Four percent of Panama planted to *Leucaena* could satisfy Panama's energy requirements.

And Duke points out that all of U.S. petroleum requirements could be satisfied with the hydrocarbons derived from planting acreage the size of Arizona with euphorbia, commonly known as "spurge," a shrubby plant with a bitter milky juice that survives in arid areas.

Then there is the family of oil palms, considered the third amongst the plant families important to man after legumes and grasses. They produce quantities of oil, and can grow very well on marginal, or even desertified, land. According to the Office of Technological Assessment (1984), about two billion hectares of tropical lands are in various stages of degradation, a wasted potential asset. Technologically improving such degraded lands with sewage sludge and planting energy trees would offer an organic solution that would lead to higher productivity of energy sources while temporarily but vitally tying up CO₂.

Tropical countries, especially humid countries, with few or no fossil fuels, bankrupt by high energy costs, and hungry for energy alternatives, must, says Duke, look to what natural resources they have at hand. For the Third World, he suggests a variety of palm oils that could make many of those countries self-sufficient in fuel. Much degraded land requires expensive irrigation and desalinization, but the nypa, a palm of southeast Asian mangrove swamps, grows even where it is inundated once or twice a day with saline tides. The nypa can give two to three times as much alcohol per hectare as can sugar cane; and the Philippines alone have 400,000 hectares suitable for nypa production. Upgrading the OTA's two billion degraded hectares to give twenty-five barrels of oil per hectare per year, could, said Duke, reading from one of his serious papers, facetiously entitled "Reading Palms into the Future," produce the required fuel to run the world. "OPEC," he added with a smile, "might become an acronym for Oil Palm Exporting Countries." Oil palm trees, representing a standing biomass of about ten to one hundred metric tons per hectare, would meanwhile tie up a lot of CO₂ in previously unproductive land that tied up very little.

The babassu tree (*Orbignya barbosiana* Burret) is reported by OTA to yield more than a ton of fruit per year. During World War II liquid fuels were derived from the babassu; they burned easily and cleanly in diesel engines. Residues were converted to coke and charcoal. In Brazil nearly 100,000 people are presently employed on 15 million swampy hectares described as "probably the largest vegetable oil industry in the world." It is wholly dependent on wild plants, developed from an indigenous cottage industry, capable of further expansion. Of the fruit, 10 percent is kernel, 50 percent of which is oil, indicating a yield of about forty kilograms of oil per tree, or a barrel for every four trees. Ironically, Brazil, a leader in developing alcohol from energy crops, producing a billion gallons of alcohol a year, mostly from sugar cane, is obliged to import diesel fuel. Yet it is admirably suited to producing diesel from palms that have twice the energy content of sugar

cane, and are easier to grow.

Duke is convinced that the oil palm (*Elaeis guineensis*) can outyield other varieties such as *Aleurites* and *Sapum* to produce ten to sixty barrels of oil per hectare per year, *renewable yearly*. Transesterified palm oil is an excellent substitute for diesel fuel, with a far lower polluting effect.¹

Although the perennial palm produces nearly twice as much energy as the sugar cane, which has to be replanted annually, and ten times as much as the soybean, it is not a last minute solution, as it takes eight years to come to maximum fruition. However, as Duke points out, oil palms can spend the first two years intercropped with sugar cane, the next two years intercropped with cassava, and the next four to eight years intercropped with annuals like peanuts, sunflowers, or soybeans. And with full oil palm production, there is still a good yield from the intercropped legume.

Authors Clement and Mora Urpi suggested in 1984 that *Bactris gasipaes* may yield four times as much fruit as the date palm, or 11-30 metric tons per hectare, with up to 55 possible. Its oil yield might be as high as those of oil palms, with a more nutritious residue. They speak of a yield of from 35 to 105 barrels of oil per hectare per year, *renewable*. Malaysia, presently at the forefront of palm oil production, has twenty-four-hour pipelines relaying palm oil from the interior to the coast.

To supply the whole world's requirements in fuel oil would take two billion hectares of palm oil. But if it were possible to double the yield through biotechnology such as developed by Steiner, Carlson, and others, that acreage could be halved. By OTA figures there are 4.8 billion hectares of land in the tropics, of which only 1.8 are in forest, leaving 3 billion to develop for energy plantations. To increase their potential, Duke suggests screening clone tissue cultures for increased tolerances to aluminum, cold, drought, salt, and salt-water irrigation.

Opting for a green world instead of a greenhouse, Duke points out that anywhere on the planet we can increase the rate of photosynthesis to sop up CO₂ to make simple and complex sugars we can decrease the magnitude of the greenhouse effect, a solution, simpler, cheaper, and more practical than some of the far fetched and expensive suggestions of worried climatologists.

A hectare of leucaena can fix 25 metric tons of CO₂ per year, or 2,500 metric tons per square kilometer, up to maturity when they slow down almost to a stop. Balick and Gershoff (1981) mention another palm species also found in Latin American swamplands,

¹ Transesterified is a chemical term for converting an organic ester into another ester of that same acid.

and in upland forests: *Jessenia baux*. It is a rich source of both food and oil, which could tie up plenty of CO₂ in marginal swampy land. It should take only a million square kilometers or a 100 million hectares of leucaena to soak up the 2.5 billion tons of CO₂ we put into the air each year. And if all the Leucaena were harvested to give energy (instead of burning our fossil fuel) the effect would be doubled. CO₂ could be stopped in its tracks.

But Duke warns that palms are presently an endangered species, their fragile family disappearing about as fast as the energy resources they could help replace. He urges concerted effort to analyze *all* palms for their economic potential, while they are still around.

"Then there's conservation. A good half of the energy this nation uses—more fuel than is consumed by two-thirds of the world's population—could be saved through conservation, which alone could decrease the U.S. contribution to the greenhouse effect by 50 percent, denting the world total by one-third."

Each North American consumes about 2,900 gallons of oil equivalent per year, or nearly 70 barrels per capita, 17 percent of which is spent on food, whereas the world mean is only about 11 barrels. Americans use much more energy to produce, process, retail, and prepare food than there is energy in the food produced. And each year the average American consumes about as much wood in the form of paper as people in the Third World use to cook their food.

It takes as much as 300 gallons of oil per acre to cultivate land in America. Ninety percent of all grains, including corn, grown in the United States goes to livestock to provide the animal protein that Americans crave, or have been maneuvered into craving. A meat-centered diet is the most resource-expensive of all diets. An American steer eats twenty-one pounds of plant protein to produce only one pound of protein in steak. A stunning 25 thousand calories of energy are expended for every thousand calories of beef protein produced, which only goes to putrefaction in the human gut. If America were to take the presently unpalatable step of going vegetarian, says Duke, all that grain could be saved for energy production, resolving the energy crisis, and greatly improving the health and energy of humans.

Energy conservation, says Duke, does not require the curtailment of vital services; it merely requires the curtailment of waste. Often a dollar invested in energy conservation makes more net energy available than a dollar invested in developing new energy resources. Thirty percent to 50 percent of the operating energy in most existing buildings could be conserved, and 50 to 80 percent could be saved in new buildings.

Duke makes several encouraging suggestions for improving the country's future, many already popular with organic gardeners: planting gardens on rooftops; developing two-and-three-tiered forest ecosystems in lieu of monocultured orchards; developing desirable vines to climb over houses during summer to function as natural air-conditioners, conserving energy and cutting down on CO₂; filling every window with culinary herbs or ornamental plants. But, like Hamaker, his prime suggestion is to keep planting trees; he suggests the addition of fast-growing species to the existing slow-growing ones. A firewood farm that generates fifty metric tons per hectare per year instead of twenty-five will tie up twice as much CO₂. Fallen firewood in the forest, harvested and burned instead of fossil fuel, frees up more space for green plants. And Duke recommends using living fence posts instead of energy-consuming metal-electric fences.

Richard Saint Barbe Baker, the English forester who pioneered the movement to save California's redwoods, proclaimed that man's existence depends as much on trees as it does on plants, and that trees are as essential to agriculture as to breathing. The minimum for safety, he insisted, is tree cover encompassing a third of the total land area of the planet, a ratio we have imperiled to the point that we are losing an acre of rain forest every second. Saint Barbe, as he was familiarly known, discovered that in an agricultural area if he devoted 22 percent of the surface continuously to trees he could double the crop output of the contiguous cleared area. Trees create microclimates in which crops flourish; they reduce the speed of wind, lift the water table, feed an increased population of worms. A single eucalyptus tree, forty-five feet tall, will transpire over eighty gallons of water a day.

Only 2.8 percent of the world's land is fertile enough to grow wheat indefinitely without the assistance of trees. In England, one field that has raised wheat continuously for a hundred years is surrounded by oaks whose roots go deep, tapping minerals to feed its leaves. When the leaves have served their function, they fall to earth and rot. Surfacing worms carry down their residue overnight to replenish the soil with essential trace elements. And yet, for decades, the trend has been to fell trees and plant pasture, which rapidly erodes, further imperiling life, as nature's long-term wisdom is sacrificed to man's short-term gain.

Saint Barbe and others have cajoled thousands of men and women into planting millions of trees, and have pleaded that millions more can, and must be, planted. One of the adherents to his world-wide "Men of the Trees" movement, Charles Peaty, after a lifetime spent creating, managing and harvesting forests in Europe, decided to do something about reforesting man-made

wastes of western Australia, which less than a century ago were covered with hard-wood forests of timber and shrubs that each year sprang into a blaze of colored flowers across the entire countryside.

When farmers cleared this land, a thin layer of topsoil was swept away in a single generation by cyclonic winds and downpouring rain. The fertilizer-laden runoff accumulated in creeks and rivers to turn them into salt bogs, while the trees which had flourished along their banks turned into matchwood. To create new tree-stands and shelter belts Peaty invented a special method of planting trees in desert country with minimal, even no, watering. Over the past six years he has planted on treeless farm acreage millions of specimens of false mahogany, Bald Island marlock, blue mallet, flat-topped yate, wandoo, cypress, two kinds of acacia, eleven varieties of Eucalyptus and casuarina trees, one of the world's oldest varieties. To date the results of his efforts are a thousand farms with shelter belts and with millions of dollars worth of pine plantations 170 miles south of Perth. Peaty told many audiences of Australian farmers: "If each of you plants trees to slow the wind, your ground, your water, your whole environment will be brought back into balance. Flocks of birds, long since departed will return."

That Peaty's vision is not utopian is proved in a moving tribute written by Jean Giono, one of southern France's most lyrical writers, to a simple French peasant, Elzeard Bouffier. From pail after pail of collected acorns and seeds, Bouffier is credited with having single-handedly planted a forest of a million trees, covering a vast expanse of previously unparalleled desolation, now a thriving countryside within a splendid French national preserve. If only a million people in this or any country were each to plant a single tree, the feat could be duplicated, and the number would increase exponentially as more people planted more trees. Only thus, and by bringing new life to a remineralized soil, can we hope to save what passes for civilization, and recover the bounty of life on this planet, the secret to which, as is patent, lives in its soil.

Our problem is with time. If Hamaker is right, we have let slip the chance we had to plant the trees in time to save the planet from disaster. But one last hope remains: microscopic in size but gargantuan in power, the oldest, hardest plant-form on the planet, a survivor, through billions of years, from all the hazards, imaginable and unimaginable, dished up by an indifferent fate: the one-celled, blue-green algae, known as *Aphanizomenon*. Proliferating at the rate of knots, the algae, could, according to Daryl J. Kollman, scientist, author, and educator, dispose of surplus CO₂



Daryl J. Kollman

and feed the world. Grown in man-made ponds all across the world, especially in such vast spaces as the Sahara desert, the metabolizing biomass could suck up vast quantities of CO₂. No plant, says Kollman, grows fast enough to create the biomass to get us out of trouble.

To propagate blue-green algae all one needs is a pond, a pond liner, more water, and rock-dust as a nutrient—all infinitely easier, cheaper, and more effective than any of the climatologists' far-out suggestions. The water does not have to flow, but needs merely be stirred so that the infusion of algae all get exposed to the sun. Proliferating, the algae draw in CO₂ from the air. Harvested, says Kollman, the algae are the world's best nutrient, sufficient with their protein to save the lives of millions of starving Africans and Third World peoples. And if, for any reason, a batch goes bad, it makes organic fertilizer.

Ancient organisms, algae resemble bacteria but have cell walls and a far greater capacity to photosynthesize, making them the most efficient chlorophyll-producing organism in existence. Monocellular, each individual is self-sufficient. Having no circulatory system as do plants, they are mostly microscopic, though some grow into giant seaweeds, hundreds of feet long.

To Kollman, the blue-green, standing as it does at the very

bottom of the food chain, is more basic to biological life than even the regular bacterium. For billions of years it has dwelt in every drop of water and every inch of fertile soil, transforming minerals, gases, and sunlight into viable foods for bacterial, plant, and animal life, responsible directly for about 80 percent of the world's supply of food.

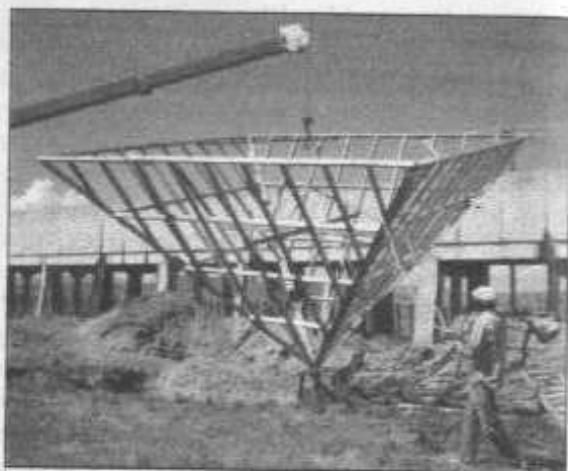
A few years ago, Kollman came across a supply—almost inexhaustible—of blue-green algae in Klamath Lake in southern Oregon, near the quiet lumber town of Klamath Falls. The lake is 130 square miles in area, the only known accessible and unpolluted source of such algae growing wild and in abundance. Geologists estimate that for the past ten thousand years the lake had had an annual procreation rate of 200 million pounds of algae, a rate that can persist indefinitely without disturbing the lake's pristine and healthy ecology.

Entirely surrounded by the beautiful Cascade Mountains, with Mount Shasta in full view some fifty miles to the south, the secret to the lake's bonanza lies in its location, a natural trap for the nutrient makings of life. Rain and snow that fall on four thousand square miles of rich volcanic soil of the Oregon Cascades, wash into Klamath Lake millions of tons of nutrient topsoil. All the required minerals are carried down from the glaciers, available for hungry algae to turn, with their strong supply of chlorophyll and with the power of the sun, into chelated organic molecules of super food—food to feed a starving planet.

To add to this nutrient supply, much of the algae has accumulated through millennia into rich sediment, which now covers the bottom of the lake to a depth of thirty-five feet. The top one inch of this sediment alone, according to Kollman, could support a massive algae bloom for sixty years to come without any new nutrients entering the lake. And its waters are unpolluted. In an area devoid of industry, town sewage, or the chemical toxins of agriculture, the rivers and streams that enter the lake are pure, clean, and potable, with little recreational boating where algae carpet the surface.

Kollman came to his discovery by a circuitous route. A teacher and administrator with a masters in Science Education from Harvard, he was trained in Italy in the Montessori method. Over a twelve-year span of teaching young children he noticed a steady increase in problems normally classified as "learning disabilities," problems he soon recognized as being associated with the diminishing quality of the children's diet. Under-nourished or poorly nourished children were not capable of absorbing information, and therefore, of learning.

We came upon Kollman in a Los Angeles suburb in the house



Daryl J. Kollman's double pyramids, built in Oregon, to the scale of the Great Pyramid, the mirror half buried in the ground.

of one of his supporters, just as he was beginning his campaign to run for President of the United States on an ecological platform. Tall, balding, quiet-spoken, in his fifties, with a deeply lined face that easily breaks into a pleasing smile, Kollman explained: "I knew that concentration was the first requirement for learning, and that it was getting more and more difficult for children to do so. If I wanted to be successful in the classroom, something had to be done to help the children's diets. An extensive computer search through existing literature revealed that micro-algae were being used in Japan and other Far Eastern countries for the remediation of poor educational performance in schoolchildren."

In 1976 Kollman and an associate became the first researchers in the United States to systematically grow and experiment with spirulina and chlorella, forms of green algae now widely marketed. But Kollman wasn't satisfied; he didn't like the idea of having to grow the algae artificially in man-made ponds; and the cellulose cell wall of chlorella made it difficult to assimilate. The discovery of algae growing wild in one of the world's richest natural "nutrient traps," completely free of artificial influences, answered for him both problems: the *Aphanizomenon*'s cell wall was found to be composed of a substance nearly identical to glycogen, making the algae 95 percent assimilable by humans. And the algae contain all the trace elements essential to animal and man.

To get the blue-green distributed even more widely, a system was devised for harvesting the crop during the summer, then freeze-drying it to protect the beneficial enzymes and heat-sensitive vitamins, guaranteeing both the algae's nutritional value and the lake's ecological integrity. The result is a 100 percent plant substance, 69 percent protein, with all the trace elements in a colloidal state, readily assimilable, the highest source, according to Kollman, of natural vegetable protein and chlorophyll in the world, containing all the essential amino acids in perfect balance, almost exactly as in the human body.

As a food he says it has no peer: one gram of blue-green algae has tested out as containing about 1,400 micrograms of beta carotene. To obtain that much betacarotene one would have to consume 14 grams of liver, 70 grams of carrot, 14 eggs, or 5 quarts of milk. It is also a rich source of neuro-peptides, quickly absorbed to nourish both the nervous system and the brain.

At dinner with Eddie Albert, of *Green Acres* fame, also a devoted supporter of organic farming and an authentic ecological revival, Kollman expanded on his program: "The first order of business is to get the people of this country healthy. That means cleaning up our agriculture, and restoring health to the soil. If we don't act now to clean up the environment, we may lose forever

the opportunity to do so. We are close to the upper limits of reversibility. And the United States is the only country with the power and the influence to lead the world into a massive environmental and economic cleanup. So far, we've left it to the "experts," and you can see the mess they've made. They've left us 375,000 toxic waste sites to be cleaned up in the USA alone."

"To FDR's Four Freedoms we must add the freedom to have clean air, clean water, vital food, and the right to pass on to our children a world that's fit to live in. This earth can support a lot more people. With a little bit of intelligence, we can support them all in a way we've never seen before. There's glacial till that's thirty to fifty feet thick in North and South Dakota; we can grind it up and move it into Iowa, Illinois, Kansas, Nebraska, Colorado, Texas and Wyoming for vital soil and vital crops. Meanwhile, until we grow more healthy food, the algae can bring us all the elements we lack for a revitalized, enduring health. The blue-green algae is a gift from heaven. But it may be the last we get if we don't shape up. We can talk about the future, and visualize the future, but if we want that future we must act."

Chapter 19

PURIFIED WITH FIRE



It took the Chernobyl disaster to arouse the Soviets to some action, belated, and far from what was needed. In the rest of Europe, alarm at the fallout consequences momentarily took people's minds, confused and helpless, off the problem of their dying trees.

Not so in America, where the plague was spreading. Satellite photos—taken five hundred miles above the earth—revealed panoramic shots of mountains dotted with dead and dying trees. These were supplemented by earth-based closeups of yellowing needles and lifeless branches. To struggle with the problem, an international five-day conference was convened at the end of October, 1987, on the shores of Lake Champlain, in the threatened Green Mountain State's city of Burlington. Formally entitled "The Effects of Atmospheric Pollution on Spruce and Fir Trees in the Eastern United States and the Federal Republic of Germany," the conference brought together a large number of forestry experts and other scientists from both countries who were studying the health of trees from space, or the condition of their roots in the soil, and everything else in between.

The general consensus admitted, as it had for nearly a decade, that American and German trees were rapidly dying for a series of reasons as complex as they were mystifying, apparently from both man-made and natural causes. But *that*, as the *New York Times* put it in a summary article, was about the extent of the



Damage to trees at Camel's Hump, Vermont, as of 1984, recorded by Hubert W. Vogelmann, professor of botany and chairman of the Department of Botany at the University of Vermont in Burlington. Twenty years ago, says Professor Vogelmann, the evergreen forests on the slopes of Camel's Hump, a high peak in the northern Green Mountains of Vermont, were deep green and dense. The trees were luxuriant, the forest fragrant, like a primeval paradise. Red spruce, more than 300 years old, rose 150 feet into the sky. Today the red spruce are dead or dying. Since 1965, 50 percent have died. Scientists look to this devastation as the first signal of an approaching environmental disaster.

agreement.

It took Dr. Viktor Kovda, director of the U.S.S.R. Academy of Sciences' Institute of Soil Science, to turn attention away from what he considered more than an ample discussion of the industrial pollution of the atmosphere to a potentially more intractable problem: the introduction of health-threatening heavy metals, such as lead, mercury, cadmium, aluminum, arsenic, and selenium into the soil, and thence into the food chain, a process he feared might be irreversible.

But a surprise was in the air. As if in answer to some universal

prayer there came a message from the subcontinent of India, brought by a Hindu Yogi, that the process was not irreversible, that something could be done to fight the planet's polluting plague. Arriving in Baltimore, all the way from a small railroad town south of Calcutta, he claimed to have been specially sent by higher authority with a surefire method for cleaning up the atmosphere, restoring health to forests, and bringing back to their verdant fronds flocks of happily singing birds.

The message, he said, was from a venerable sage responsible for reintroducing to this planet the ancient purifying wisdom of the Vedas, Parma Sadguru Shree Gajanan Maharaj, said to be a Kalki Avatar—or "ascended master," who needs not return for another life to this wen of pollution, but does so for some higher ideal—come to preside over the destruction of pollution on our planet, Kalki being pollution.

His messenger, a young Yogi named Vasant V. Paranjpe, born in the old British stronghold of Poona, southeast of Bombay, having rid himself, in the manner of the Gautama, of all his possessions, arrived in New York in 1972 without a penny. In the great city Vasant walked the streets until people spontaneously offered him a visa, a green card, money, whatever he might need to set himself up. Declining all favors, he insisted he had a mission to perform and that destiny would guide him. It did, first to John Hopkins, then to Washington, D.C., where the rector of St. Stephen's Episcopal Church, Father William A. Wendt, the first priest to promote the ordination of women, took Vasant under his protection and helped him get started with his mission. He was to spread the ancient science of Agnihotra with methods every bit as astonishing as those of Steiner's "spiritual science."

Again the key ingredient turns out to be cow dung, raising the question of whether the Hindus may not all along have had some cogent and highly beneficial reason for tending their cattle as they do, allowing them to wander unmolested through country lane and city street.

This time the dried dung is placed in an inverted copper pyramid, the size of a monk's begging bowl, stepped like a ziggurat, along with a spoonful of ghee, a handful of rice, and a pinch of redolent sandalwood. This strange assortment is set ablaze—to the accompaniment of a mantra chanted in Sanskrit—as curling pearl-gray smoke rises from lapping red-and-blue flames to purify, or so its devotees claim, the surrounding atmosphere, miraculously increasing the quantity and quality of fruits and vegetables grown in the area. *Agni* in Sanskrit means "fire," and *hotra* "the act of purification."

In a building on a farm on the outskirts of Baltimore the first

devotees in this country of the exotic practice have kept an Agnihotra fire alive for years. During all that time a dedicated score of individuals have taken turns reciting an uninterrupted mantra, around the clock, day and night, summer and winter. To satisfy our own curiosity we traveled to Baltimore, and at dawn of what was to become a bright sunny day in May of 1987, sat cross-legged in a small building on a hillside just beyond the beltway, barely fifty feet from where the uninterrupted mantra was being dutifully but cheerfully recited by its chain-firing devotees. We were to witness a private Agnihotra ceremony performed by a man with Middle Eastern features and a thick black mustache who sat in a yoga position facing an inverted copper pyramid. Beside him stood a gallon jar that must have once held mayonnaise, now half full of translucent ghee, a round biscuit tin filled with dried cow dung, and a tall tea box containing special basmati rice. With these unlikely ingredients, the yogi prepared his fire in the pyramid, breaking up the cow dung, pouring on the ghee, and scattering in the rice. As blue-red flames danced up from the opalescent copper, and pale gray smoke rose toward the blackened ceiling, he intoned a Sanskrit mantra by means of which he hoped to inject into the atmosphere sufficient nutrients and fragrance to stimulate plants and neighbors to grow happily together.

In the trees outside, a flock of birds was already warbling a cheerful morning chorus. According to our guide, Noni Ford, a young acolyte with prettily beaded hair, the fire must be lit precisely at sunrise and sunset when certain energies rise out of the earth with a quintessential sound audible to developed senses. To establish the exact moment of both dawn and dusk, anywhere in this country, the devotees have computerized the location of every tiny hamlet in the United States, and can produce a computer printout at a moment's notice.

Later, in the main house, the owner of the farm, John T. Brown, a jovial fellow of forty, father of two teenagers just on their way to school, explained how he had gotten into Agnihotra after years as a member of a group that follows the teachings of the famous Indian yogi, Paramahansa Yogananda, whose autobiography is a classic in the genre.

Our main objective, said Brown, was not to create any formal organization. "People simply began to show up, out of the blue, and the message spread by word of mouth. There was no publicity, no proselytizing. Vasant's message was simple enough: Be happy! Be happy here and now. And practice Agnihotra to clean up the planet."

Brown smiled as if indeed he were a happy man, convinced that a solution to the toxins had been found. Then he elaborated:



Vasant V. Paranje, the Hindu Brahmin messenger from Hindu sage, Purma Sadguru Shree Sajanian Maharaj, performing the Agnihotra cleansing ceremony in our West Virginia kitchen. He is burning cow dung, ghee, rice, and balsam wood in an inverted copper ziggurat. (Photo by Doris Presley)

"Gradually the practice spread throughout the Baltimore area until now there are hundreds of families involved in the regular burning of dung, rice and ghee in copper pots. To spread the message, Vasant has traveled during the last few years all over the country, and all through South America, Asia, Europe, and Africa. Practitioners of Agnihotra are everywhere, especially in such unpleasant and far-flung former dictatorships as Chile and Poland. In one place in the Andes, Cochiguas, in the Elqui Valley of Chile, an Agnihotra fire was started eight years ago by a little old woman under a thatched roof beside an ancient pre-Inca wall. Now hundreds of people congregate there daily, thanks to the enormous success local farmers have had raising their crops with Agnihotra ash, or 'miracle-dust' as they've come to call it."

Noni Ford showed us out into the garden. "You should see our corn and potatoes. Their color and taste are remarkable. Last year we had raspberries right up into the frost. And, despite the drought and the freezes, we had wonderful pears, apples, and peaches."

"Just smell that air!" said Brown. "Last year we tried to get

government people to come out and test it. But they said: 'If your air is bad we will come. If your air is good, why should we bother?'

Brown explained that up until the previous year he had had a business with about a score of employees, whom he could feed from the three acres of land they cultivate. He pointed to some trays of what looked like cow dung drying in the sun. "We soak our seeds in cow's urine for two hours, then coat them with cow dung and lay them out to dry. Then we plant them in rows in the ground with Agnihotra ash and say a mantra. The ash seems to stabilize the amount of nitrogen and potassium in the soil. And a chemist in Colorado who works for the U.S. government has found from repeated soil tests that the ash greatly increases the solubility of phosphorus."

Brown described the Vedic technique of Vajnya, a process of purification of the atmosphere through the agency of fire. Vajnya is tuned to rhythms of nature, to radiational effects, and to astronomical combinations. "Vajnya," said Brown, "injects nutrients into the atmosphere and neutralizes their effect at a subtle level. Nothing is destroyed, only changed. A powerful change takes place in universal *prana*—the life energy that pulsates through us and connects us with the cosmos—creating a healing effect on body and mind. It also leads to a better absorption of the sun's rays by the water resources of the planet. Fire produces out of a normal state of matter an ideal state, which allows energy transformation at a different level. Bursts of energy emanate from the Agnihotra copper pyramid, depending on the phase of the moon and the position of the earth in relation to the sun."

As we looked in through the door of the small unprepossessing cinderblock building in which the uninterrupted mantra was being sounded, Brown elaborated: "Clairvoyants say a strange phenomenon occurs when plants are grown in an Agnihotra atmosphere. An aura-type field of energy is generated from the plant and persists around it while the ceremony is being performed in its proximity. This enables the plant to maintain maximum growth and yield levels. If you breathe in that smoke, it quickly goes into the bloodstream via the lungs and has an excellent effect on the circulatory system."

The main object of the exercise, according to Brown, is to heal and improve the land rather than pollute and destroy it with chemical poisons and thoughtless farming practices. "We grow superior crops without the use of chemical fertilizers, pesticides, or herbicides. By spreading Agnihotra ash over the soil before tilling we make the seeds more disease and pest resistant. Under polluted conditions, elements of the earth begin to change. Agnihotra is a process whereby the molecular components are reconstructed.

Without it, unknown elements begin moving into the intersphere, setting off a chain reaction of disasters. Soil in many places becomes unable to support plants. Trees die for unknown reasons. Forests disappear, not because they are cut; they are choked to death due to the lack of nutritional content in air and soil. Clouds in many parts of the world are seeded with hydrocarbons and other toxins. Barium and cadmium become catalysts and cause a change in the genetic structure of man. Fissures in the atmosphere cause seepage of radiation. A change in the nuclear structure in plants due to pollution makes it impossible for humans to extract nutrients necessary to survive, unless plants are grown in an Agnihotra atmosphere. Plants are starving, and the nutritional value of edible plants decreases, as does the medicinal potency of plants. The amount of chlorophyll the plant is able to produce is impeded by the concentration of pollution in industrial areas. Diseased soil transmits cancer to domestic animals, especially pigs. The meat humans consume will be dangerous to eat. All forms of red-blooded animals used for food are beginning to cause cancer on a very large scale."

At which point the "messenger" himself made his appearance, a quiet, peaceful man, with powerful dark eyes, the gray beard of a prophet, and the mellifluous tones of the subcontinent. He said he had just returned from the Erzgebirge mountains in Saxony at the Czech-East German border, where he had recommended building platforms in the devastated forest on which to practice Agnihotra to encourage newly planted trees. We had caught him, he said with a smile, on his way to Chile and then Bolivia, where he was invited to start some Homa farms. Homa, he explained, was Sanskrit for the ancient science of growing plants based on the rhythms of nature—sunrise, full moon, no moon, equinox, solstice, etc., all with a pyramid of fire. In Germany, he added, several thousand families were practicing Agnihotra, but the federal authorities had taken issue with the ashes being used medicinally; so he had moved on to Poland, where the ash was greeted, as in Chile, as a miracle performer.

Vasant said the Soviet government had put pressure on scientists and the medical profession to find some solution to the problem of radiation. But although more people near Chernobyl continued to get sores on their bodies, the Soviets would not use the Agnihotra dust, waiting for its effects to be proven by science. "A pity," said Vasant, "it can do no harm. After all it is nothing but cow manure, ghee, and rice. Why not give the poor people a chance?"

With a grave expression he warned that children in Europe will start to get cancer, the first symptoms being diarrhea, actually a

dehydration of the bowels. And he was afraid that people in the United States living near radioactive sources would be developing sores. He warned that pollution leads to hybridization of insects, which become immune to insecticides, and that in a short time we may be hearing of giant man-eating ants being added to the problems of South Africa.

That his prophecies may not be as farfetched as they sound was indicated by his foretelling several months before dead and dying dolphins surfaced along the Atlantic Coast and seals were found mysteriously dying in the North Sea off Britain, that large shoals of fish would be dying as a result of pollution in the oceans.

Vasant explained that in the language of the Vedas when pollution goes beyond a certain limit there comes a change in the nuclear structure of plants, and they become unfit for human digestion. He considers Agnihotra the only solution, and it is his hope that chains of Agnihotra centers will spread around the United States and then around the globe. He claims it will even help solve the problem of the ozone hole developing over Antarctica, a potentially serious danger to the planet.

"The United States," said Vasant, "is a blessed country, and it is the divine will that from this country the whole planet should be saved. But we need in each state a place where we can show how Agnihotra works, and where clean produce can be grown abundantly in a small area, which becomes a place of healing with just the use of a single simple mantra. When we hear of anyone interested in practicing Agnihotra we consider it our duty to go to them, at our own expense, and teach them how to do it. Their only investment, apart from a little cow manure, some ghee (easily made from butter), and some basmati rice, is a copper pyramid, which costs a mere \$10—a small investment to help clean up the planet, and at the same time grow luscious, healthy crops. It has been easier for us to start with organic farmers; they are more open, and they have already taken the first step by getting rid of pollutants on their land. Even if you get only the same yield, we tell the others, you don't have to spend money on fertilizers, pesticides, and herbicides. Your land and water are safe. And the taste, texture, and quality of your produce will be superb."

Asked what he considered to be the formative force in Agnihotra, Vasant replied without a moment's hesitation: "Sound. If you test Agnihotra with an oscilloscope, you will hear a special sound coming from the fire. It is a sound that heals. All the other physical things are there, nutrients, vitamins, minerals; but the key is the sound. If you are subtle enough, you can detect it. Fire produces sound, but it also reacts to sound. If you sing special vibrations

while the fire burns in the pyramid there is a resonance effect. Ancient science states that it invigorates the cells of plants and helps the reproductive cycle. Resonance plays a vital part in nature. We have to consider a healing molecular spectrum far beyond the infrared, indeed beyond the whole electromagnetic spectrum."

As a parting shot, Vasant recommended to us the use of Agnihotra as a means of ridding one's property of pests. Presenting us with a couple of complimentary copper pyramids, he enjoined us to help clear the pollution in our respective areas, and at the same time rid ourselves of unwanted mice or roaches in the cellar.

"Just sprinkle Agnihotra dust wherever you see an infestation," he said with a smile as benign as it was clearly heartfelt, "and you'll be surprised how quickly it clears up. It doesn't kill the pests. It simply drives them off."

As we drove off, discussing these strange events, we were struck by the number of similarities between Steiner's "Spiritual Science" and the practices of the devotees of Agnihotra, including their common use of cow dung and their similar remedy for insects.

From Europe we received reports of groups of scientists in Rovinj, Yugoslavia, experimenting to establish just what Agnihotra does, and how. Their interest had been aroused by the discovery that after they had burned the required ingredients in the copper pyramid their instruments failed to pick up radioactivity in the immediate area, an anomaly since the Chernobyl disaster, which irradiated, along with large parts of Europe, even their small Adriatic seaport on the Istrian peninsula in the province of Croatia. The Yugoslavs also learned that groups of subcontinent Indians living within the borderlands of the Soviet Union who used dried cow dung to seal their huts had remained unaffected by the radioactive contamination. Intrigued by these mysterious developments, the Soviets had invited one of the Yugoslav scientists, Mato Modric, a biochemist, to visit the Soviet Union to demonstrate the method of Agnihotra in the hope that it could be of value to its citizens.

To check out this curious data, and the amazing parallel between Homa farming and Steiner's biodynamic farming, we traveled to Rovinj, the former Italian town of Rovigno, a charming Adriatic seaside community with whitewashed tile-roofed houses bunched together on a tiny oval peninsula jutting from the Istrian coast, surmounted by a tall white steeple, its cypresses and oleanders reminiscent of the Monterey peninsula of California.

Mato Modric, a stocky welterweight in his late fifties, with a

broad, strong face and piercing eyes, an expert in electromagnetic fields, dowsing, and geopathogenic zones, lives with his wife, Maria, a petite dark woman weighing only ninety pounds, in a small duplex overlooking the harbor.

Over a supper of gnocchi and roast chicken thighs, Modric, who speaks English remarkably well, and German and Italian fluently, says he became involved in the Agnihotra phenomenon through his interest in pyramid energy, or "waves from shapes," along with such allied subjects as what the French call *radiathesie*. Trained in physics, he was particularly curious about the role of the special vessel made of copper (or gold) and its specific ziggurat shape, a form related to the horn antennas used in high-frequency transmissions. What high frequency, he wondered, might be being amplified and broadcast by such an antenna to affect the human aura, its nadis, chakras, or its kundalini? That the ash could produce disinfectant, anticoagulant, and tissue-contracting effects on living matter he said was well established. And he said he believed Vasant when he claimed the ash had pesticidal and fungicidal properties and that it might ultimately solve the problem of mineral deficiencies. It remained to be established what trace elements were in the ash, research into which was going on in such disparate places as the former Yugoslavia, Germany, and New Mexico.

Modric explained that he believed he was dealing with a complex that could potentially affect the whole environment, countering the toxins of modern technology developed over the last century by the industrial revolution, and that the process might have enormous implications for our very existence.

He added that he believes that Agnihotra ceremonies performed at various specifically spaced points on earth, if done exactly at sunrise and sunset, could affect an energy associated with the earth, one such as described by both Steiner and Reich, the enhancement of which would have a healing effect on the environment, difficult as it might be to understand or prove in terms of modern science.

He explained that in his conception the Agnihotra ceremony was energetically quite complex, involving at least three energetic aspects, or field phenomena, having to do with the fire and the ash, with radiation of an undefined nature, and with ESP, or psychism. He said that a lot of research was needed to lift the subject from the purely speculative, there being at play biophysical and biochemical interactions, and that much time and money for research might be required. "We believe we can establish the fact of an electromagnetic radiation during the ceremony," he elaborated. "But we are in an area beyond what conventional sci-

ence considers rational, into an area of informational transfer through intermolecular and interatomic processes mediated by ultraviolet photons. It is logical to conclude that some kind of energetic mechanism is being activated which can be translated into physical meaning linked to concrete information systems that are as yet unknown, but connected to systems of resonance. We are in an area where it is not easy to prove anything. A lot of work will be necessary, and it will depend upon the cooperation of very many people."

His remarks reminded us of Lily Kolisko, working for thirty years almost alone, to reveal some of nature's secrets in *The Agriculture of Tomorrow*, most of which were ignored for years.

But Communist Yugoslavia, in which nowhere could a Xerox copy be made of anything unless it was first inspected and approved with an official stamp, was not conducive to the required effort. Though the Serbs are remarkable people, with no false *politesse*, tough guerrilla fighters who held down thirty-five to forty Nazi divisions throughout the war—thereby contributing to the safety of Moscow from Hitler's Barbarossa attack—they now do not even have enough money for the upkeep of their existing buildings. Belgrade is dilapidated, with a foul-smelling yellow-gray smog hanging like a shroud over the city, the result of burning soft lignite coals and other pollutants. As Modric lamented, the country cries out for an Agnihotra cleansing. Potentially one of the richest countries in Eastern Europe, it is being ruined, so we were told, by the dogmatism of Marx's heritage, with what amounts to a strategy of terror practiced by the "leaders" of its own people.

Again the people were marvelous, incredibly cheerful and hospitable despite their gloomy political and economic prospects, with food and gasoline prices doubling as we arrived, the native's every move restricted by the inane regulations of a deliberately tyrannical big brother. Agnihotra they said, laughing, echoing the Yugoslavs, might be their only hope for cleansing not only the environmental atmosphere, but the political. Vasant, they said, had seen in Poland a "different nation", prophesying for it a renaissance, with a significant future.

"You can't imagine," said Lech's wife, Helena, "the effect of the Agnihotra ceremony. Even in a tightly shut room, with no windows open, or air circulating, the air during and after the ceremony becomes fresh and pure."

Officially, Agnihotra was brought to Poland by Vasant in 1971 when he attended a symposium on psychotronics organized by Lech. But to the Stefanskis, Agnihotra has come mostly through their twenty-four-year-old daughter, Bogna, who studied the prac-

tice in India, along with Sanskrit, Hindi, and Bengali, living in the Agnihotra center in Shivapuri, and taking long hikes in the Himalayas nearly all the way to the Chinese border.

Bogna said it was hard to say how many people in Poland were practicing the ceremony, several thousand for sure, but that mostly it is done in the family, privately. She said there was no conflict with the Catholic Church because Agnihotra is not a religion, and anyone of any religion can perform it. A lot was being practiced in the Gdansk area, near the Baltic Sea, so "dead" from pollution it is no longer possible to swim in its once sparkling waters. The ash, she said, was excellent as a remedy for cuts and bruises, and a natural medicine when taken internally, especially for clearing up addiction to this or that or the other drug.

To Vasant, the future of Agnihotra depends on how it is validated in America, where he counts on serious research. Pat Flanagan suggested a physical explanation for the depolluting effect of the Agnihotra smoke, pointing out that its colloidal molecules of ghee and cow manure could chelatingly attract and grab pollutants in the air, the way water is purified by being flocculated. The seized molecules, he added, as they settle on the ground would alkalize the soil; and if they came into contact with a plant they would stick to the leaves and act as a time-release foliar nutrient. Physically, because of the ghee and the manure, the smoke would be electrically charged. But when asked what the metaphysical properties of Agnihotra smoke might be, though he admitted they must be there, he merely raised an eyebrow, promising to pursue the matter further.

Chapter 20

TUNING IN TO NATURE



Rudolf Steiner's recipe for getting rid of mice was every bit as exotic as that of the Agnihotra devotees. Catch a fairly young mouse, said Steiner, at a time when Venus is in the sign of Scorpio, skin it, and burn the skin. The mouse must be a field mouse if you wish to affect a field, and the moon's influence must be supported by that of Venus, because the animal kingdom, according to anthroposophical science, conserves the moon influence even when it is not full moon. In Steiner's words: "The animal carries the force of the full moon within it, conserves it, and so emancipates itself from the limitations of time."

His instructions are to carefully collect the ash and other constituents that remain from the burning. "Take this pepper and sprinkle it over your fields at the high junction of Venus and Scorpio. Thereafter the mice will avoid the fields because: in what is destroyed by fire, the corresponding negative force is pitted against the reproductive power of the field mouse."¹

To be rid of nematodes, Steiner recommended burning the whole

¹ Kottsko tells a strange story about her first experiment with getting rid of mice. "We began by breeding a large number of white mice in order to carry out the necessary experiment during the constellation of Venus. The mice were kept in glass cages covered with wire mesh in a separate room. Each cage contained a male and female mouse. The exact hour for the experiment was fixed for four o'clock in the afternoon of the correct day of the constellation. We examined the mice every other hour, and found everything in complete order. At two o'clock we

insect, not just the skin. This, he said, had to be done when the sun is in the sign of Taurus, or precisely opposite the constellation in which Venus has to be when one prepares the mouse-skin pepper. In effect, says Steiner, the insect world is connected with the forces that evolve when the sun is passing through Aquarius, Pisces, Aries, and Gemini, and then on to Cancer. "In Cancer the force appears quite feebly, and it is feeble again when you come to Aquarius. It is while passing through these regions that the sun rays out the forces which relate to the insect world. If you thus prepare your insect pepper, once again you can spread it over the beet fields and the nematodes will by and by grow faint—a faintness you will certainly find very effective after the fourth year. By that time the nematode can no longer live. It shuns life if it has to live it in earth thus peppered."

Kolisko explains that the ash of the burnt insect radiates into the surrounding soil, and that the insect does not like to live in an area "whence there streams out the counter force to its own life force, its power of reproduction."

That insects attack only weak and dying plants has, by now, become a truism, thanks to the efforts of Howard, Albrecht, Walters, and a whole train of agricultural experts. One would like to know, however, just how the creatures gain the information, how they know just where to go and when, which plant is sick and which is well.

Now, thanks to the efforts of an entomologist with a special understanding of the mysteries of radio antennas and of infrared radiation, what once appeared as necromancy can be reduced to science.

In the course of a lifetime of investigating the habits and habitats of insects, Dr. Phillip S. Callahan, professor of entomology at the University of Florida in Gainesville, and a senior entomologist with the USDA, has discovered that insects are well aware of what goes on around them because they communicate on the infrared band of the electromagnetic spectrum precisely as we communicate with radar, microwave, or radio, using a variety of antennas, as sophisticated as any designed by man. With these delicate and

examined them for the last time as we fed them. Some minutes before four o'clock we entered the room and received a real shock. In each of the cages one mouse was dead. The female had killed her mate. In all the cages there was the same ghastly spectacle. The female mouse had bitten through the throat of the male, then opened the skull and begun to eat the brain. Some mice must have started earlier or worked more quickly, because we found different stages of this terrible process. In a few cages the female mouse was sitting quietly beside the victim, looking innocent, as if everything were quite all right. Some mice had apparently first eaten the brain, and then started to eat the other inner organs....They had bitten off four paws and placed them symmetrically in a square in the sawdust."



L. Kolisko, (1889-1976)

highly sensitive instruments, and the use of infrared light, they can electronically smell out—at quite a distance—meal or mate. Obversely, by the same infrared, they can be lured to a dismal death.

Most mysterious of the known electromagnetic wavelengths, the infrared, only discovered in 1865 by the English astronomer Sir William Herschel, have remained unfathomable until very recently: there was no instrument with which to tune to them. A mite longer than the longest rays of light visible to humans, they cover all of seventeen octaves, sixteen more than visible light, a *terra* of some two million frequencies, largely *incognita*.

Herschel happened on them when he placed the mercury-filled bulb of a thermometer against a colored prism, and was astonished to find that although yellow was brightest, red was hottest. His astonishment increased when he moved the thermometer past the visible red to an invisible area just beyond it, which produced nothing his eyes could see. There, the thermometer recorded an

Kolisko's explanation for this amazing scene is that the female mice had acted under the influence of the planet Venus, which had come to its highest effectiveness earlier than they had expected. "No other explanation was possible," says Kolisko. "The constellation of Venus had driven the female mice to kill their mates in this extraordinary way....That we were interfering with the forces of reproduction is quite obvious from the fact that the female killed the male." Recovered from the shock, Kolisko went on to find the proper rhythm with the planetary forces and had no further problem getting rid of field-mice.

even higher temperature; and the emitted rays, called by Herschel "invisible light," came, after more than a quarter century of controversy, to be called *infrared* radiation.

Many of the properties in this band are still so inaccessible—as Pat Flanagan was to find in the case of Paul Dobler's experiments in which radiation was emitted from agitated water—it came to be called the *X-band*. Yet this all-pervasive band of frequencies is the one most linked to life. Within its ambit, life bubbles up as if from a spring: life does not require visible light, only infrared, which accounts for creatures in caves and the sea's abyss that have never seen the light of day.

On the outskirts of the town of Wichita, we came across Phil Callahan in a setting as exotic as it was unlikely. From the flat, geometrically sectioned prairie land of Kansas there rose before us the Great Pyramid of Giza, in replica, as sparkling white as the original must have appeared several thousand years ago. Beside it, like an excrescence on a lunar landscape, eight geodetic domes of the Buckminster Fuller design burgeoned from a man-made knoll.

This strange complex, a center for holistic medicine and research, funded by Olive W. Garvey, widow of oil-and-wheat millionaire R.H. Garvey, was the brainchild of psychiatrist Dr. Hugh D. Riordan. The pyramid, as we inspected it, sixty by sixty feet at the base, and thirty-nine feet high, devoid of electric wiring, plumbing, or mechanical equipment above the floor level, is used, so we were informed, for low-energy research, such as the body's emission of magnetic pulses.

In an adjoining geodesic dome, Phil Callahan, also an expert on pyramids and obelisks, had set up a laboratory to monitor the infrared spectrum by means of a highly sophisticated instrument known as a *Fourier transform infrared spectrometer*. Invented in Cambridge for spying from satellites, the instrument is capable of picking up and identifying the exhaust of missiles, or, if used in a bomber, to identify infrared radiations from buildings, as was done in the sneak raid to target Qaddafi's Libyan quarters.

More peacefully, Callahan is using the machine to analyze the infrared wavelengths broadcast by molecules of different substances. "The night sky," says Callahan, "is filled with waves of electromagnetic radiation. It is also filled with vivid colors: red, blue, orange, and green, from thousands of stars that irradiate our atmosphere. Infrared colors, in varying wavelengths, and ultraviolet colors emitted by constellations, are reflected from our own sun to the surface of the moon and down to earth. All these frequencies from cosmos, stars, sun, planets, and moon, manipulate molecules on earth, depending on the incoming frequency

and the size and shape of the receiving antennas on the molecules."

With these strictly scientific remarks, it was possible, at last, to validate Paracelsus and see how iron on earth could be affected by the planet Mars, or tin by Jupiter.

Callahan pointed through the picture window at an expanse of grassland bounded by some leafless cottonwood trees, muttering, half question, half statement: "Are you aware that in such an acre of land there can be as many insects as there are humans in North and South America combined? An insect is nothing but a satellite covered with antennas, like a cruise missile, winging through a sea of electromagnetic wavelengths. At various times during the night, the gaseous molecules that compose our many atmospheric layers are stimulated to glow at very low intensities in beautiful hues of red, green, near-infrared, and ultraviolet. We cannot see these low-intensity colors with our eyes. The cones of our retina, which work so well in bright daylight, cut out at low intensities of light. But the insects see perfectly well with ultraviolet light, and they communicate with infrared."

And communication on the infrared and other electromagnetic wavelengths, we learned, does not stop with insects. Cleve Backster, whose discoveries about plant communication launched *The Secret Life of Plants*, now shows that microcosmic bacteria communicate with each other, and at quite a distance; Dr. Fritz Alfred Popp, of West Germany's Kaiserslautern University, has shown that individual cells do likewise, by modulated electromagnetic radiation. Electron microscopic studies of bacteria reveal arrays of long rod-shaped elements, closest in form to the sensilla antennas of insects. Antibodies are known to recognize and bind invading microorganisms, while enzymes search out and collect raw materials to convert into biologically useful products. Even molecules, says Julius Rebek Jr., of the University of Pittsburgh, lure and trap each other. Callahan goes further, positing that chemical elements radiate electromagnetic signals to find, recognize, and join each other.

Substantiation for this "flight of fancy" is adduced by the remarkable drawings of individual elements produced by Leadbeater and Besant with their "siddhi" powers in their *Occult Chemistry* (see Appendix C.) As analyzed by Callahan, the horns, spikes, and antlers depicted by the two theosophists are replicas, if not originals, of sophisticated man-made antennas used to communicate in a whole gamut of very high frequencies. By Callahan's calculations, the wavelengths to fit such submicroscopic atomic structures would be in the ultraviolet or X-ray bands. And so, at last, Steiner's strange dicta about the elements being sentient,

such as nitrogen sensing where there's water, begin to make some sense. And at even higher frequencies, thought, and what motivates that thought, may well manipulate the very smallest matter. Steiner's and Koenig's notion that stag antlers are antennas for picking up cosmic radiations falls from the stars into the realm of physics. Thanks to Callahan—who considers himself a natural philosopher, in the mode of Goethe—much of Steiner's mysterious talk about "the spiritual forces of the cosmos" becomes reducible, with the help of a machine designed to spy from satellites, to academic respectability.



Philip S. Callahan with his favorite bird, a peregrine falcon. (Photo by Acres U.S.A.)

All of which had its start in Callahan's boyhood, growing up in New York State in the woods and fields around the small Hudson River village of Menands, close to Albany. There all his free time was spent in the wild, exploring nature, or pouring over books about insects, birds, and especially hawks.

His other great boyhood fascination, only apparently incongruous with hawking, was an attachment to the spreading technology of radio. Aware that if you twang the string of a piano it can cause a violin string across the room to vibrate in resonance—providing both strings are tuned to the same frequency—and aware that his crystal set worked on the same principle, vibrating a transmitting antenna that could vibrate a receiving antenna cut to a matching frequency, he was alerted to a prime function of all

life: *resonant communication*. In due course it was to lead him to the momentous discovery that a whole world of subtle communication pullulates with life in the darkness of night or cave, and all through the sinews of the "lightless" earth.

As a boy it caused him to wonder if the bond with his hawks might not also be based on some similar phenomenon. Was he somehow tuned to his hawks? Was it possible that living things—insects, animals, humans—could communicate with one another by as yet unknown electromagnetic signals similar to radio waves?

When Callahan joined the army in the Second World War, at the age of twenty-two, his boyhood experience got him assigned to radio school, then to one of the most unusual assignments given any enlisted man during that conflict. As hordes of American soldiers were being convoyed from training grounds in Northern Ireland to ships headed for the Normandy Beachhead, Callahan, a sort of "Wrong-way Corrigan," found himself proceeding by jeep in the opposite direction. Destination: the Magheramena Castle Radio Range near the tiny village of Belleek between the British province of Ulster and the Irish Free State. There, until the end of the war, he was to be engaged in what Winston Churchill called "the Battle of the Beams."

The Magheramena Range put out a series of highly classified low-frequency radio beams—as yet undiscovered by the enemy—extending northward across a wild moorland known as the Pullan, eastward over Lough Erne, and out over Donegal Bay to the western Atlantic. Using these beams, RAF flying boats loaded with depth charges could soar out over the ocean, no matter what the weather, to sink German submarines pinpointed for them by the RAF Coastal Command, then safely return to their bases. Far out to sea, five hundred miles or more, the planes would use a radio compass to home in on a signal from Farrancassidy Cross, near Belleek. Within a hundred miles of the coast they would switch to a beam from Belleek station, then, nearly home, pick up a radio "Z" signal that told them they were in the airspace directly above the radio station.

This devotion to duty, used in conjunction with the intelligence received by cracking Hitler's super code "Enigma," enabled Allied planes to locate German U-boats off the West coast of Ireland and win the Battle of the Atlantic.

As Callahan watched the great Catalina flying boats snake their way home along his beam, he was reminded of the way male moths weave their way towards a waiting female or a sickening plant. On leave one afternoon by a crooked bridge at the foot of Pullan Brae Hill, Callahan spotted a beautiful moth engaged in odd behavior. With its wings of pure white and dark buff it was hovering

over a spot on the grass, fluttering and dancing as if tied by an invisible thread to a skyhook. As Callahan peered at it more closely, he noticed that in one respect at least the moth was different from any other he had ever observed: *Its antennae were extremely short.*

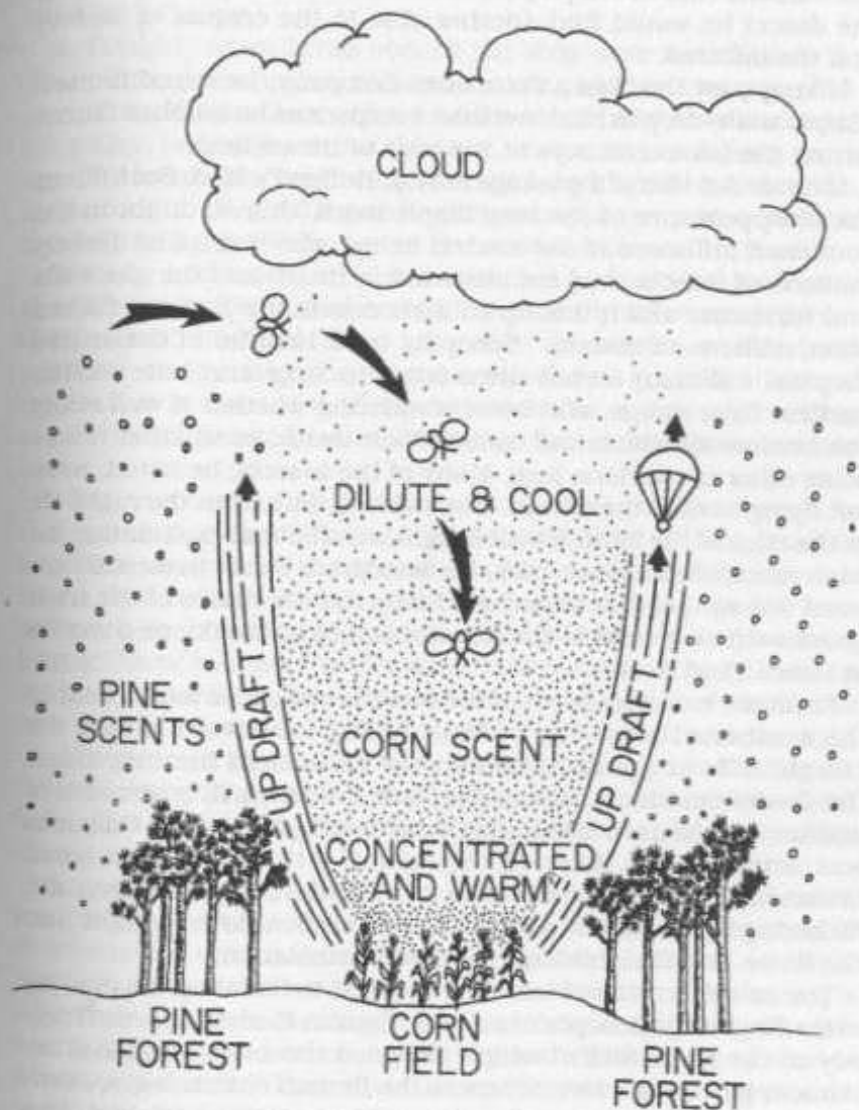
Puzzled by this anomaly, Callahan found in an old bookstore in Londonderry a copy of *The Butterflies and Moths of the Countryside* by F. Edwards Hulme, illustrated with a beautiful picture of the moth, known locally as the "ghost swift." The book explained that this "swift" performs its seemingly aimless hovering flight over spots where dull-colored females of the same species hide in the grass waiting to lay their eggs so that the larvae which hatch from them into caterpillars can feast on the roots of dandelions and stinging nettles.

But how, the young soldier wondered, did the male ghost moth know that a female was hidden below? Was it because of some signal from the female analogous to the "Z" signal from Magheramena Castle? Were the moth's antennae really instruments to receive and transmit signals in some frequency of the electromagnetic spectrum as yet undiscovered by science? The Belleek station sent out its beam of electromagnetic energy as pure radio frequency, known as a *carrier wave*, tuned to by a receiver with an antenna; but the beam of itself said nothing. To carry a message it had to be modulated by voice or code. In the case of Belleek, the Morse code signal varied either side of the beam, causing the plane to fly back and forth across the beam to keep on course.

What, Callahan wondered, caused the moth to follow such a pattern? To find out was to take most of his maturing life.

Visiting Hiroshima, only months after its destruction by the atomic bomb, Callahan was aroused by the interaction of radiation with living things. In the wake of that nuclear holocaust, science was concentrating, one-sidedly it seemed to him, on biologically destructive radiation and the dangers of *high frequency* emissions at the upper end of the electromagnetic spectrum—ultra-violet light, X-rays, beta and gamma radiation. Nobody seemed to be paying attention to its other end: the lower frequencies on the other side of the tinily narrow band of light, visible to humans, descending through the infrared all the way to the very long waves he had used to guide planes back to Ireland, and beyond to the mysterious extra-low frequencies, known as ELF, later discovered to be emitted from the brain and to produce on living organisms, at only one to one hundred cycles per second, all kinds of effects, both salubrious and lethal.

Ever ready for adventure, Callahan traveled on foot across



High-flying corn earworm moths navigate at altitudes of 500 to 2,000 feet. To find a cornfield they use their antennae to collect infrared radiation from molecules of scent rising from the field. Since the scent is warmer and more concentrated near the corn, the infrared wavelengths are longer and fit the long sensillae of the moth's antennae. Higher up, the scent is diluted and cooler; so the frequencies have shifted to shorter wavelengths that fit the shorter sensillae. The insect thus "knows" not only the direction but distance to the corn. (Diagram by Philip S. Callahan)

China, Thailand, and Burma into India, thence via a seagoing tugboat, on which he worked a hellish furnace-stoking job, across the Persian Gulf to Iraq's port of Basra, little suspecting that in the desert he would find another clue to the enigma of insects and the infrared.

Hiking past the Basra Petroleum Company, he found himself almost ankle-deep in cindered insect corpses as he watched flames flaring gas from chimneys at the edge of the oil field.

It reminded him of a passage in W.J. Holland's *Moth Book* about the disappearance of the rosy maple moth "due no doubt to the combined influence of the electric lights, which actually destroy millions of insects that are attracted to them, and the gas wells and furnaces, which lick up in their constantly burning flames other millions of insects." Scooping up a handful of desiccated corpses, Callahan sorted them out into large and little moths, beetles, flies, wasps, and bees, wondering whether it was really the luminosity which had caused their death, or whether it was some other mysterious lure. Many of the insects, he noted, were not flying toward the flames, but swirling around in the night air at the edge of the light. If visible light was the real explanation for such suicidal madness, why, he wondered, didn't insects fly toward the sun, or the moon? And why did the dance of the Irish ghost swift so resemble the frantic dances of the doomed moths at Basra Field No. 1?

From the eastern shores of the Mediterranean he took a boat to the southern Italian city of Bari, hiking northward across the Murge Hills in Apulia to camp near an ancient hunting lodge, the Castel del Monte, where Emperor Frederick II, a scientist of stature, had housed and trained his hunting falcons. As Callahan was writing in his diary, to the light of a thick candle, a small brown moth flew from the grass to make darting passes over the flickering light. First it singed its wings, then dove straight into the flame in a Brunhildian act of self-immolation.

The moth's irrational behavior recalled to Callahan his reading of the English philosopher and poet Thomas Carlyle's poem "Tragedy of the Night-Moth," which assigned the moths' suicidal actions to passionate love, whereas the French entomologist Jean-Henri Fabre, in his essay on the great peacock moth, had, less romantically, seen in its flameward kamikaze rush a desire to "kill" the flame. Neither solution seemed satisfactory to a still curious Callahan.

His next revelation about animal and insect behavior came aboard a commercial freighter, the *Maria C.*, bound from Naples, via Algeria, to Philadelphia with Callahan, this time working above decks to enjoy the breeze. Halfway across the Mediterranean, a

strange bird with beautiful patterned plumage and an extended crest appeared from nowhere. From its downward curving bill Callahan recognized a hoopoe, so-called because of its musical "Hoo-po-po" song.

At twilight, when lights aboard the ship were switched on by the bulkhead doors, Callahan was amazed to see swarms of insects around light emitted from under a bulkhead door leading to the galley, but only around this one. From its perch on a yard-arm, the hoopoe darted through the semi-darkness to grab a moth, continuing to dive with great agility, snapping up insects from around the lighted doorway as fast as it could swallow them.

Since he had been part of the crew that had painted that same door the day before, Callahan realized the only difference between the "hoopoe" door and others ignored by the insects, was its fresh paint, of no special color, just the usual dull gray. Beetles and moths flew in front of it in capricious circles, eventually settling on the rough painted metal, *vibrating their antennas* on its surface.

What, wondered Callahan, could be attracting the insects to that particular door? Noting that its paint had a faint smell of bananas, reminiscent of his mother's fingernail polish, he remembered that Holland had described how night-flying moths were attracted to fermenting bananas and had consequently used a concoction of beer and bananas to ensnare them. Strangely, most of the insects were crowding not over the whole door itself, but only on that part of it well-exposed to light. If it was the light which attracted them, then why didn't they also go to the lit portions of other doors on the ship? It must be a combination of the light, *plus* the banana-like odor of the paint which was attracting them.

And whatever the energy from this combination might be, the insects seemed to be resonating to it, not with their eyes or with their olfactory senses, as most entomologists maintained, but with their vibrating antennas. Could it be, he wondered, that the ship's fifty-cycle light was heating the door and causing the scent molecules of paint to oscillate as if they were little transmitters of infrared radiation? That was the way the sun was supposed to work: affecting all gases in the atmosphere, at a molecular level, with its infrared radiation, pumping them with energy which they reradiate like tiny radio stations. Was the light bulb a low-energy sun and the paint smell a gas? If so, how and why did it affect the moths?

Next to radio waves, higher up the spectrum, come the extra high frequency emissions used in navigation-assisting radar, detectable with metallic *dish-shaped* antennas. Of higher frequency

than radar beams are *microwaves*, used for long-distance telephone communication, which are sent, or seized, by antenna shapes reminiscent of trumpets and other brass instruments, consequently known as *horns*.

Higher still in the spectrum are rays of visible light detectable, not by metal devices, but by the rods and cones on the retina of the eye, which allow humans to see the world around them so long as a light source is available. Just beyond these frequencies are the so-called ultraviolet ones, which the eyes of insects, made of multiple lenses—imaginable as foreshortened and rounded antennas—can easily pick up, allowing them to “see” a nighttime world denied to human beings.

In between the band of frequencies captured by metal antennas, and the band sensitive to the visual sensors of humans and insects lie the still not fully-explored frequencies of the world of infrared, an understanding of which requires not only a special knowledge of antenna design, but of the physics of optics. Just as in Dobler’s day, a decade or more earlier, no sensors for filtering out these infrared frequencies from the ether, as radio receivers do for radio, had yet been pinpointed when Callahan attacked the problem. To Callahan, the antennas of insects, whose unaccountable behavior he had been observing around the world, seemed somehow to function as if, like their man-made counterparts, they were receiving strange signals to guide them to objects of desire: food, members of the opposite sex, or, tragically, a source of fire. Unlike higher frequency radiations, these seemed to require nonmetallic, insulating antennas, such as horn or wax.

If, as Callahan was beginning to suspect, insect antennas were indeed receptors of infrared signals, the principle, duplicated with man-made transmitters, might enable man to control their comings and goings, especially those that cause depredation to vegetation, and in so doing avoid the pestilence of chemical pesticides. No entomologist had ever addressed the problem, perhaps because its solution required not only an in-depth knowledge of the *behavior* of insects but a detailed description of their *morphology*, or physical structure, and the *chemistry*, or organic makeup, of their antennas. The task was all the more daunting because it required a familiarity with many other branches of knowledge, including electrical engineering, which most scientists, preferring the safety of sticking to their specialties, were not willing to undertake.

Using an old microscope, Callahan took a closer look at the antennas of certain moths that preyed on farmers’ fields, particularly the one known to be most destructive to corn, cotton, tomatoes, and a host of other agricultural crops: the corn ear-

worm moth, which, together with relatives in Europe and Asia, was estimated to have destroyed billions of dollars of food plants all around the world.

Painstakingly, he brought into focus the tiny spines jutting from the antennas of corn earworm moths. It was to take him a decade and a half before he was sufficiently confident to publish a paper meticulously illustrating and describing in full detail the complexities of this microscopic system of communication in the infrared band.

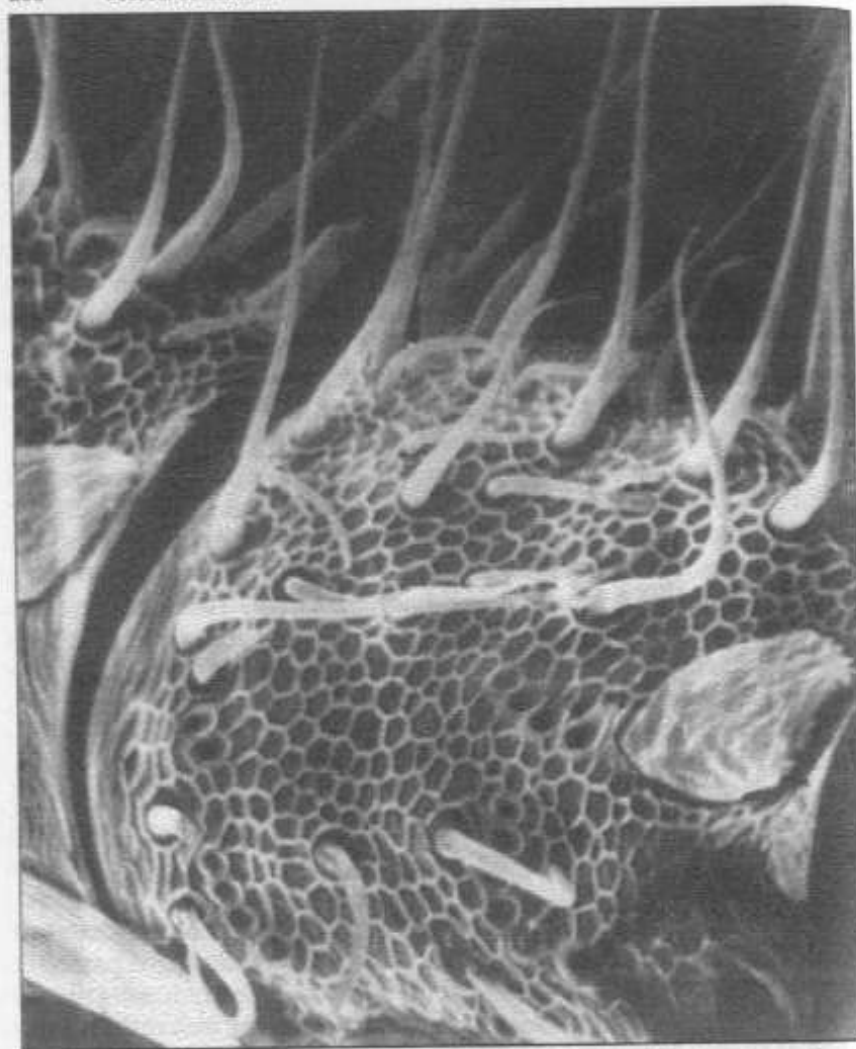
Moth antennas look very much like TV antennas, with long bars or spines for long waves, and short spines at the tip for shorter waves. They are even organized mathematically as log-periodic antennas, with bars closer together as they grow shorter—implying that nature not only geometrizes but mathematizes.

While the paper was in press, a new technological marvel was invented at Cambridge University in England, the scanning electron microscope. As soon as the first sample was delivered to the United States, Callahan, accompanied by his corn earworm moths, rushed to California where it had been installed. To his immense satisfaction he noted that, at powers of magnification and resolution many orders of magnitude greater than he had been able to attain with his own microscope, the huge, clear images of antennas and their sensilla—tiny sense organs in the form of spines, plates, rods, cones or pegs, each composed of one or a few cells with a nerve connection—exactly corroborated the drawings he had made. What had taken him fifteen years to accomplish could now be done in the same number of days.

Appointed to teach at the University of Louisiana in Baton Rouge, Callahan used its excellent laboratory facilities to discover that female moths, aroused from their quiescent daylight period, engage in a peculiar behavioral sequence. Moving their antennas forward, they spread their wings to vibrate so fast it is difficult to see that their wings are actually moving. This wing-vibration raises their body temperature about eight degrees higher than the usual 65 degrees Fahrenheit through which male moths fly at night in search of mates.

As the female heats up she begins to radiate waves in the infrared. With a complex instrument, known as a bolometer, Callahan could see these signals emitted by the corn earworm moth just as easily as if it were a firefly. And the fact that the signals were coded by the moth’s wing-beats—like a blinker signal that chops a light beam into segments to produce messages to send from a ship’s bridge—supported his theory that the moth was broadcasting a *unique navigational message*.

Using an oscilloscope to read out both the intensity and ampli-



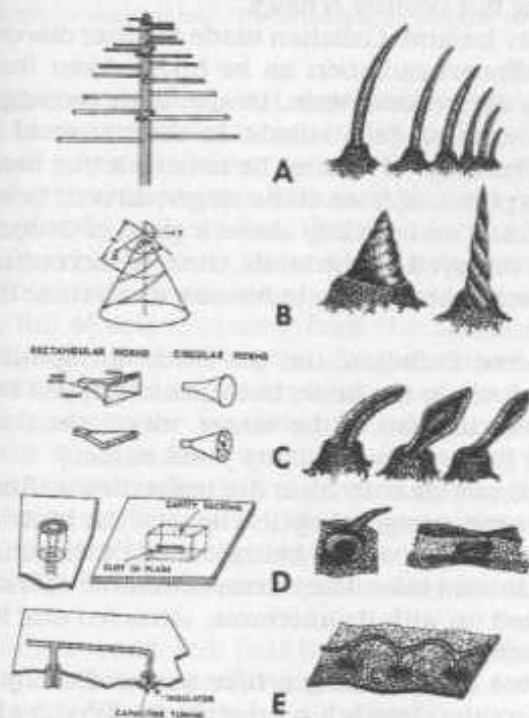
One segment of the antenna of the pink bollworm moth. The reticulated scatter surface and sensilla (spine) antennae are evident at this magnification (4000 X). They are of different lengths to resonate at different wavelengths. (Photo by Philip S. Callahan)

tude of the signal from any point around a moth, Callahan was able to determine the moth's position in space. He could tell whether a male detector moth was located above a female emitter moth, or, as aircraft pilots put it, approaching from two o'clock high at 50 degrees compass azimuth.

Yet, no matter how excellent the characteristics of the moth's modulated infrared signal might be as a navigational guide, it was not likely, in Callahan's eyes, to also include the attractant signal. A male moth would be induced to home on this unique

signal only if some other message told it the signal was actually coming from a female of its own species and that she was in the proper state to mate with him.

Like a detective in search of further clues, Callahan began to ponder the shape of moth antennas. More comparison between man-made antennas and those of various insects caused him to come to the startling conclusion that every single antenna shape designed by electronics engineers could be found at much smaller scale in the insect world. Insects had indeed anticipated man as the designers of radio antennas. Callahan's microscopic studies, and the photos they produced, revealed a world of exquisite detail. A tiny green peach aphid, or plant louse, on a desmodium stem, had dome-shaped sensors on its antennas surrounded by curving spines. The spines on the antennas of a red-banded leaf roller moth rose like pickets on a fence. A species of gall midge, to whose extended family belongs the Hessian fly that destroys wheat in the Midwest, has loop-shaped spines. A yellow jacket, one of a family of small wasps, has pyramidal and corrugated helical sensilla reminiscent of highly directional loop antennas.



Comparison of insect dielectric and man-made metal antennae. (A) Log periodic spacing; (B) Conical spiral type; (C) Horn and lens types; (D) Cavity types; (E) Loop types.

The corrugation on antennas, he realized, served to amplify the incoming signal by making it tap-tap like a drum.

As stunning as it was to Callahan that what electrical engineers call log-period antennas had already been anticipated in insects, his entomologist colleagues, to a man, kept criticizing this radical notion because, as everybody knew, for insect spines to be able to collect frequencies in the infrared band, to act like radio receivers, the emitted wavelengths would have to be *coherent*, i.e., gallop abreast like horses in a cavalry troop, rather than stamp off in all directions, as they do from light bulbs. Without such coherency, insect antennas could not possibly "tune" to resonate to them, as one tunes a crystal radio to one's favorite station.

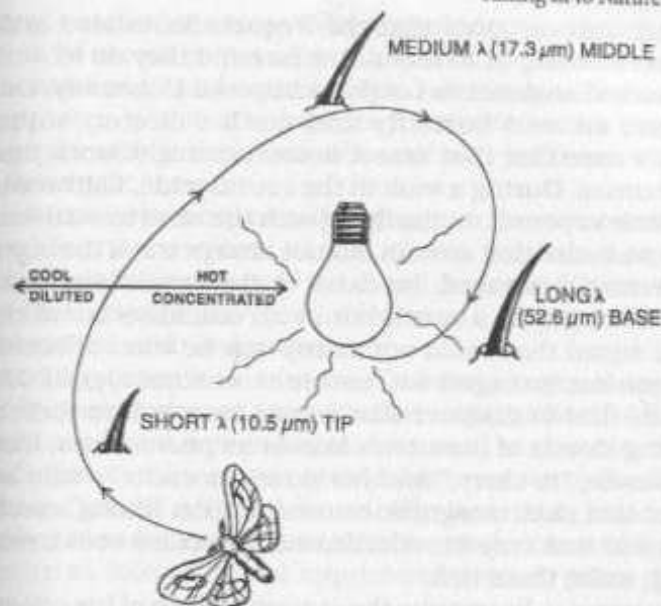
Because his colleagues, like the majority of university men everywhere, kept to the placid view that chemicals were the only way to assure a defense against insect crop depredation, Callahan resigned his professorship at Louisiana State. Hired by Dr. H.C. Cox, Director of the U.S. Agricultural Research Service's Southern Grain Insect Laboratory in Tifton, Georgia, he found his new co-workers in total agreement with his point of view that chemicals do nothing but destroy ecology.

On holiday in Ireland, Callahan made another discovery about insects and infrared radiation as he hiked down from Coragh Patrick, Erin's sacred mountain, to spend an evening in a pub, listening to a tenor singing ballads. In the course of an IRA lament called "The Siege of Venice" he noticed a tiny moth making endless circles plumb in front of the singer, directly below a single hanging light bulb and directly above a glass of Guinness stout. The balladeer, annoyed by the moth, tried unsuccessfully to grab it, but the insect kept dodging to resume its circular flight above the pint of ale.

Why, wondered Callahan, did the moth not spiral up to the light bulb, or down to the brew, but remain gripped by some invisible force just in front of the singer, much like the wavering ghost moth at Pullan Brae so many years earlier?

At last it became clear to him: the molecules wafting up from the ale were being energized by the light of the bulb while their amplitude was being raised by being jostled by the singer's voice, causing them to emit laser-like bursts of infrared radiation. These the moth picked up with its antennas, attracted and imprisoned into fixed gyrations.

The next clue came during a hike across Devonshire's wild Dartmoor, where the ghostly hound of the Baskervilles had spread nightly terror in Sherlock Holmes' tortured tale. Pausing to eat lunch near Watern Tor, one of a collection of towering masses of



A night-flying moth flies a log periodic spiral to a light bulb because the moth is not going to the light but to the narrow band (coherent) infrared radiation from the light-stimulated molecules around the bulb. The antenna is log periodic. (Diagram by Philip S. Callahan)

stone strangely sculptured and weathered by the fierce winter winds that blow across the moor, Callahan became aware of a cloud of small insects hovering against the sky over the tor in a dance for which entomologists had no explanation.

An accomplished rock climber, Callahan scaled the steep side of the tor to put his hand on its sun-warmed topmost surface of black rock. On his downward climb, he became aware of a mysterious mist, full of scent, coming from the heather, bog cotton, mosses, and lichens on the surrounding moorland.

It came to him, on his way to Cranmere Pool, that as the scented vapors drifted across the tor their molecules would be bent and rotated by the hot rays from the rock, stimulating them to oscillate at many unknown infrared frequencies. Had he "infrared eyes," he mused, he would have been able to give names to those infrared "colors," as easily tuned to by an insect antenna of proper design as visible colors are distinguished by normal human vision.

Could it be, he wondered, that the flies above the tor were attracted to the infrared vapor "colors" from plant scent molecules in turn stimulated by the heated pile of rock to emit frequencies like so many wind blown satellites? Could insect antennas be tuned to these subtle frequencies? Trudging on, he was increas-

ingly filled with certainty that the frequencies existed and that insects were tuning in to them. But how did they do it?

An electrical engineer in London's Imperial University, Dr. E.R. Laithwaite, an avid butterfly and moth collector, supported Callahan's assertion that insect antennae might work just like radio antennae. During a walk in the countryside, Laithwaite had noticed male vapourer moths flying with the wind toward females. Since he was sure that suitors did not always track the objects of their affection downwind, he came to the conclusion that they were not attracted by a scent, but by an omnidirectional electromagnetic signal that could not in any way be wind-affected.

His opinion enraged an eminent entomologist, H.B.D. Kettlewell—first to discover that female insects lure their males by emitting clouds of hormones known as *pheromones*, from the Greek *pherein*, "to carry," and *hormone*, "to excite"—who angrily countered that electromagnetic communication among insects was claptrap and that only his odoriferous molecules could, sexually speaking, make them tick.

In an attempt to harmonize the opposing views of his colleagues, a physical chemist, Dr. R.H. Wright, held that insects could identify scent molecules through what are called *osmic* frequencies, most likely to be found in the infrared portion of the spectrum. Though how they might do this remained an enigma.

In essence, the conflicting arguments were those of an entomologist saying that insect antennae detect *scent*, an electrical engineer saying they detect *infrared radiation*, and a physical chemist saying they might detect infrared radiation *from* scent.

Callahan was of the opinion that all three were partially correct. Back in his Tifton laboratory, he delved again into the scientific literature to find that he and Dr. Wright were not the first to believe that insects could sense radiation from oscillating molecules. Way back in 1892, C.V. Riley, a noted entomologist, had suggested that insects might communicate through their antennae by *telepathy*: "This power would seem to depend neither upon scent nor upon hearing but rather on certain *subtle vibrations*, as difficult for us to apprehend as is the exact nature of electricity."

Riley's reflection was followed in 1936 by that of the South African journalist and poet, Eugene Marias, who, in his classic *The Soul of the White Ant*, described how a female termite, after finding a suitable spot, would come to rest on her forefeet and lift three-quarters of her hind body into the air, remaining as still and stationary in this position as if she were a termite statue. "What is she doing?" Marias wondered, then replied: "She is busy sending a wireless SOS into the infinite."

Marias also believed the signal might be caused by a scent, but

hesitating, qualified the idea: "When speaking of scent, one should also think of waves in the ether. It is false to assume that perfumes consist of gases or microscopic substances. Perfume itself is not entirely a physical substance. One can scent a large room for ten years with a tiny piece of musk and yet there will be no loss in its weight."

No more conjecture on the subject appeared in print until 1949, when an electrical engineer, G.R.M. Grant, published a paper in the *Australian Proceedings of the Royal Society of Queensland* to theorize that sensory "pits" he had found on insect antennae might be resonators to infrared radiation.

Inspired by Grant's conclusion, Callahan began a search for behavioral patterns among insects that might indicate *both* olfactory *and* an infrared-sensing basis for insect communication. His studies heightened his certainty that this must surely be the case: the insects "smell" odors electronically by tuning into narrow-band infrared radiation emitted both by sex scents and by plants they desire as food. His next requirement was to prove it, indisputably.

On the premise that older knowledge, so often spurned by younger scientists as *passé*, might still have value, Callahan rebuilt what he called his *Russian Infrared Machine*, an instrument conceived in 1924 by a Russian researcher, Dr. Glagoleva-Arkadieva, for the purpose of detecting infrared frequencies.

When he was finally able to place his moths in front of it, they went into a frenzy of excitement. Believing infrared emissions from the machine to be the real thing, females tried to lay eggs on it, males attempted to mate with it, extending their genitalia towards its components, adding one more rung to the ladder of proof. With the same machine, by broadcasting different frequencies, Callahan was able to determine that sickening plants signal the news of their impending death to waiting bugs by means of the same infrared radiation, which goes a long way towards explaining why healthy plants remain impervious to pests.

At last it was clear what actually happens with the mating moths. The female emits her pheromone molecules, which are carried on the wind in a plume like cloud, growing thinner and cooler as they distance from her body. The male moth, flying into this plume of pheromones, uses the sensilla of his antennae to pick up electronically the infrared signals emitted by the scent molecules. If he strays too far from the center of floating scent, the signal fades as the concentration of hormones becomes dilute. He must therefore turn back into the plume, flying a serpentine path, to and fro towards his goal, just like an RAF Catalina following its radio beam.

Two things help the male moth navigate correctly: temperature, and density of pheromone molecules. The further he is from the female the colder and more dispersed are her pheromones, giving off shorter and weaker frequencies, which the male picks up with the shorter sensilla on his antennae. The closer he gets, the warmer and more condensed are the pheromones, giving longer waves, which he picks up with his longer sensilla.

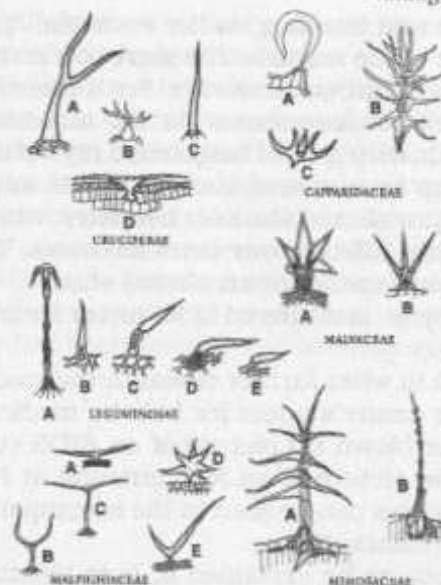
The male also has an additional powerful means of modulating the free-floating scent by vibrating his own antennae at audio frequencies to amplify the signal. All insects vibrate as they move—different species at different frequencies: bees at five hundred cycles, moths at sixty, ants at twenty. This helps the male moth amplify the female signal with his own vibrations. As he reaches his goal, the signals peak, and their matching wavelengths tell him he's right on, and she's turned on.

In the same way moths tune in to the wavelengths emitted by the specific plants they are designed to feed on. The sicker the plant, the more powerful the scent, the easier for the moth to home in on its prey.

In a chapter entitled "A Blueprint for Insect Control" in his book, *Tuning in to Nature*, Callahan makes the final incisive point that his predictions with respect to various characteristics of the free-floating infrared-emitting pheromone, open up a whole new way to deal with pests. By assembling an astute group of entomologists, antenna engineers, physical chemists and physicists it may be possible—of course with the aid of morphologists—to produce emissions with enough energy to attract insects or jam their communication systems over great distances."

Such a system would indeed be a boon to farmers. Instead of going to their agricultural co-ops to buy insecticides, farmers could lease microminiature transmitters either to attract to traps, or, by beating against insect pheromone frequencies, jam them to prevent mating. The same companies that produce insecticides could produce different chemicals to make solid-state transmitters, even the transmitters themselves. And if, as the Free Masonic founding fathers of this Republic believed so warmly, "there is room at the table of life for one and all," why not room for insects? Of the thousands of species, only a tiny minority are noxious in any way to man or plant. The rest serve multiple and varied vital functions, enlivening the soil, pollinating species, and, in Steiner's clairvoyant view, constituting a vital link with the wavelengths of the spirits of nature, especially the fire spirits he sees so closely tuned to insects.

Surely, says Callahan, any improvement is preferable to the present archaic, indiscriminately lethal, and outdated system of



Different types of trichomes on certain plant families. If plants are chemically "talking" to one another, as has been shown, then the trichomes must be the antennae for molecular messages. (Diagram by Philip S. Callahan)

pest eradication. And the ultimate practical advantage of such a new control system, in addition to its ability to attract, bug by bug, only selected species to which it is tuned, is its ability to be turned off—unlike toxic poisons—when not required.

In his geodesic lab in Wichita, with the help of his new infrared spectrometer, Callahan demonstrated for us in scientific terms, an overlap between physics and metaphysics, validating the wisdom of the Vedas. Into the beam of infrared light, channeled by mirrors through his machine, Callahan intoned the basic sound of the Hindu mantra, "Aum," repeating it several times.

He then pointed to the computerized printout, which clearly showed the effect of his mantra in the form of a group of spikes on the graph. "Above the base line," he explained, "infrared energy is radiated by the molecules jostled by my voice. Below the base line is the energy as it is taken in. When the molecules of whatever is in my breath are energized, they emit laser-like spikes of infrared radiation. And just like a radio picks up the *Eroica* from your favorite classical music station, this machine picks up the frequency at which the molecules are radiating, and can identify their signal frequencies. If you know the frequency of an atom or compound, you can identify its presence and its amplitude. Here, for instance, is carbon monoxide. You can see it right there on the graph." He adjusted a knob to produce a printout.

"All of this," he said handing us the evidence, "proves the extraordinary power of the mantra. The more you recite it the more it clears your body of carbon monoxide. See it there? This leads to an altered state of consciousness. As the mantra vibrates the molecules of breath, they give off heightened rays of infrared. These must be picked up by our acupuncture points and fed back to the body, causing an altered state of chemistry, which affects the breath, which again affects your consciousness. The more you chant the more you experience an altered state."

He laughed happily, and offered to let us try for ourselves, with similar results.

When we asked to what further research the machine was being applied in the center's quest for holistic medicine, Phil surprised us with the blown up picture of an AIDS virus which he compared with the picture of an RAF antenna at Heathrow Airport. The similarity (as can be seen in the accompanying illustration) was indeed remarkable.

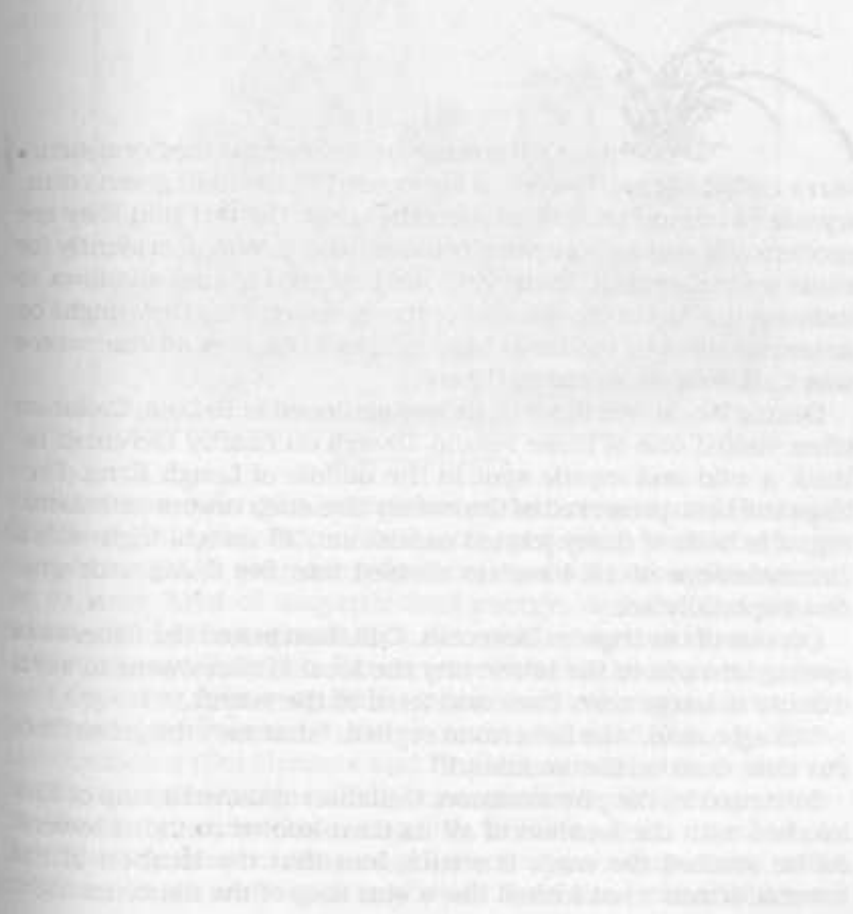
Callahan's object, as he explained it, is to identify the precise frequency given off by the AIDS virus. He then hopes to develop a means of replicating the frequency, and by jamming the virus' signal, neutralize its effect. The whole of an afflicted person's blood could then be passed through the same sort of machine as is used in kidney ailments, and, with luck, neutralize the disease.

"It's funny," said Phil, as he walked us to our car, "how many important discoveries are made and ignored for decades, or even centuries. The other day I got a jolting surprise when I ran across the works of the almost totally forgotten nineteenth century Irish scientific genius, John Tyndall, which contained a lost chapter in the history of science. It described how molecules of perfume such as those emitted by patchouli, sandalwood, cloves, lavender, attar of roses, lemon, thyme, rosemary, spikenard, aniseed, and the oils of cloves and laurel, all absorb infrared radiations. Tyndall's inspired work spawned a whole new branch of science: infrared spectro-photometry. Yet, though Tyndall also discovered the beneficial effects of penicillin eighty years before Sir Alexander Fleming, and was clearly on the point of inventing the laser a century before that feat was accomplished, his contributions were totally ignored by later chemists and olfaction physiologists." Phil shook his head. "It caused Tyndall's successes to be characterized in the *Encyclopaedia Britannica* as "due more to his personality, and his gift for making difficult things clear than to his original researches."

Equally inspiring to Callahan was the work of Tyndall's great Gaelic contemporary, Robert Lloyd Praeger, whose masterpiece on the natural history and topography of Ireland, *The Way I Went*,

described by Callahan as "a field guide to the soul of an entire country," became his admired viaticum.

It was to lead Callahan to a discovery almost as monumental as that of insect communication in the infrared band: proof of the beneficial influence on agriculture of radiations from outer space. These discoveries, made by Callahan subsequent to his years of entomological research, were to validate scientifically the clairvoyant vision of cosmic forces described by Rudolf Steiner, meshing with Julius Hensel's censored conclusion that "animate" rocks, though speechless, may yet rid us of the noxious chemicals with which industry has been greedily and increasingly fouling its nest.



Chapter 21

TOWERS OF POWER



Of the sixty-five mysterious medieval structures called Round Towers so far located in the lush green countryside of Ireland little is known other than the fact that they are geodetically and astronomically placed and oriented, evidently for some special reason, their windows designed to cast shadows to indicate the day of the solstice or the equinox. That they might be antennas used by medieval Irish monks to capture cosmic waves was Callahan's surprising theory.

During World War II, when he was stationed at Belleek, Callahan often visited one of these Round Towers on nearby Devenish Island, a wild and mystic spot in the middle of Lough Erne. Perhaps the best-preserved of the twenty-five such towers still standing, it is built of finely jointed sandstone, 25 meters high with a circumference of 15.4 meters divided into five floors with windows specially set.

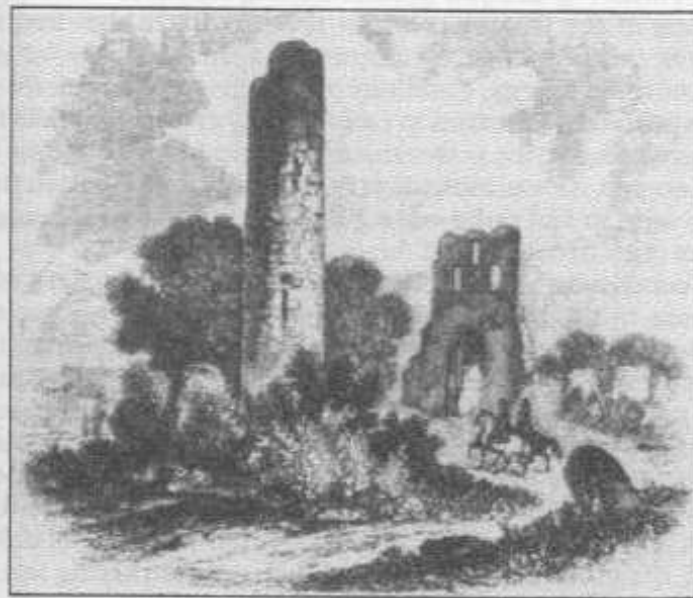
On one of his trips to Devenish, Callahan asked the fisherman rowing him out to the tower why the local farmers went to such trouble to barge cows back and forth to the island.

"Arragh, man," the fisherman replied, "shar isn't the grass finer out thar than on the mainland!"

Intrigued by the phenomenon, Callahan obtained a map of Eire marked with the location of all its then-known rounded towers. As he studied the map, it struck him that the location of the towers formed what looked like a star map of the northern night

sky at the moment of the December solstice, Polaris being clearly marked by an especially magnificent tower on the grounds of the monastery of Clonmacnoise next to the River Shannon on Ireland's central plain.

Could there be a link, Callahan wondered, between the lush green grass around Devenish Tower and the position where it stood under the starry cosmos? Could the round tower be acting as an antenna for some cosmic energy broadcast from the stars? The fact that in 1932 Dr. Karl G. Jansky of the Bell Laboratories had first discovered radio waves from the cosmos, and had measured those from that particular part of the sky as arriving in



Irish round towers.

14.6-meter wavelengths, seemed more than coincidental. It struck Callahan that the Devenish Tower, precisely positioned and shaped, might be resonating to cosmic radio wavelengths, as well as to some kind of magnetic-field energy. And the fact that it consisted of paramagnetic rock also pointed in that direction.

Stones, says Callahan, have a secret life that involves two equal and opposing, but very little understood, magnetic forces, the plus and minus of nature, the yin and yang of the Chinese. These are the forces that German and English natural philosophers of the nineteenth century called paramagnetism and diamagnetism—the former attracted by a magnetic field, the latter repelled. As described by the scientists who discovered paramagnetism in the mid-nineteenth century, it is a "weak, fixed susceptibility toward

a magnet." By fixed, they mean the magnetic attraction is "inherent" in the substance and cannot be transferred as one does with ordinary magnetism by rubbing a nail or a screwdriver against a horseshoe or bar magnet. Callahan's postulate was clear: the Irish Round Towers, made of limestone, sandstone, or basalt, and therefore definitely paramagnetic, could be massive electronic collectors of cosmic microwave energy as well as giant accumulators of magnetic energy.

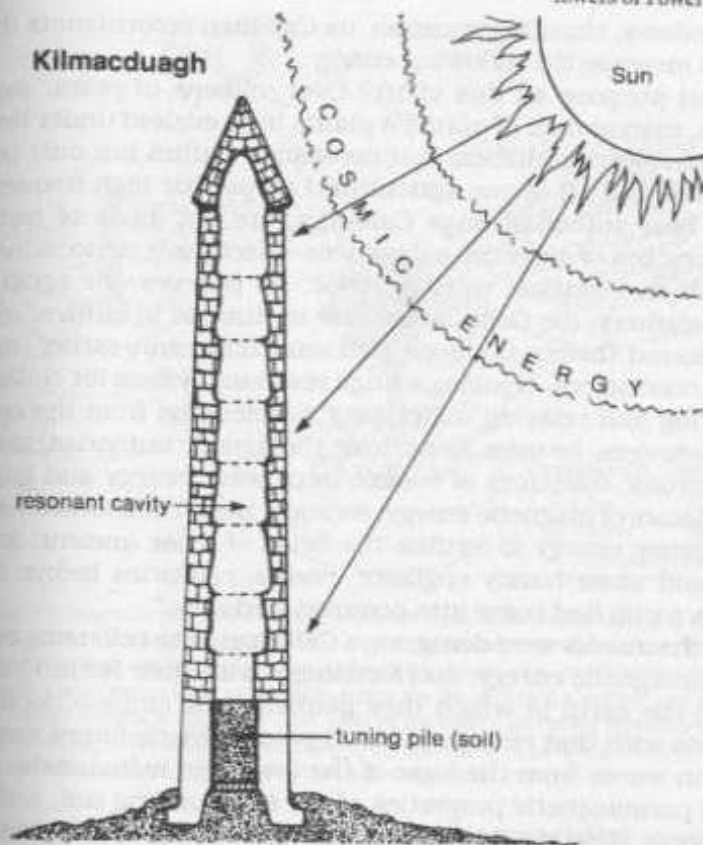
To find out, he began to experiment with small-scale models made of paramagnetic sandpaper and later carborundum, using the dimensions published in Professor G.L. Barrow's book *The Round Towers of Ireland*, producing one model to the exact dimensions of the Devenish Island tower. With a high-frequency oscillator called a *klystron* to generate a three-centimeter wavelength of radio energy, Callahan placed his ten-centimeter-wide sandpaper model (fourteen in circumference) within a radio beam and, sure enough, the power meter went up from six to nine decibels of energy, a clear indication to Callahan that the Irish Round Towers were in fact radio-wave guides, acting the way a magnifying lens does to collect and focus light.

The conclusion also resolved for Callahan the mystery of why the doors to the Irish Round Towers were invariably set many feet above the level of the ground, placed there, according to orthodox archeologists, as one of the protections against Vikings.

The notion, says Callahan, is quite ludicrous, if only because the first Vikings did not invade Ireland until well after the eighth century, and the height of the doors would have presented no obstacle to their determined attacks. There had to be a better reason, and the anomalous fact that, within the base of differing towers, the monks had compacted the earth to varying levels indicated to Callahan just what that reason might be.

No matter how mathematically accurate electrical engineers design their antennas, says Callahan, their figuring seldom provides a sharp enough resonance. Antennas need to be shortened or lengthened by trial and error to conform with an incoming wavelength. To tune their stone antennas to the night-sky radiation, says Callahan, the monastic tower builders merely needed to fill each of the interiors with dirt up to a level at or near their door heights until they obtained the right incoming frequency.

To strengthen his contention that the Irish Round Towers are indeed paramagnetic antennas, Callahan realized he would have to be able to show magnetic field-force lines on one of his models similar to those shown by iron filings on a sheet of paper under which a magnet is placed. In theory, these would appear as rings at different levels. To make them visible he decided to soak a



The tower at Kilmacduagh in County Galway, Ireland, thirty-four meters in length, is the tallest of the Irish Round Towers, which served, according to Professor Philip S. Callahan, as antennae to receive cosmic or magnetic energy. Part of the base below the doorway of such towers was filled with dirt "tuning pile" for shortening or lengthening the paramagnetic rock antenna. (From *Magnetic Antennae and Ancient Agriculture*)

carborundum model of the Turlough Tower in County Mayo in a solution of Epsom salts for forty-eight hours in the hope that this diamagnetic salt would be light enough to be affected by the extremely weak forces involved. He was elated to see the model become circled with a spiral of white lines from its pointed top all the way to its base. Even more astonishing, at each level of the model, where a floor and window were located on the larger tower, a particularly broad strong band of white Epsom salt appeared.

These lines of force were similar to the standing waves of energy that can be measured on a resonant electromagnetic radio antenna, called electromagnetic *modes* by electrical engineers. In other words, it looked as if the towers were designed so that the strongest "mode" lines were concentrated on the floors of the towers where the monks would be observing the stars through the small

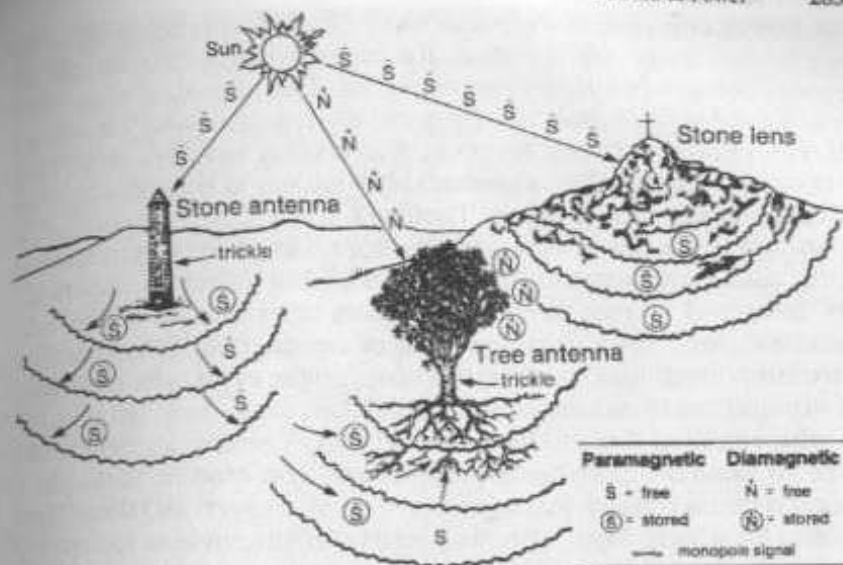
tower windows, chanting mantras, as Callahan reconstructs the scene, to increase the inflowing energy.

To what purpose all this effort? Over millions of years, says Callahan, man and all of nature's plants have evolved under low-energy microwave radiation that constantly bathes not only our own bodies, but all of our agricultural crops. For high frequencies the best antennas, says Callahan, are not made of metal conductors, but of dielectric substances—electrically nonconducting—such as Plexiglas, wax, or stone. He believes our agricultural forefathers, the Celts, knew how to "tune in to nature," using the Round Towers as silicon-rich semiconductors rather than metallic conductors, creating a huge resonant system for collecting, storing and relaying meter-long wavelengths from the cosmos. The towers, he says, were "tuned" magnetic antennas, massive electronic collectors of cosmic microwave energy and giant accumulators of magnetic energy. As such, they "contributed beneficial cosmic energy to fertilize the fields of those ancient, low-energy and stone-handly engineer monks, centuries before the word *electricity* had come into common parlance."

What the monks were doing, says Callahan, was collecting cosmic paramagnetic energy, and focusing it with their Round Towers onto the earth in which they planted their crops—"doping" the plants with that energy. Infrared paramagnetic forces would radiate in waves from the base of the towers to increase the attracting paramagnetic properties of the surrounding soil, rather than directly affecting plants, which have a diamagnetically weak, fixed force, repelling a magnetic field, a fact discovered by the English scientific genius, Michael Faraday, and confirmed by his Irish contemporary, John Tyndall, who also tested some thirty different species of trees for diamagnetism.

The towers, huge, well-designed stone waveguide detectors of microwave radiation from the cosmic universe, would resonate, according to Callahan, by day to the magnetic energy transmitted by the sun and, by night would capture the 14.6-meter wavelengths emitted from that starry region of the universe to which they were carefully aligned at the winter solstice. And, because plants exhale highly diamagnetic oxygen during sunlight hours, they are diamagnetic by day, but, as unrecognized by Faraday and Tyndall, become paramagnets at night when they concentrate on breathing out highly paramagnetic carbon dioxide.

Aware that form as well as length is necessary for strong resonance in radio antennas, and that the same is true of stone paramagnetic antennas, Callahan wondered what part the characteristic tapering of the Round Towers might play in their paramagnetic properties. His models showed that tubular structures with



Place of the magnetic poles in nature. A circle around the monopole means it is stored in the soil, stones, or plants. Starting at the sun's magnetoelectric dipoles, the dipoles are torn apart by flare activity and free magnetoelectric monopoles, south and north, head for earth across space. Most reach earth where the Ss are being absorbed and stored by stone Round Towers, stone mountains such as the sacred mountain (shown with cross), and by paramagnetic soil. The N monopoles are absorbed by plants such as the tree shown. Once absorbed they are stored as a battery (circle monopoles).

conical pyramids, or dunce-cap covers, were ideal conductors. Experimental plants growing around them invariably bowed toward the central tower, with seedlings sprouting more quickly on the north side, leaving those on the due south side to grow to only about half the size.

The first serious large-scale field test of Callahan's theory was carried out in 1986 in Arkansas, on land belonging to Thomas C. Quackenboss, a gentleman farmer. Operating on the premise that, if the Irish Round Tower system worked for Callahan with his small-scale models, it should work just as well with medium-sized models built to the same proportions as the Round Towers of Ireland, Quackenboss and his family raised three six-foot long and one-foot-in-diameter terra-cotta drainpipes filled with highly paramagnetic granulated basalt to irradiate an area of some two hundred acres. They located the pipes in accordance with Callahan's discovery that his small models radiate the lion's share of their energy in a cloverleaf pattern to the north of where they are situated. To render the terra-cotta towers even more paramagnetic the Quackenbosses topped them with conical pyramids of basalt mixed into cement. Total investment: \$250.

Fields of cotton and soybeans were planted in early summer. By fall the happy result was an increased harvest of more than \$8,000 above what had been expected. The following year the Quackenbosses raised twenty-one "towers of power," hoping thereby to increase their revenue. And further to increase whatever advantage Callahan's cosmic radiation might be so positively bringing to the family crops, Thomas's thirty-two-year-old son, John, made studies of dowsing literature on subterranean water veins, and above-ground "ley lines," with the object of situating his "towers of power" directly over spots where his dowsing rod indicated such lines were crossing or overlapping. The results were surprising from another and novel angle: in an area plagued by drought the Quackenbosses, unlike their neighbors, got plenty of rain, enabling them to harvest 1.8 bales of cotton per acre and over 40 bushels of soybeans, the second best crop in their history, an extraordinary feat in a year of drought such as 1988. The reason for which, says John, may well be attributable to the mysterious powers of the towers, the only extraneous factor.

When two former college classmates heard of John's exploits, they induced their own families to try the experiment. It was thus that in central Virginia, on the land of well-known Richmond businessman, Jim Wheat, his farm manager, Richard Dix, and his actual farmer, Ray Thomas, had the unprecedented courage to place seventeen towers on a thousand acres of tidewater land in the estuary of the Rappahannock River.

So impressed were they by the first year's harvest with the magical towers, which brought in an added \$50,000, they have determined to go a step further and try biodynamics on all of the five thousand acres he farms and give up the use of chemicals as fertilizers or as pesticides. A happy move, for when we were there in the early summer, just as the corn was being planted in a heavily poisoned field, we found the remains of a beautiful hawk that had feasted on one of three dead crows, and on the edge of his burrow, the tracks of, dying groundhog.

That the system of broadcasting cosmic energy with towers, obelisks, or pyramids goes back to the historical developers of such structures, the Egyptians, stands to reason, but the proof of it is very recent, only now come to light through the efforts of Gabriel Howearth, who for many years has backpacked hundreds of miles into the roadless Central American jungle into territory where few white men have ever penetrated, to commune with his fellow Maya agriculturalists.

Studying their method of handling the land, he found them to be amazingly sophisticated, with fields of rich produce, sometimes as large as four-hundred-acre lots, richly intercropped—as



Six-foot terra-cotta drainpipe filled with basalt and capped with a cone of cemented basalt raised on the New Hampshire farm of a client by John Quackenboss (right). The proportions are the same as the Round towers of Ireland, and early experiments have given significantly increased harvests.

was the practice before the arrival of Cortéz. "They had permaculture sixteen hundred years ago," says Howearth. "And now they have fruit and nut trees over a thousand years old that are still growing and bearing."

That the Maya were in contact with the Egyptians, as painstakingly documented by Auguste Le Plongeon, and thoroughly corroborated by such eminent epigraphers as Professor Barry Fell, is no longer in question, except perhaps by such establishment subsidized skeptics as Martin Gardner and Randy the "Magician," whose stance, like that of Cardinal Bellarmine with Galileo, is to deride all such wonders as spurious or heretical.

Now the link between Mayaland and Egypt is further supported by Gabriel Howearth's discovery that the Maya used a method of weed and insect control that amounts to a form of what is modernly known as *radionics*. This they married to an amazing science of astronomy-astrology in which cosmic forces are picked up and relayed by tiny pyramids, directed along the local grid of ley lines, just as with Callahan's "towers of power."

"They know," says Howearth, "which planets affect which insects—such as Venus influencing ladybugs, and Mars influenc-

ing aphids—and they have specialists constantly plotting the course of the planets as they move against the stars. To their innumerable and very accurate calendar stones, some carved with glyphs not only of the planets but of the various weeds and insects, the Maya attached movable sections, which enabled their brujos to determine, and then manipulate, as did Steiner, cosmic forces to control unwanted weeds and insects."

Their expertise in these matters, says Howearth, passed down through the centuries, is amazing, and enables the Maya astronomers to perform such ecological controls as capitalizing on a grasshopper they know to carry a virus that eliminates a certain weed.

On one unusual calendar stone, said Howearth, the glyphs of the planets are not arranged around the outer rim, as in some, but run straight down the center, including glyphs for sun, moon, and the asteroid belt. This enables them accurately to compute and schedule their agricultural activities.

Over the years, as Howearth gained their confidence, the Maya taught him what they knew of the influence of planets, as well as other well-kept secrets, not divulged to gringo archeologists. He says they took him out into fields to demonstrate what amounts to a modern technique of radionics. As the planets move into the correct positions, the Maya use small pyramids with special glyphs of weeds or insects to relay forces from the cosmos along terrestrial ley lines, and thus control both weeds and insects.

Howearth says that deep in the jungle, removed from gringo eyes, the Maya practice some of the most advanced agriculture he has ever seen. "Their ability to work the weed problem in the tropics, where the problem is outrageous, is amazing; but they can do it with their glyphs and pyramids. They keep and nurture the weeds they want for their integrated agriculture, but have a subtle method for controlling the ones that otherwise get out of hand. As did Steiner, they will take the ash of a seed and place it in a pyramid. As the influence of the right planets peaks, the effect is radiated to eliminate the weed from where they do not want it. They tell me that in the old days they used to put the smaller pyramids inside the larger ones. They also have inverted pyramid structures, built into the soil, mostly of adobe, in which they can store their seeds indefinitely."

Like Darryl Kollman, Howearth's Mayan friends aspire to rejuvenate agriculture in this hemisphere. And it is Howearth's project to get some of them to come north to help put into practice on his uncontaminated land the ancient wisdom kept alive by natives of America, whether North, Central, or South. These are the natives whom we, of the United States, have so far done our best to enslave or massacre in a tradition worthy of Cortez. Had his extir-

pator of *malezas*, archpriest Diego de Landa, not destroyed the precious Maya codices, we might have saved our soil the misery of half a millennium of ignorant mishandling.

COSMICULTURE



Luckily our Indian heritage is slow to die. In the highland woods of Georgia, within sight of the Great Smoky Mountains, mystic haunt of the Cherokee, it lives on by the Tallulah River into whose turbulent waters the daughter of a chief once threw herself from a thousand-foot cliff to join her young white lover, sacrificed by her understandably segregationist father. Now, a few miles upstream from this lover's leap, the granddaughter of another Tallulah Cherokee, Sarah Hieronymus, has been tapping cosmic waves. In a laboratory on the shores of Lakemont, not far from the Cherokee reservation, she is carrying on the work of her late husband, T. Galen Hieronymus, running the Advanced Sciences Research and Development Corporation, a non-profit organization presently devoted to the spread of "Cosmiculture"—the channeling of cosmic energy into the ground for the benefit of plants.

This Steinerian ideal is accomplished with what Galen called *cosmic pipes*, ten-foot-long plastic polyvinyl-chloride tubes, three inches in diameter, which are raised, like an Egyptian *dged* column, to a height of eight feet, their bases inserted thirty inches into the ground. Atop each pipe is a copper electrode designed to absorb the mysterious solar energy Galen called *eloptic*, a combination that obeys "some electrical laws but not *all* of them, and some optical laws, but not *all* of them," and passes it down a wire coiled around a quartz crystal to an underground amplifier, there

to be broadcast through the soil for a mile or so in all directions.

"We don't make them any higher," Galen told us in the summer of 1987, a few months before he died, "because the potential increases as you go up; it gets too strong above six or seven feet. All around us is a great sea of energy, cosmic energy, solar energy, lunar energy, planetary energy, and the energy of the earth itself. But, unlike the chemicals sold in commerce, this energy is free, and it isn't toxic; it's highly beneficial. All we have to do is tap it; and that's what we've done. When I saw that chemical fertilizers and patent medicines designed for livestock were making paupers of the farmers of this nation, I got out my early experiments in *eloptic* energy and adapted them to tap this sea of free energy, and so we devised the cosmic pipe."

For many years an engineer in charge of heavy power distribution, Galen liked to quote astronaut Edgar D. Mitchell to the effect that there are no unnatural or supernatural phenomena, only very large gaps in our knowledge of what is natural. For the last fifty years Galen has been pioneering in the exploration of what he calls "subtle energies," energies outside the electromagnetic spectrum, as little understood by orthodox science as are electricity or gravity—the world of energies so lucidly described in the Hindu Vedas, in theosophy, and in anthroposophy.

As early as the 1930s, Galen showed that solar energy could be conducted over wires, and, more difficult, he succeeded in obtaining a U.S. patent for an instrument that did it. Shortly after World War II he developed radionic instruments on the basis of the sophisticated work of Dr. Albert Abrams, a natural genius who did his pioneering in San Francisco at the turn of the century. Ever resilient, Galen then discovered his *eloptic* energy. "We need a new kind of dictionary," he said, "to describe these energies, which are allied to, but are different from those in the electromagnetic spectrum. It's a subtle cosmic energy. It does not attenuate with distance. We can conduct it over wires."

With his radionic instrument Galen mysteriously rid the fields of many a Pennsylvania farmer of Japanese beetles and of European corn borers, remotely affecting the fields with a photograph placed in his "black box" many miles away. So successful was this method that a U.S. general helped form a company to exploit the invention. But the Pentagon, quickly realizing that the same system might be applied to soldiers in the field, did the chemical companies a service by remotely tuning Hieronymus out of the business as effectively as he had tuned out the bugs on the farmers' fields.¹

¹ See his *The Truth About Radionics and Some of the Criticism Made About It By Its Enemies*. (1947)

Fingering one of his cosmic pipes in the laboratory of his Lakemont headquarters, appropriately called Oasis, surrounded by innumerable electronic and radionic instruments, Galen spoke of eloptic energy as if it were a friendly djin: "It doesn't like coils. It likes straight lines; but we can manipulate it with coils and make it radiate. And it moves with the speed of light. We proved this when the astronauts were on the far side of the moon back in the sixties. We knew, fifteen minutes before NASA, that they'd fired their retro rockets. NASA was out of radio communication; but we could plot the astronauts with eloptic energy."

Well into his nineties, his eye as sharp, and his step as lively as that of a Hunzakut, Galen looked forward to demolishing the premise that chemical fertilizers in agriculture can be of any use whatever. "If we don't get 'em in this life," he joked, "We'll have to get 'em in the next."

To help the farmer clean up the poisons already in his soil and balance it for healthy organic growth, Galen developed three other instruments for use in connection with the cosmic pipes. His *eloptic energy analyzer* gives the farmer the means, radionically, of analyzing the soil to find out what's good or bad in it, and how to remedy the situation. The same instrument can also be used to diagnose the health of livestock. Both land and livestock can then be treated with the *treatment instrument*, engineered to restore vitality to the soil, eliminate pests, and cure cows of such diseases as mastitis or leukemia. With the dial set for a particular poison, and the right detoxifying agent in its "well," the instrument is also used to clean poisons out of feed, get the bad algae out of cattle tanks, and even, says Sarah, keep the barn from burning down when it is packed with flammable wet hay. The third of Galen's exotic contraptions, a *beam projector*, is designed to transfer a selected energy from one source to another.

If the farmer needs help in analyzing the status of his land, the Hieronymus organization will train him to graph the data so as to understand with their instruments the balance or imbalance of soil, crops, seed, or plants. He can also be shown how to remedy the health of chickens, turkeys, or other animals that have been feeding on poisoned foodstuffs.

The end result of the joint use of these instruments, Galen told us, leads to rejuvenation, enrichment, and revitalization of the soil, earlier fruition, increased yields, higher quality, more nutritious crops, healthier stock, reduction of pesticides and fertilizers, and a consequent increase in profits. Not only is the cosmic pipe designed to take in and redistribute amplified energy, it is also furnished with a "well" around which the descending wire is coiled and into which what Galen called a "reagent" can be placed—

in fact, as many as fifty. The reagents modulate the wavelengths of the carrier "eloptic" energy, the same way a radio beam is modulated by voice or music to be broadcast. With their analyzer, the Hieronymuses search for an energy they like, then "transfer" it to a vial of oil or water, place it in the "well" and broadcast it to the land around the cosmic pipe.

Most amazing, the Hieronymuses had begun to broadcast the Steiner preps, as well as the barrel compost, by inserting them



Sarah Hieronymus and Sara Sorelle (who helped greatly with the research for this book) standing by a cosmic pipe in the garden of the Oasis Laboratory in Lakemont, Georgia.

into the well. "After all," they said, speaking in satisfied unison, "the power of the preps is in the forces they contain, and those forces can be channeled through our pipes and broadcast with eloptic energy, just like any other force."

There are now four different-sized cosmic pipes, a small one that will cover forty acres, costing \$500, two intermediaries, and a super pipe for \$2500 that will cover 2500 acres. In the fifteen different states where they have been installed they are also credited with affecting the weather locally, with less violent storms, gentler, more consistent rain, and milder temperatures.

"The cosmic energy manifests in earlier crops," said Galen, "in stronger stems and better quality. A couple of years ago we cleaned

up an apple orchard, just about fifteen miles down the road. The land had been so heavily dosed with herbicides and pesticides and commercial fertilizers it had not borne fruit for years. The trees were in bad shape from dry rot. So we put the pipe there in January of 1986. In spring the blossoms were a gorgeous cloud of color, and when the leaves came out they were a lush deep green. The trees are vigorous now, with the most apples I've ever seen."

"The rosy apple aphids bothered us at first," said Sarah, "but we put a reagent in the pipe to resist them. We got hold of a bug and put it in the test tube, corked it and put it in the well of the instrument to find its energy wavelength, then found a substance it didn't like and reduced its vitality to zero. So we treated what it lives on and made it so unpleasant the bugs wouldn't stay. We also had good success with larvae by putting pictures of the trees in the well with something I found they didn't like."

Sarah paused to pick up a small vial of colored water with which to illustrate the process: "We took the leaves of the red geranium and transferred its energy into this vial of water and intensified it about ten times—the equivalent of diluting it and shaking it homeopathically. I put the vial with the cut-up geranium leaves in the well here, and neutralized the water on the plate before turning on the power about ten times. That charged the energy through this plate into the vial of water. To check its effectiveness I put a worm in a jar and began to treat it with the geranium water. The poor critter backed right out and lay down to die. So we did the same thing for army worms, and tent caterpillars, and gypsy moths, all very successfully."

To demonstrate to visitors the effectiveness of his reagents in disposing of such pests as nematodes, Galen attached a video camera to his microscope to project a living, moving image onto the screen.

"Instead of using pesticides," said Galen, "we can put a reagent in the well of a cosmic pipe that will radiate enough energy to keep the pests away. We put some Shaklee Basic-H in the pipe and got rid of a whole mess of flies. I can show you a barn with dozens of cows standing with their tails hanging down, and not a fly around, maybe three or four on the ceiling. And we've cleaned up the odor. If the cow eats clean fodder, without poisons, its feces soon lose their foulness, and the flies are no longer attracted."

"For a reagent," said Sarah, "we sometimes use the rules of homeopathy that the hair of the dog is good for the bite. We had to work on one place where the thistles were seven feet tall and the cows couldn't get through. So we put a leaf of the thistle in our beam projector and broadcast it to the field. In a year we had



Sara and Galen Hieronymus standing in their orchard after it had been reconstructed radioactively.



Compare with sickened condition of tree before treatment.

the thistles back to size, with a much smaller taproot."

Sarah displayed a photograph of their orchard, loaded with apples. "In our orchard we managed to keep the fruit from being caught by an early frost last spring," she added with pride. "We kept them from freezing by fortifying them with the essence of pine and spruce, which can withstand the cold. And Mark Moller, who has a farm in northwest Arkansas, at Pea Ridge, on top of the mountain where they had that great Civil War battle, was afraid an early frost might kill all his thirty-five acres of blueberries. When he heard a cold front was coming through, he flew down here to Lakemont and we made up a vial of different energies."

Her lips curled into a distant smile: "You may find it hard to believe. It sounds wild, and incompatible, but along with some liquid calcium he put the energy from a picture of the sun taken from the moon, obtained from NASA, and some Agnihotra dust along with its Sanskrit mantra. To get the mantra into the vial Mark played a cassette and ran the sound through a wire into the earphone of the well of the instrument. And at first it looked as if it had worked. By the time the frost arrived, his blueberries had already blossomed and had tiny leaves. All seemed well. Then the leaves failed to mature; so he got worried. When we tested out the leaves in Galen's analyzer we found they'd been subjected to too much heavy stress by the freeze. So we made up a vial with *aqua lithium*—it's produced by a lab in California at San Jose—and when it was broadcast to the plants it relaxed and de-stressed them. They grew beautiful deep green leaves, and Mark had the best harvest in years."

Every time the Hieronymuses send out a pipe they send with it twelve reagents, one to increase soil productivity, one to eliminate pests, a soil detoxifier, a chemical detoxifier, and so on. For very cold climates, such as Wyoming, where the temperatures goes down to 40 below, they "put their energies" into oil instead of water, so they won't freeze, just solidify without breaking the vial. "But we never use any poison in the pipes," said Sarah. "Nothing that would lower the vitality of the soil or the plants, or hurt the elementals. The elementals have been displaced from too many places with all the concrete that's being poured, and all the poisons in the fields which cause birth defects in birds and animals and humans. The little fairy folk have had to move away."

The remark opened vistas into Sarah's character, explaining her close association with Galen, who might be described as a "sensitive." Sarah, who travels astrally like Robert Monroe and his cohorts, has accumulated hundreds of tapes of channeling to other dimensions, claims to read past lives, has the gift of seeing

people that have "passed on." She has been told that a special mark on her body denotes her having been a member of the order of the Divinensis among the Albigensians massacred by the church. She says she thought every one saw "the little people," until her mother scolded her for dreaming. Ever since she was a little girl, she says, watching the raindrops in a puddle she could see the rain elementals, very small, just their outline, silvery and very graceful, misty figures with nothing on their heads like the green and brown ones in the pasture or the woods, different also, she explained, from the ones in the sunlight, or in the leaves of trees, or in the fireplace, changing shape all the time, with bright colors, tiny little things that dance a lot. "You can pick up their thoughts," she said, her Cherokee features distant but warm. "People who can't see the little people think it's all a lot of bunkum. But then they can't see an electron or a proton, yet they believe in them because they're taught that everything that science tells them must be the truth. The smaller creatures in the garden or the grass are harder to communicate with. Aeolus, the wind, is a very powerful elemental. With his help you can change the path of a tornado. It's like the healing touch, it's available to anyone, but not everyone knows that it's available."

Sarah said she had asked the elementals for help with the cosmic pipes. "Once you get the pipes set up and spreading energy, the little ones are very happy. They know that you're collaborating. And the energy is what they need to do their job with the colors and the shapes of flowers, with the maturing of the fruit, the gestating of the seeds. There are many grownups now who are beginning to think about these elemental forces and to try to learn to contact them and make a good environment in which we can learn to get along together."

To ascertain whether Sarah and Galen with their cosmic pipes were really onto some old magic, or whether it was all a flight of fancy, we set off to visit an orthodox chemical engineer, replete with the requisite academic background, who has been experimenting with the cosmic pipes for several years.

Nestling in a typical Ohio landscape a few miles west of Lake Erie, just north of the Appalachian foothills, in a flat expanse known as the Firelands—because the British burned the early settlers' homes—a luxurious biodynamic oasis burgeons with healthy produce of all sorts, including sixteen-foot cornstalks growing alongside apple trees that kneel beneath their load of ripening fruit. Where Huron Indians used to play, diesel trucks now roar on their way to Cleveland or Toledo. Unperturbed, Harvey Lisle has set up two Hieronymus cosmic pipes directly over ley

lines, one running east-west, the other north-south, with an Indian medicine wheel at the intersection.

A sprightly, outgoing, and loveable gnomelike character with curly gray hair parted down the middle, and a shaggy salt-and-pepper beard, Harvey, in his sixties, has been in biodynamics since the 1970s, when his cunning wife, Louise, placed an anthroposophical text where he could not help but stumble on it. Quit of his job as a chemical engineer for a company producing chemical fertilizers, Harvey now swears by both the BD preps and by the Indian circles of stone he places around each of his many types of fruit tree.

In his cellar, among bushel baskets of early Wealthy apples, and enough glistening fruit jars to outlast World War III, Harvey's lab is set up for the production of sensitive crystallizations and chromatographs—such as were made by Pfeiffer and Kolisko—as a means of checking the forces and qualities in both BD 500 and BD 501. Used either directly in the soil, potentized by homeopathic stirring, or simply transferred to plain water through the Hieronymus Instrument, with results that are surprising, especially when broadcast via a cosmic pipe.

Ley lines along the earth, he explains, are like nerves on human beings, allowing the energy to move from point to point. "All my stone circles—about a hundred of them on my little eight acres of land—are connected to each other, to the medicine wheel, and to the cosmic pipes. All together they make for a powerful center. Energy all over the place! That's why everything grows the way it does, without chemical fertilizer, and only some BD 500 and BD 501 which I put on several years ago. Now I broadcast the preps through the Hieronymus pipes, and it works. But I'm playing around with an even more extraordinary system."

With a V-shaped plastic dowsing rod, held together at the point by a red electrical wire nut, Harvey set off into his jungle of fruits, vegetables, and flowers, to demonstrate how it works, and we had to follow quickly for fear losing him in the underbrush or have him vanish into one of his own stone circles.

On our way beyond a shallow creek that meanders through the property we came upon a row of blueberries, about six feet high with small cakes of soap attached to them by wire. "Keeps the deer away," said Harvey. "They won't touch the blueberry bushes if there's soap around."

Opening the well of one of his cosmic pipes Harvey revealed its incongruous contents: next to several leaves of poison ivy—by means of which he hoped to rid himself of its luxurious growth, brought on, no doubt, by the excellence of his BD preps—were some baked larvae of the plum curculio, a pest that digs into the



Harvey Lisle with a sixteen-foot stand of corn achieved with biodynamics and Indian medicine wheels of stone laid on the ley lines.

heart of plums, but which, thanks to the cosmic pipes, had managed that season to bore into the fruit only about a quarter of an inch before dying. "Next year," said Harvey, "we hope to have the little critters totally licked."

From the well of the pipe he also drew a vial about two inches long of what looked like sand. "It's the remains of about a hundred slugs," said Harvey, an impish grin enlivening his eyes. "They were burned to ashes on a charcoal fire. Last year we had slugs by the tens of thousand. This year, after the burning, we had them by only the hundreds. Within a year or two they should no longer be a problem. Funny thing, that's only on my farm. On the other side of the property line, my neighbor still has them by the tens of thousands, just as we used to." Harvey turned toward a thicket of oak trees in the west. "When the sun goes down," he said, gesturing toward a russet sunset, "the energy goes out of these cosmic pipes, as if someone had turned off a switch. At sunrise it comes right on again."

Inspecting some shriveled leaves on a quince tree, he explained that he was using a Hieronymus beam projector to see if he could improve the quality of his quinces. In one well he had placed the leaves of three quince trees, in the other a piece of his favorite pear tree. As the Hieronymuses claimed to have successfully transferred the flavor of pecans to acorns, Harvey was intent upon



Harvey Lisle placing ground-up slugs and poison ivy in the well of a Hieronymus cosmic pipe together with a reagent to eliminate both slugs and ivy from his land.

trying to transfer the quality of one of his best pears into the quince trees he had planted at the bottom of his garden.

"The quince," he complained, "is too hard to eat. But both the quince and the pear are of the same rose family. You can graft either one to the other. Wouldn't it be wonderful to be able to pick a quince right off the tree and eat it like a pear?"

The idea sounded great, but by the look of the quince there seemed to be some resistance still.

To several other trees Harvey had attached "French coils," which he surveyed unhappily, claiming that instead of increasing the trees' energy, as recommended by certain dowsers, the coils interfered with the flow, depriving the trees of energy, so that some of them had developed a blight, only recovering after the coils had been removed.

With a small pendulum Harvey demonstrated how to find the energy "door" to a tree, a door that all trees have. "Block and Davis," he explained, "discovered the neutral spot in a bar magnet. By dowsing we've discovered that a tree has the same thing. A tree is bipolar: the top, with its branches and leaves, is south, or positive; the root part underground is north, or negative, and there's a small neutral block in between, a few inches up from the ground. And there's your door.

A luscious Lodl apple tree swayed gently in the breeze, loaded

with succulent fruit. Kneeling by it, Harvey dug to uncover a small plastic film-container, half filled with BD 500. "I buried it about three inches, down close to the roots, on the east side of the trunk, because the earth energy runs east-west," he said. Pointing at the bark about a foot above the ground, he explained: "Here I've strapped this tiny crystal made of quartz, pointing up to catch the cosmic inflow. I'm going to take them both off now, and we're going to dowse to see if any energy is coming off this tree. Then I'll put them back, and you can see for yourselves just what I'm talking about. Then I want you to do it too, so you'll know that it's all for real."

The rest of the afternoon was spent in the orchard with a Melrose apple tree experimenting with potentized biodynamic preps and Hieronymus facsimiles of them in vials of plain distilled water. In each case the tree radiated force into the surrounding garden on an approximately equal scale; organic and facsimile appeared to be equally effective.

As predicted, the rod dropped only at a distance of about ten feet from the tree, as it picked up the tree's own energy field. With the 500 buried by the root, the rod went down with force a little over a hundred feet away, and when the 501 was added, about another six feet further. "It looks as if the tree is acting like a cosmic pipe, relaying the forces out around it, just like a Galen Hieronymus pipe."

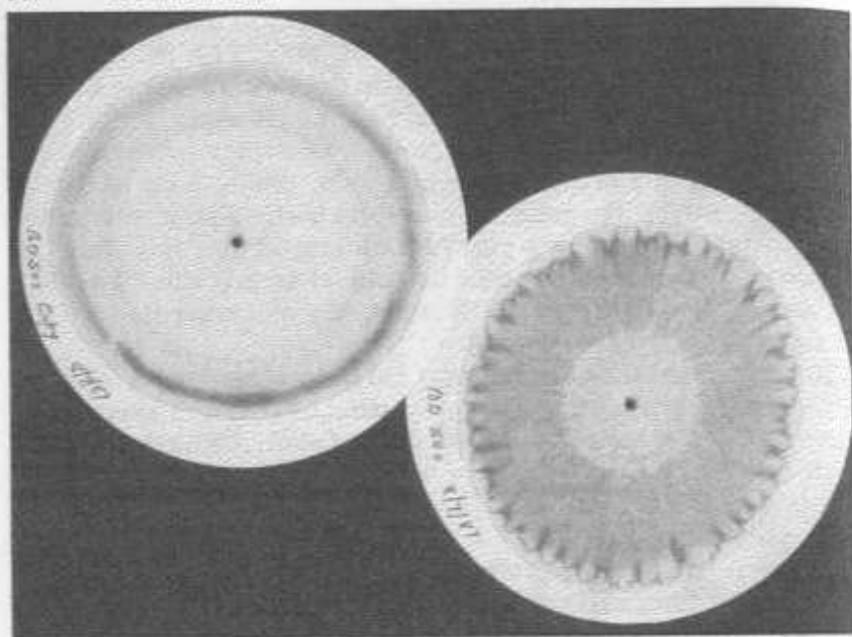
"The question," said Harvey, "is whether the forces are actually alive in every case, the same for the organic substance as for the facsimile in water. We have to know whether the facsimile carries both life and force. And that we can find out only by making some crystallizations of each and every one."

Thirty-six hours later, including one spent stirring the 500 and another stirring the 501, the results, as Harvey predicted, were clear enough to see.

In the crystallization made with the potentized water from the BD 500, not only are signs of energy clearly visible, but also the qualities recognized throughout the years by Pfeiffer, Kolisko, and others, as being attributable to "life." A chromatograph of this same water shows the typical outlines of living organic matter.

On the other hand, the crystallization of the distilled water energized by the Hieronymus instrument does show the force, as can be easily compared with a crystallization of just plain water, unaffected by the instrument. But the crystallization lacks the indications of vitality. It has none of the strong clear lines radiating from a center to be seen in the organic water. Instead its lines are murky and amorphous.

From all of which it can be deduced that Hieronymus's cosmic



Chromatograph made in Harvey Lisle's cellar from BD 500 stirred for one hour (bottom) and a radionic copy, showing far less vitality. (Photo by Harvey Lisle)

pipes may well be broadcasting the energies contained in the potentized BD preparations. But somehow in the transfer of these energies via the eioptic analyzer on the beam projector, the "life" in the preps seems to get mangled. Harvey Lisle assumes that it may be because of the electricity used in making the transfer. As the Hieronymuses are well aware, and ready to exploit when they want to neutralize a substance, a quick shot of magnetism given to a vial will cause it immediately to lose its power. "The same thing," says Lisle, "may be happening to the 'life' force when subjected to an electric current.

What remains is the fact that the cosmic pipes do broadcast some form of creative energy, picked up with a dowsing rod or with the Hieronymus instruments, as testified to by scores of happy farmers who are growing healthier crops without benefit of fertilizers other than the BD preps, whether they are using the substance itself, or the water from it potentized by stirring.

But without making a big issue of it, indeed rather preferring to play the subject down, unless strictly among their own anthroposophs, most Steinerian biodynamic practitioners admit that a whole step in the transfer of energy into plants, and their successful fertilization, has been left out of the equation: the whole world of nature spirits described, amongst others, by Paracelsus,

Blavatsky, Steiner, Leadbeater, and most enchantingly by Geoffrey Hodson and, at Findhorn in Scotland by Ogilvie Crombie. All those sensitively involved with the problem attest, without exception, and without the slightest qualification, that in the growth of plants a vital and essential role must be played by the denizens of the elemental kingdom, and that until they too are duly taken into account, as does Sarah Hieronymus, nothing in the world of agriculture, horticulture, or gardening will ever make much sense or progress.

PEREGRINA



PERELANDRA



In the 1970s the world discovered the community of Findhorn, along with its other world of nature spirits, devas, and the Great God Pan. Some were quick to accept as authentic the messages the sensitive Dorothy Maclean claimed to have received clairaudially from the devas responsible for the remarkable fruits, vegetables, and flowers that flourished so well in that remote and chilly wilderness of Scotland. Others took it as romantic fancy, which might, at best, serve to awaken mankind to a more sensitive approach to the plants it depends on for its life. Actual communication with the nature spirits, a harmless enough performance for the fey entourage of flower people of the sixties, was certainly nothing rational people could pretend to indulge in for themselves.

Now comes a young lady living in the wooded foothills of Virginia's Blue Ridge Mountains who says that anyone can communicate with devas, nature spirits, and the Great God Pan, by the simplest of devices which she is happy to impart to less spiritually motivated mortals just for the asking. It's time, she says, in a more serious vein, that we try, if we want to heal the planet of its ills, to communicate and collaborate with the forces of nature whose function is to do just that.

Her name—as exotic as her pursuits—is Machaëlle (pronounced Michelle) Wright, and in an open field by her woods she has created an extraordinarily beautiful garden called Perelandra (after

the book by C.S. Lewis), entirely, or so she says, at the direction of her insubstantial teachers. What's more, she now regularly gives workshops to impart to other aficionados of the garden from Oregon to Florida, and from New Mexico to Maine, how to communicate directly with her diaphanous friends.

Her premise, for which there is a strangely growing support around the world, is that only by collaborating with the Third Kingdom, that of the elementals, the world of nature, is there any hope of cleaning up the pestilential miasma that has gripped this planet, and by healing it, heal all the life that it sustains. The same dream motivated the supporters of such movements as Jose Arguelles' Harmonic Convergence. The same message has been preached by Paracelsus, Blavatsky, Leadbeater, Besant, Hodson, and especially Rudolf Steiner. Only, Machaëlle has never read their books. She gets her information from the source, where anyone on earth, she insists, can get it, by simply following her method, though not necessarily the ordeals that led to her awakening.

As a young girl, suffering from dyslexia, with a drunken mother, tyrannical father, and a vengeful stepmother (who threw her onto the street in her early teens without money, home, or job), she found herself split into two people: one outwardly somber, trying to survive; the other inwardly joyful, powerful, life-giving.

Meditation led her to astral travel in which "instead of empty space, I saw before me forms, like a group of people so out of focus that I could barely make them out. I felt I was looking at them through a window, and suddenly I realized that I had come home—my real home. I didn't know where this place was, but I knew, without a doubt, that it was home and that I had left home to come to Earth."

In her astral traveling Machaëlle learned that when out-of-body she could be of service to others, giving quick assistance to embodied spirits in distress, such as a priest on a train in Yugoslavia whom she managed to comfort, spiritually, just before the train crashed and he died. "Each time was different, and I learned something new about the amazing, unseen, complex activity that goes on all around us all the time."

Closer to daily life, she helped form the Community for Creative Non-Violence, convinced that ecology was one facet of non-violence: "the destruction of nature being the destruction of man himself, the quality of man's existence being directly related to the quality of his link with nature."

Moving to live in the woods brought more rapid developments. "I first noticed something different about the woods when I was alone in the house at night. I could feel an energy, and at night it



Machaelle Wright at Perelandra with one of the friendly chipmunks that have the run of her garden.

intensified to the point where I would feel uncomfortable about walking in front of a window, or by the double glass doors—especially during the nights of the full moon. My uncomfortableness wasn't fear that I was going to 'get gotten' by something or someone. Rather, it was more a response to being surrounded by intensity—an air of intensity. Nothing hostile."

In 1974 Machaelle discovered books about Findhorn. "All of a sudden, I was being told that the vague energies I had felt around me at Perelandra actually had names. Devas. Nature spirits. They weren't created from my imagination. They actually existed! What I had felt in the woods was a life force that now was identified and could consciously be worked with."

By early January, 1977, her commitment had been made. "I walked into the woods and announced in a loud, clear voice: I want to do at Perelandra what they did at Findhorn. I want to work with devas and I want to work with nature spirits....Then I left the woods, returned to the house, put myself into meditation and waited."

Machaelle admits that at the time she did not really know what she was doing. But the response was immediate. "Like Dorothy Maclean at Findhorn, a crowd of voices came at me. And only when I asked that they communicate one at a time did they re-

spond, to my amazement. From the meditation standpoint, I found the devic level to be a level of consciousness very high in vibration. As if someone were to hit a bunch of tuning forks and we could distinguish the vibratory difference between them rather than the different sound....It resembled nothing I had experienced in meditation previously."

And so Machaelle's collaboration started with the members of the Nature Kingdom. "I was given instructions. I was told what seeds to buy. What fertilizer to use. How far apart to plant the seeds. When to thin the plants, and how much space to leave between them."

As each deva came into her awareness she says she noticed a slight shift in vibration, until after a while she could recognize them as they entered her awareness. "One day, I felt a very different vibration, and found myself connected to the Overlighting Deva of the Garden."

Machaelle says that because she tends to see the reality around her in terms of energy rather than form, she experiences the nature spirits as swirling spheres of light energy. "Out of consideration for me, when the nature spirits choose to be visible, they choose a context with which I am comfortable—energy. I know that they do appear to humans in the form of elves, fairies, gnomes, etc. But I think that's only to people who are comfortable with these concepts. To manifest that way, they make use of our own thought forms."

As we sat in the shade of a young oak tree by the edge of the field in which her garden thrives, only a few feet from a roped off sanctuary, off limits to all but the nature spirits, Machaelle laughed openly: "They've taken some bad raps because of our mistaking them for our own thought forms. They are extremely powerful entities, responsible for the existence of all that has form around us, and at the blink of a flea's eye, they can remove that form."

It was then that Machaelle, tall, good-looking, in her early forties, dark hair held back from the midsummer heat, cheerfully showed us how to get in touch with her invisible companions. "It's easily done with a form of kinesiology" she explained. "Hold your left little finger to your left thumb. Into that circle thrust the thumb and index of your right hand, pinched together. Then ask a question, any question, providing it can only have a yes or a no for answer. Push up against the circle formed by your left thumb and little finger. If they part, it's no. If they stay firmly shut, it's yes. You'll be amazed how quickly you catch on, and how quickly you'll be in touch with the world of elementals all around you."

Elaborating on the science of kinesiology Machaelle explained that it is in no way mystical or magical, but that when any "nega-

tive" is placed within a person's field—his electrical system, the electrical energy grid contained within his body—it will immediately respond by "short-circuiting," making it difficult for the muscles to maintain their strength and hold their position as more pressure is added. Conversely, when a "positive" is placed within the field, the electrical system holds, and the muscles are able to maintain their level.

"If you ask a question using the yes-or-no format," she added, adroitly demonstrating with her fingers, "the elementals can answer your question by transferring a yes (positive) or a no (negative) into your energy field. You can then read the answer by testing yourself with kinesiology." (Further instructions are in the How To Appendix.)

But our first preoccupation was with finding out about the garden in which she appeared to have gone one better than Courtney, Podolinsky, Hieronymus, or even Lisle, producing, as she put it, enough extra food to feed Philadelphia, all from about a quarter-acre plot, without benefit of Carlson, Hamaker, or BD preps, either sprayed or broadcast from a cosmic pipe. Nor does she water her garden, except at the moment of planting. Thereafter, not a drop, even in the summer of 1986 when the Federal Government declared Virginia (and several eastern states) an agricultural disaster area because of the drought. While all around her well-mulched gardens withered in the sun, Perelandra stayed fresh and bright, leading her neighbors to suspect her of being a witch.

The garden, a hundred feet across, is laid out in a circle, with concentric rows of luscious vegetables and brilliant flowers in the most amazing variety and juxtaposition. In the center, in an area specially reserved for birds to feed and bathe, stands a wire structure in the form of a "Genesa" crystal, an antenna device made of four copper circles, two feet in diameter, designed by plant geneticist Derald Langham "to attract to it the life force energy from all form within its range, cleanse this energy, and spin in back out into the environment." Beneath it lies a gemstone, all on a slate above a Flanagan pyramid tensor. The haven is also surrounded by a circle of stones, like Harvey Lisle's, to create a zone of power.

"The focal point," says Machaelle, "has changed in content, but not in position. It used to have a natural white quartz crystal in the center; but then I managed to get hold of a much more precious jewel."

Three spiral paths lead from the periphery to the center. A fence surrounds the garden to keep out the neighbor's horses and cows, but not the animals of Perelandra which are free to come and go as they please, including rabbits, moles, deer, and any kind of



The Perelandra circular garden laid out in the northern Virginia hill country. (Photo by Machaelle Wright)

insect. No foreign repellent or insecticide is used, organic or other.

"I maintain the garden on the principles of energy," said Machaelle, speaking with the intensity and single-mindedness of Bernini's Santa Teresa receiving the arrow of love directly into her bleeding heart. "This gardening, this co-creative energy gardening, is a metaphor for life. As you change your approach to the garden, you will, in turn, change the very fabric of how you approach your life. The Perelandra garden is my life, my heart, my breath. It is my friend, my helper, my nurturer, and teacher—especially of myself—my planet, my universe. It is my key to the universe. It gives me access to spiritual truth and universal natural law contained within the universal flow. It is the demonstration of these truths and laws played out before my eyes. It is my proof that what is spiritual truth and universal law courses through all of reality—and this includes a garden."

And some creative miracle must certainly be being played out in the beds of that small garden, for Machaelle's method of fertilizing her soil is more unbelievable even than that of Podolinsky, Carlson, Howarth, Hieronymus, or Lisle. She has made up what she calls her "soil balancing kit," a collection of tiny packages of bone meal, rock phosphate, Nitro-10, greensand, cottonseed meal, dolomite lime, kelp, and essence of comfrey—all on instructions from her devic friends.

"People don't realize that without the proper nutrients the physical aspect of the plant receives no life-sustaining support. It must have nutrients."

These she holds out, one at a time, just a pinch in the palm of her hand, and asks how much of each is needed by the soil. As she gets a response she requests of the appropriate nature spirit that it receive the energy from the nutrient in her hand and shift it in an appropriate amount to the appropriate depth in the appropriate section of the garden.

"You may feel an immediate sensation in your hand or a change in the nutrient you are holding," said Machaëlle, quite matter-of-factly, as if describing a recipe for fudge rather than some quintessentially metaphysical feat. "Hold your hand out about ten seconds. Once complete, just drop the nutrient on the ground. Don't try to save it because it is nothing but form without energy, and is no longer useful. At this point, the nature spirit is shifting the energy of the substance you are providing from the form in your hand and using it as the base to expand the energy to the amount needed. The nature spirit will reinfuse that expanded energy into the ground in the proper concentration and at the needed depth. Once the energy is in place, the nature spirit you are working with will shift the energy to the form level. In short, by using the expertise of the nature spirits, you can infuse thirty tons of greensand over a one-square-mile area to a depth of five feet, and it all starts with a teaspoon of greensand in your hand."

Machaëlle smiled happily, then gazed again at the beauty of her garden. "When you've done, spend a moment sensing the land you have just balanced. Note any changes. If you sense nothing, don't be disappointed. The effects, because of the nature of this work, may take a few days or weeks to show or be felt. Over a period of time, you will note a change in the garden balance, the devic information received, how everything in the garden weaves together more easily. You'll see the garden rhythms change. Things that an outsider wouldn't even notice, but the very things a person working intimately with the land will pick up immediately."

Machaëlle explained that if they wanted to, the nature spirits could easily find and move energy about without relying on us. "But that would defeat the purpose of the *game*. They need us as much as we need them in order to have a co-creative endeavor. Although nature is powerful beyond imagination, and humans are powerful beyond imagination, man and nature together hold the promise of many times their individual power. A potential of this union is the creation of the Earth's own healing energy grid through its gardening system around the planet. And the healing power which will radiate from the gardens and ultimately from

the grid formed by the link-up of the gardens will be equally available and usable to both humans and to nature, because it was created by humans and nature united."

Machaëlle's approach to insects turned out to be as amazing as her approach to fertilizing her garden. "If man is to sensitize himself to the communication of the insects, it is important that he view them as messengers of a problem, not the problem itself. When dealing with disease in humans or nature, the insects in question may be conquered or controlled by man with his technology; but the disease itself will not be eliminated until the underlying reason is addressed. In areas where insects appear to be troublesome or out of control, I suggest you draw back and look at the larger environmental picture for the answers you are seeking. If you still have difficulty identifying the real problem, look at precisely how the insects are interfacing with human or natural form: there lie the clues you'll need for the answers to the overall picture."

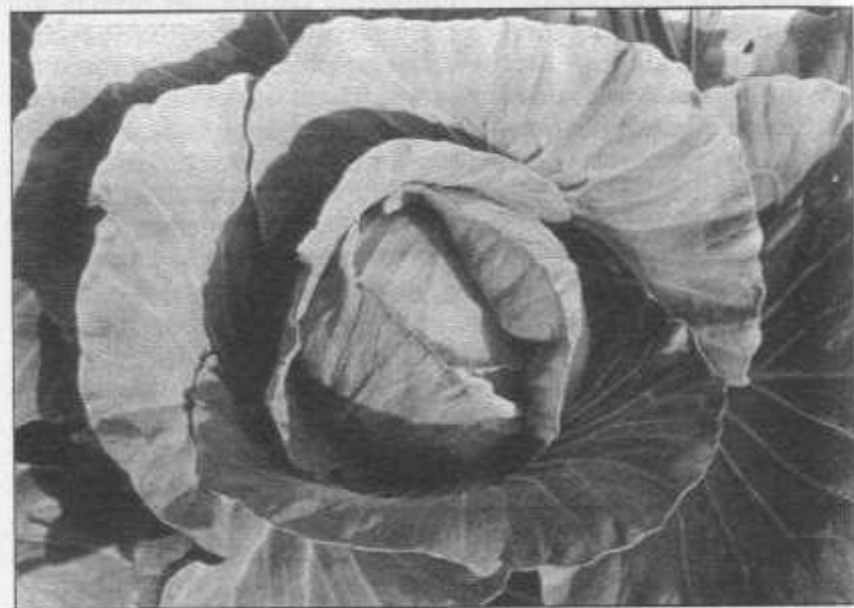
Machaëlle headed towards a smaller circle, about twelve feet in diameter, entirely devoted to tomatoes.

"I have found" she went on, delicately picking a beetle from one of the plants and gently placing it onto the ground, "that in the garden insects function as quick dispatchers of communication. If I see a plant or row suddenly overwhelmed, or seemingly overwhelmed, I'll open to the appropriate deva and ask if the plant balance is off. For example, I may find that a particular rose bush is covered with aphids. When I first inquired, I was told not to panic, just do the monthly fertilizing as planned and that would rebalance the bush. And it's true: once I've done the planned fertilizing, the aphids leave the bush within twenty-four hours."

From the tomato circle she moved to another circle filled with flowers, her tone becoming more serious. "Everything can be going along just fine in the garden and all of a sudden, out of nowhere, there's a horde of something eating three rows of vegetables. I have learned that when this happens, more often than not, it is because there has been a sudden and dramatic shift in thought, intent, or emotion, either with the gardener, or with the family or community connected with the garden. When it comes to ungrounded, raw, emotional energy released by humans, nature functions in the role of absorber. Even though emotional energy is invisible, it is no less tangible in its effect on the world of form than insects, heavy rain, or drought."

The reason for Perelandra's success with insects became clearer as Machaëlle headed for a shaded outdoor table where some cooling herb tea sweated slightly in the breeze. "Since the beginning of my adventure, I have tithed ten percent of the garden back to

nature, just on general principle. To be frank, I don't believe I have ever fully been taken up on that tithing. What I've observed is that where animal and plant interface, it is with the softest of touches. At the same time I've felt an air of aggression which hung over the garden gradually dissipate and eventually disappear altogether. Then I realized I had removed my attitude of aggression toward the animal kingdom when I changed my mindset;



A perfect Perelandra cabbage, radiant with life forces administered to it by the nature spirits, as photographed and described by Machaëlle Wright.

and this, in turn, changed the collective attitude with which the animal kingdom interfaced with the garden. They no longer had to fight for life. They could exist within a natural environment without fear of reprisal. What's more, it set into motion the creation of a new balance—one in which the quantity and quality of activity was increased manifold. By including all members of the chain of life who belong within the balanced garden environment, one encourages and enhances the quality and intensity of life energy within that chain, and within the environment as a whole."

Machaëlle's description of how she handles the cabbage worm, is wiser perhaps, and certainly kinder, than luring them into sexual traps, however appealing the bait and painless the death.

"When my cabbage, broccolt, cauliflower, and Brussels sprouts," said Machaëlle, "became heavily infested with cabbage worms, a common problem in the area, I connected with the Deva of the Cabbage Worm and announced I wished to give one plant at the

end of each of the four rows to the cabbage worms, and I requested that the worms remove themselves from all the other plants, except for the four which I had designated."

Machaëlle smiled happily: "The next morning all the plants in the four rows were clean of cabbage worms, except for the one plant at the end of each row. What surprised me most was the amount of cabbage worms on the end plants. Each had only the number of worms it could comfortably support; the rest had simply disappeared! Birds, wasps, and various other creatures had been feasting on the abundant cabbage worms and the plants were left to continue their growth without missing a beat. In less than seven days the infested plants had 'healed,' leaving no holes in their leaves; and by late summer even the designated plant had formed a perfect four-pound head."

A tall young man with a thin moustache and the gentle expression of a person who cares for what he does, came wandering up the path from the house a quarter mile away. It was Clarence, ex-Paulist seminarist, who had given up the cloth to live and work with Machaëlle. "Then, just as our corn crop began to tassel," she went on, waving to him to join us, "it was attacked—ravaged is the word—by Japanese beetles. They ate the pollen and demolished the silk. But based on my luck with the cabbage worms, I decided to contact the Deva of the Japanese Beetle. Much to my astonishment, I touched into an energy that I can only describe as that of a battered child. It was an energy of defeat, of being beaten into submission. Yet it still had mixed in with it anger and a manic desire to fight for its life. I was told by the deva that what I was experiencing was not devic but the consciousness of the Japanese beetle itself. So I simply asked that the beetle recognize Perelandra as a sanctuary and invited it to join us so that it could begin to heal. I stated that we would not damage or destroy the beetles. To seal the bargain, I promised to leave unmowed a specific area of tall grass that was a favorite of the beetle.

The sun was almost onto the crest of the Blue Ridge, casting long, cool shadows from the woods that reached almost to the garden while the first of the evening swallows darted after insects in the amber light. "I addressed the issue of the corn," said Machaëlle, "still hoping to salvage some. I decided to try to raise the vibration of the individual stalks. Perhaps the ears would fill out despite the Japanese beetle. I spent three days putting my hands on each stalk and loving it. At the end of three days, the nature intelligences had had enough of this nonsense and I was told to leave the corn patch and not return until further notified. Devas and nature spirits do not respond to what they call gooeey, sentimental love. Their love is of action and purpose, the kind

they desire from us."

Clarence smiled with evident satisfaction. "For three weeks she stayed away from the corn patch, until one morning she was told she could return. Every ear of corn had filled out—not fully, only half. She was told it was all that was needed to feed the birds. A later planting, not damaged by the beetles, would be for our exclusive use. A month later it matured, untouched."

"It was the same with my roses," Machaëlle added. "The beetles would take one or two flowers on a bush and leave the other ten for me. After watching this process year after year, I have been able to change my attitude about bugs from focusing on what they attack, or weaken, or damage, or destroy, to focusing on the gift each insect offers to the countless other members of the garden."

"This, in turn, has allowed me to see the insects' right to be part of the plant kingdom. It may sound odd, I'm sure, but I see the insects as not only an integral part of the environment, but also as part of the garden crops. I encourage their health and vibrancy as I would anything else in the garden. And I look to the garden to draw to it and support a balanced and full population of insects which, in turn, helps to support the overall life of that environment. I was told, for instance, to plant costmary in the herb ring, a herb I personally do absolutely nothing with, though I've heard it is used for medicinal teas. Each year I dutifully fertilize it, and early each spring it becomes completely covered with a billion aphids. About a week later, almost the same number of ladybugs appear in the costmary. Not long after that, there are no aphids, and the ladybugs have scattered about the garden. The costmary in the Perelandra garden is obviously intended as a breeding ground for ladybugs."

Michaëlle—like that sensitive and astonishingly literate Scot, R. Ogilvie Crombie, better known as Roc, friend of Findhorn, and possessor of a library of arcana in Edinburgh worthy of being the reincarnation of Queen Elizabeth's wizardly astrologer, John Dee—describes making contact with the Great God Pan. As ruler of all the nature spirits, he conveyed to her, as she understood it, that the overriding intent of any garden is to be of service. "Without service," was the message, "there would be no need to create such an environment. Prior to harvest, the gardener is of service as he works to assist the garden into form in balance. During this period, the garden serves humans in return by creating an environment which shifts and heals all it touches and enfolds. This is true healing service. But the garden's full capacity to serve begins with the harvest. At this point, the human experiences through harvest and ingestion the full notion of serving on all

levels. And the partnership that was formed from the very instant he set foot upon the planet is celebrated by man and nature on all levels. Those humans who work with nature in the spirit of co-creativity have acknowledged and successfully demonstrated the link they have with the nature world both physically and spiritually, and nature has responded in kind by producing food and fuel for the physical support of the human spirit on the planet."

In unison, says Machaëlle, and as a parting shot, the Overlighting Deva of the Perelandra garden, the Deva of the Soil, and Pan all told her that in order for man to be physically, emotionally, mentally, and spiritually supported, as he evolves into the Aquarian Age, he must, in partnership with nature, work toward full ecological balance.

The sun was down as we headed for the house. Machaëlle walked ahead slowly, showing the way, thoughtfully kicking a pebble with her sandal. "They're real, the nature spirits," she said quietly. "And they may take many forms; but one thing they never are. They're never cute. They seek a co-creative partnership with humans, and they are in the position to accept no less."



In early March of 1988, as a late-afternoon dusk was settling over Moscow, we emerged from a downtown subway station close to the Arbat, heart of the city. Along intersecting Vesnina Street, we slip-slid for three blocks over powdery snow underlain with a layer of ice so gray it resembled a coating of ashes, to arrive in front of a four-story nineteenth-century Tsarist building in the process of renovation. Though no identifying sign proclaimed to passersby what might be taking place behind its massive wooden door, well padded around the edges to seal off blasts of late winter wind, we knew it to be the home of a newly born Soviet "think tank," attached to the U.S.S.R. Academy of Sciences, innocuously and unenlighteningly named *Otdel Teoriticheskikh Problem*: Department for Theoretical Problems.

A ring of the doorbell admitted us to an all-but pitch-dark-foyer where a dank flight of stairs led up to a spacious, well-lit office and the greetings of a short, wiry, nattily-dressed young man with a wolfish smile. A head of hair the color of dusty straw topped an aquiline face in which the eyes still betrayed the three-hundred-year old occupation of the Mongols. Erast Andriankin, a combination of gracious Russian host and wily Soviet administrator, alerted to our arrival via a telephone call from Prague, contemplated us with a mixture of unfeigned curiosity and puzzlement.

The call had come from a Czech philosophy Ph.D. turned ex-

perimental scientist, Zdenek Rejdák, president of the International Association for Psychotronic Research, which, despite myriad Czechoslovak strictures, he had managed to found in 1968.¹

In Prague, Rejdák—who believes it is only modern scientific overspecialization that is blocking new investigations into unrecognized human abilities and unused mental reserves—confidentially informed us that the Otdel in Moscow was harboring the possessor of a mysterious power to increase the growth of plants. "It is time," he told us, "to look deeper into things which might help people come into harmony with the bigger world around us, to cohere with living processes rather than just dead matter. Go to see Andriankin. I think some surprises might await you in his shop. I'll call to say you're coming."

In the Otdel office, half a dozen of Andriankin's collaborators were sitting around a boardroom-style table at the foot of his desk. They included a young and reputedly brilliant math and physics "whiz-kid," Andrei Berezin.

Half addressing us, half addressing his collaborators, Andriankin cleared his throat: "Our efforts here may come to an end at any moment. We could be closed down any day. What we are doing is alien to a system built up over the years. Our research is a thorn in the side of senior scientific officials, who look upon it, at best, as nonproductive; at worse, as outright flummery."

With this warning, the assembled company rose and trooped out to another flight of stairs that led to a dark corridor and a half-opened door. Crossing its threshold we entered a high-ceilinged room, no more than ten feet square, suffused with eerily flickering shadows cast by the light of two small tapers. An aromatic trace of incense, burning somewhere in a hidden corner or crevice, wafted into the surroundings to mix with the sonorous tones of an *a cappella* Russian Orthodox church choir broadcast from a large black stereo cassette recorder.

On a low end table next to a three-seat divan lay a heavy black-bound Russian translation of the *Holy Bible* printed in the Soviet

¹ Psychotronics, a word coined by a French engineer more than a quarter century ago, generically refers to the action of pure mind or psyche—regarded by the ancient Greeks as ephemeral as any butterfly—in the same way that its semicognate, electronics, refers to electrically-induced action. Like its precursors, parapsychology, and its even older brother, psychical research, it welcomes into a kind of scientific foster home a host of phenomenological orphans, among them dowsing, clairvoyance, telepathic communication, and psychokinesis—the apparent ability to mentally move, distort, or otherwise affect material objects in ways inexplicable by known physical means. All these Wunderkinder are vehemently denied as bastards by rationalists and scientific pundits, who see in them no more than the symbols of unsubstantiated mysticism.

Union in 1983. Hanging on all four walls were icons depicting Christ, the Virgin Mother, and saints from the Russian Orthodox pantheon.

At first sight, it felt as if we had been transported by some Wellsian time machine back into the nineteenth century. In the gloom of the strange audiovisual setting, it would not have been surprising to spot the hulk of a black-bearded *suyashchennik* priest in contemplation of his breviary.

Instead of any clergyman, we found a petite and attractive blonde woman seated at a small desk across from the doorway, her eyes as orientally slanted as those of her obviously Tartar forebears, who must have gone back perhaps as far as the hordes of Batu Khan and the endless waves that swept from the inner reaches of the Gobi Desert all the way to the gates of Krakow.

"I want to introduce you," said Berezin, raising his voice, "to our charming collaborator, Alla Kudryashova, one of our most talented extrasensors and a gifted natural healer."

The title *extrasensor*, another Soviet neologism, defines, more accurately than its Western equivalent, *psychic*, any person endowed with ESP.

Rejdák had forewarned us about an extraordinary woman, somehow connected to Andriankin's effort, who he said had been found, under the strictest official testing, to be able to raise the harvest figures for certain field crops by over 100 percent above normal, affecting them in some way merely by her "presence"—in the extended, figurative, rather than the narrower, material sense of that word.

As our group milled about the room, the muted church music was drowned by a cacophony of several animated conversations taking place at once, making it difficult for a foreigner, who might normally have followed a single Russian exchange between two parties, to make much sense of all the hubbub.

It was then that we noticed huge sprays of wheat and triticale affixed to the walls or standing in urns around the room, their dried heads burgeoning with golden grain. Mixed in were spruce boughs and the sere remains of meadow plants.

"Why the profusion of grain?" we asked.

A collective smile rippled through the room. "It is an example of Alla's incredible power to energize and stimulate seeds before planting," said Andrei Berezin. "It greatly increases their growth."

Bit by bit it was explained to us what Alla could accomplish. A gifted therapist, or natural healer, her powers were not as publicized as those of Djuna Djugatashvili—reputed to have extended the lives of such failing Soviet leaders as Brezhnev and Chernenko, amassing in the process quite a fortune—but were considered

equally effective.

"When did you discover your healing powers?" we asked Alla.

"About ten years ago," she replied. "And it happened quite by chance. My father had an incurable illness associated with low blood pressure and bad circulation. One day, to his horror, he found he couldn't walk. I said to him: 'Daddy, let me massage your legs,' though I really didn't know what massage was. I just moved my hands over his torso and his trouser legs as he lay on his bed fully clothed.

"Only a few seconds had gone by when he exclaimed: 'Alla, my blood feels as if it's rushing along to keep up with your hands.' This was the first time anyone had suggested I was endowed with a special skill."

A week of this treatment and her father was able to take long three to four hour walks with his granddaughter.

"It wasn't all that easy," Alla cautioned. "You can't think of it as a machinelike process that turns on and off with a switch. I know a lot about machines. When I was just out of high school, I was plagued with a kind of inner dissatisfaction about my purpose in life, my reason for existing here on the planet. I was tormented by the overall question: What is our human calling?"

"Since no answer came, I followed a path of least resistance and entered a metal-working trade school, graduating as a milling-machine operator. I loved working with iron and other metals. My favorite smell was the machine shop; my favorite noise that of machinery; infernal to many people, it was music to my ears." Alla turned her hands this way and that.

"When I was treating my father he would sometimes say: 'Today, my child, your hands are not working.'

"This caused me to reflect upon what my mother had told me when I was still small. 'Whenever you're faced with a problem,' she had said, 'you must seek its solution not outside, but inside, yourself.' My mother was a remarkable individual, a real sunbeam. When she came into a room, she seemed to light it up as if she were a lamp. Another thing she told me that came back to me while I was treating my father was: 'Never talk to anybody or do anything when in a bad mood. If you cook a borscht, for instance, when you're feeling out of sorts, the borscht will be poisonous to those who eat it.'

"So, thinking about why my hands at times seem unable to help my father's legs, I began to look inside myself for an explanation. I found that whenever I indulged in cheap gossip or gave vent to anger, my hands, as my father put it, 'stopped working.' I realized that nature herself might be wise enough to shut down whatever my hands were emitting, lest the power, modulated by

bad or base feelings, be insidious or harmful.

"I began to understand more consciously that I was responsible for my every word spoken or action taken, as well as for the consequences of those actions and thoughts. To walk that new path was very difficult because it required blaming oneself for many things and not foisting the blame off onto others. I saw that motivation was crucial. As I progressed in healing, I understood that the *profit* I was seeking was quite different from the one usually defined by that term: so I took no money for my healing.



Alla Kudryashova transferring her energy to jars of water and wads of cotton wool and communing with a bouquet of wheat.

"And I remembered still another things my mother used to say: 'Forget anything you've ever done out of *duty*. All that is undertaken out of a sense of obligation brings only harm. Only things done out of *love* serve the positive and the good.'

"This led me to stop discriminating among people, judging whether they were 'good' or 'bad.' All kinds of remarkable things began to happen when I started to deal with people without passing value judgments on them. When sick people come to my office I treat them without letting any preconceived attitude toward them get in the way."

As a basic explanation for the development of her talent, Alla quoted the gifted Soviet children's writer Samuel Marshak: "Whatever is touched by a human hand is energized, as if illumined, by the living soul of the person touching it."

This led Alla to put her powers into ordinary simple substances

such as water, oil, or cotton wool, which could be easily tufted and given a desired shape. And so her treatment became known as the VMV method, for the first letters in the Russian words *voda*, *maslo*, and *vata*. Patients seeking succor would send her small sample jars of oil or water or cream and then use them as remedies for their particular maladies.

"Can you explain," asked Berezin, "what goes on in your mind as you treat this or that sample?"

Looking first at him, then at us, Alla measured her words: "One of the things to avoid is any concern with results, or worry about the future. I have come to realize that we must live in the present. How I live, how I am, at any given moment, determines what will happen to me later on. So many people are taught to worry about what they *will become* that they forget they already *are becoming*, that they exist...right now! How useless it is for people to think, as they do, 'If I reach a given point, then such and such will happen.' When they project notions into the future about how they should be, they are seldom happy, or fulfilled in life.

"When I am treating people or substances, I admit to myself I don't really *know* anything. I just let myself be...here...this moment. I don't struggle to find the right approach to this or that person, to choose what to say or not to say. I just try to be calm and reach a harmony with the world and its beauty. Most of us never stop to see this beauty. We mask it by making what amounts to a drug of our lives. Life should be *joy*. When I am suffused with joy, hear its voices in my heart, it's *then* that I know I can help people, give them strength that will last a long time."

At that moment Alla was interrupted with a long telephone call. Her voice, barely audible, was drowned out by two or three other conversations taking place simultaneously; so we could not catch what she was saying. But, when she hung up, Berezin explained that she is capable of treating water, oil, or cotton wool over the telephone, no matter what the distance.

"In experiments," said Berezin, "we have found that *distance doesn't matter in the least*. It's like a wireless telephone. She becomes a connecting link and, in that connection, it becomes highly important that she recognize her responsibility with regard to her mood."

Alla, it was explained to us, is sure that it is through "mood" that any person, as a receiving and transmitting station, either attracts or rejects others. The trick, in her words, is to "find oneself," to "learn to attract." It is her belief that this kind of understanding can come only through action, or purpose. Like Alex Podolinsky, she holds that the world wastes far too much time in *criticism*, which does no good because it merely confirms the ex-

isting negative. *Action*, or impulse, is the key, not only in the physical, but in the mental sense, because everything external to our being is only a projection of consciousness. To Alla, therefore, whatever is real about the work is in oneself.

It was getting late. Leaving Alla's little lair, we descended to Andriankin's office, where he looked at us with a kind of leer as if to ask: "Well, what do you make of our starlet?"

"Have you anything in the way of *real* attestations for these extraordinary feats?" we asked, "affidavits from directors of the farms on which they took place, documentation signed and sealed by responsible third-party officials, with figures showing the extent of increases claimed?" "Of course," said Andriankin; "and we'll get them to you."

Back on the twenty-third floor of our giant Cosmos Hotel, we gazed out at the soaring aluminum parabola of a rocket on its way to a space-monument to Konstantin Tsiolkovsky, first Russian to have dared to think about, let alone work on, extraterrestrial travel, in the nineteenth century at a time when his compatriots considered his vision nothing more than fantasy. Was the Otdel, we wondered, exploring a new frontier of mental space? Would hard, substantiated data be forthcoming on Alla's extraordinary powers?

The time was certainly ripe for such endeavors, with Soviet agriculture in a disastrous state, as authoritatively reported by the Russian agriculturalist Zhores A. Medvedev in his *Soviet Agriculture*.²

In our hotel, the telephone rang, and it was Berezin wanting to know if he could come over with something interesting to show us. Half an hour later he stepped into the room with a stack of papers to validate Alla Kudryashova's remarkable achievements, causing us to wish for what is easily accessible on the corner of any Main and Broad street in America, but so rare in the Soviet Union as to be unavailable to us in Moscow, a copying machine.

On top of the pile was a three-page *akt* dated December, 1986, on "The Effect of the VMV Method as Performed by A.A.

² The book, which covers the subject from before the Revolution to the fall of Khrushchev, with an analysis of what has evolved in the last twenty years, claims the system does not produce enough tractors to plow, or combines to harvest all the land that is sown, and that the machines it does make are so heavy they seriously damage the soil. Soviet farming he describes as having been in crisis since Stalin collectivized farming methods and deported five million people back in 1929-30, killing seven million in a famine caused by the forced confiscation of all available grain. Today the country cannot feed itself and has become the world's largest importer of grain. It wastes, says Medvedev, seventy million rubles a year subsidizing retail food prices, which are lower than the prices the state pays state and collective farms, which are usually lower than actual production costs. And every effort at reform complicates or simplifies bureaucracy without doing much for farming.

Kudryashova on the Growth of Broiler Chickens." The work had taken place at the F.E. Dzerzhinsky State Farm (*soukhoz*), a large broiler-production operation in the village of Mirnoye near the city of Simferopol in the Crimean peninsula.

When we did ask Alla how this work with chickens had come to pass, she replied that it had begun as the result of a fortuitous contact with a former air-force pilot who had learned about her treatment of a small flock of sick chicks owned by a peasant woman. Stricken with an intestinal disease that usually proves fatal, all the peasant's birds survived and thrived, thanks to Alla's ministrations.

"Most people don't realize," said Alla, "that chickens specially bred to produce broiler meat have weak systems because a single characteristic is bred into them at the expense of other aspects of their organisms."

When the ex-flier mentioned Alla's feat to the manager of the F.E. Dzerzhinsky State Farm, he invited her to come down from Moscow and run some experiments.

Alla found not just a farm but an associated scientific research institute. "Had I known that in advance," she admitted to us, "I probably wouldn't have bothered to go because I was aware that most professional scientists, unlike farmers, simply can't stomach anything that doesn't fit into the framework of their limited beliefs. And so it was; but only at first. When the institute director called his staff together and I began to explain what I did with respect to treating water and the kind of effects such water could produce in chickens, one of the young scientists began openly and mockingly to laugh in my presence as if all I had said was no more than a crazy joke. And I heard others muttering that their director must have lost his mind to become involved with such a scheme."

Not giving in to any irritation, and sticking to her guns, Alla said she chided the scientists with the statement that she had been taught that true experimental science should regard negative results as potentially as important as positive ones. Were they afraid, she hinted, to repeat experiments that had elsewhere proved successful?

Her challenge reduced them to silence. It was agreed that she be allowed to treat water for over ten thousand birds. But the huge number so appalled her she asked if it could be reduced to one or two hundred. It was then the turn of the chicken specialists to ask if it might not be she who was afraid.

"It was only a lapse on my part, a momentary weakness," said Alla. "I knew that by going there to do an experiment it should be done, no matter the conditions. Mother Nature never gives any of

с. Марное
Свердловского
района
Курганской области

УТВЕРЖАЮ:
Директор совхоза
"Саркучовский"
В.О. АКАШИН
Г.П. Серий
8 декабря 1966 года

А К Т
производительной проверки применения метода ИМВ научного сотрудника лаборатории ОПН АН СССР А.А. Кудряшовой на показатели выращивания бройлеров

Производительная проверка проводилась в январе-феврале 1966 года на бройлерной фабрике совхоза.

В опытной группе в 50 цыплят-бройлеров кросса "Тибро-5" с первого по 7-й день жизни дали воду, Энергетизированную А.А. Кудряшовой. Она обрабатывалась в деревянных бочках в специальных корытах. В контрольной группе в течение всего периода откорма получали одинакового состава кормовой рацион зерна.

Результаты опыта

Группы	Кол-во цыплят в 1 мес. опыта	Забито в возрасте 105 дней, голос	Общая живая масса цыплят, кг.	Средняя масса цыплят, г	Сокращение, %	Затраты корма на 1 кг прироста массы, кг
опытная	11900	11950	19500	1632	90,6	3,06
Контроль	12970	11545	16020	1388	99,0	3,42
+, - к контролю			+3480	+244	+3,6	-0,36

Применение энергетизированной воды позволило в опыте улучшить все основные показатели откорма. Работы по изучению и использованию эффекта ИМВ А.А. Кудряшовой желательнее продолжать.

Гл. зоотехник-с.-х. зооинженер *[Signature]* В.С. Крокин
Зав. цехом выращивания бройлеров *[Signature]* А.Б. Карпов
Ветврач *[Signature]* Н.И. Севастьянова
Сотрудник лаборатории ОПН *[Signature]* А.А. Кудряшова

Official Soviet documents attesting to Alla Kudryashova's remarkable gift for increasing the weight of broilers while reducing their diet, and for increasing the harvest of edible beets (for borscht) by 160 percent. One document is signed by M.N. Prokhorov, Senior Scientific Collaborator of the

УТВЕРЖАЮ:
Директор совхоза "Саркучовский"
В.О. АКАШИН
8 декабря 1967 г.

ЗАМЕЧАНИЯ АКТ
о проведении производительного опыта метода биологического воздействия на семена кормовой свеклы

11 мая 1967 г. научный сотрудник ОПН АН СССР Кудряшова А.А. на основе договоренности с научно-производственным опытом была проведена биологическая обработка семян кормовой свеклы перед посевом. Семена были высеяны на двух участках: Акашево (опытный участок - 10 га, контрольный - 10 га) и Нефёдово (опытный участок - 25 га, контрольный - 10 га). На контрольных участках посеяны аналогичные, но необработанные семена.

В течение вегетационного сезона все участки возделывались по одинаковой технологии. До уборки урожая было проведено три обследования опытных и контрольных участков. Обследование проводил старший научный сотрудник ИМ ВАСХНИЛ М.Н. Прохоров. При этом выбор квадратов для статистического учета развития проводился рандомизировано. В первом учете оценивались по балльной системе параметры развития проростков, в последующих двух учетах оценивались все корневые узлы (протокол прилагается).

В процессе уборки урожая по участку Акашево существенная часть корнеплодов была убрана без отнесения к контролю или опыту, в связи с чем этот участок из опыта исключен.

По участку Нефёдово с опытной части поля собрано 1130 ц, т.е. по 452 ц/га; с контрольной части поля собрано 4140 ц, или по 269 ц/га. Таким образом, отмечается превышение опыта над контролем в 1,6 раза.

Следует отметить, что 1967 год был очень теплым и засушливым: серьезная нехватка осадочного увлажнения, сильное иссушение пахотных слоев почвы, поэтому полученный результат представляется не менее интересным для дальнейшего изучения и внедрения.

Старший науч. сотрудник ОПН АН СССР *[Signature]* М.Н. Прохоров
Секретарь *[Signature]* В.С. Калуго

Lenin All-Union Academy of Agricultural Sciences and by V.M. Katsuro, Agronomist-in-Chief for the Serpukhov State Farm (Moscow Region). The documents are ratified with the signatures and seals of the Director of the Department for Theoretical Questions, USSR Academy of Sciences.

us any more than we can do. And it had always been my belief that one should work on any task as though it were the last thing left to accomplish in life."

The results were amazing. In the months of January and February of 1986, one-to seven-day-old broiler chicks of a "Gabro-6 cross" that drank only water treated by Alla collectively gained three-and-a-half tons more than a similar group of control chicks that drank ordinary water. Furthermore, the experimental chickens ate about 15 percent less feed.

During her visit in the Crimea, Alla also ran an experiment on the hatchability of eggs stored for periods of up to twenty-one days after laying before being introduced into incubators. The longer the storage period, the more the hatchability index dropped. The experimental eggs, over fifteen thousand in number, were put into containers with a layer of cotton wool, specially treated by Alla, covering each layer of eggs. The hatchability index rose for eggs stored seven days by 2 percent, fourteen days by 5.7 percent, and twenty-one days by a huge 21.9 percent. The experiment therefore conclusively proved the effectiveness of Alla's methods in heightening the survival of chicken embryos. It also raised speculation about whether—as in the case of her human patients—she was enhancing the immune-defense systems of the chickens.

"The same method was later used to increase the preservation of newly picked ripe tomatoes," Alla said proudly. "That got me to thinking about the vegetal world. I wanted to see if I could be effective in that domain. I was elated by the results obtained on the chickens and described it to my friend who directs a large agricultural institute in Simferopol not far away from the Dzerzhinsky farm. I said to him: 'Vladimir Nikolaievich, why don't we sign an agreement to experiment with plants?' And finally, an agreement was signed between his institute and our department.

"But then a strange thing happened. During the course of the next year, when we ran into each other several times, he seemed to have totally forgotten that he'd signed an agreement with a branch of the U.S.S.R. Academy of Sciences. The truth I wormed out of him was that he feared what his scientific associates would say about my proposed experiments and tried to make up for this by promising that he would run them by himself, in private, in secret. The academy could have sued him for breach of contract."

Later, on a visit to Moscow, the same director called Alla to make amends and to ask if he could bring over to her office a friend, V.S. Akalelov, who turned out to be the manager of the Serpukhov State Farm near Pushchino in the Moscow District. Far from having any qualms about doing agricultural research

with Alla, Akalelov said he was eager to see what she could do on a one-hundred-acre plot of edible beets, specially prized by all Russians as the chief ingredient in borscht, that unique soup, almost a stew, that is rounded out with meat, marrow bones, potatoes, and many other vegetables.

Among conclusive documents attesting to her success was one on "Certain Experiments Indicating Positive Effects Produced on the Seeds of Beet Plants Through Biophysical Action." Signed on December 30, 1987, by the director of the Serpukhov State Dairy Farm, it bore the official seals of both the R.S.F.S.R. (Russian Soviet Federated Soviet Republic), branch of the Lenin All-Union Academy of Agricultural Sciences (VASKhNIL), and that of the Department of Theoretical Problems, U.S.S.R. Academy of Sciences (OTP, ANSSR). It reported that Alla's treated beet seeds planted in the experimental hundred-acre plot produced 432 *tsentners* (43,200 kilograms) per acre while nontreated seeds grown on similarly cultivated ground produced only 283 *tsentners*.

To our query as to exactly what she did, Alla ingenuously replied: "I just sat at the edge of the field where the seeds were to be planted and held my hands against the sacks containing them. I didn't really need to use my hands. I now stress that, in my kind of work, it's best to use a minimal amount of physical contact. I realized this when a farm worker asked me: 'Would your powers disappear if you lost your hands in an accident?' I was taken aback. Would it mean I could no longer be of help to human patients and other living things? I knew the answer straight away: Of course not!

"So I put my hands down and just sat there staring at the sacks of beet seeds and, all of a sudden, I knew that the whole field I was in was a living, breathing organism. In my mind's eye I could see it writhing, tormented by the artificial fertilizers it had been drenched with, the huge tractors and other agricultural machines which compressed its surface and the coarse language of the farmers, with all the obscene words they use while working the land. It used to be that landmen had deep respect for the earth, but today, in agriculture treated as industry, that's no longer true.

"I was so upset that my body broke out into a rash and my limbs began to swell. That night, at home I was running a high fever. For eighteen days I was sick. It was only by going on a rigorous fast, with its cleansing effect, that I purged the disease.

"It took me a little while to come to the understanding that I'd brought the illness on myself. How? By taking on, by internalizing, the woes of that field. I had given in to pity, whereas what I should have resonated with the field was not pity but *sympathy*."

So pleased was Akalelov with the results that on December 30,

1987, he signed an agreement for continued work characterized as "of great scientific and practical interest," during the 1988 growing season.

News of Alla's work at the Serpukhov farm traveled all the way through the agricultural grapevine to Central Asia, eliciting an invitation for her to come and work on an experimental field station in Kirghizia near the Chinese border, where five herds of sheep of about one hundred head each had become so inexplicably nervous and jumpy—ewes, lambs, and rams—they had lost a great deal of weight. Treated by Alla, the sheep were quickly calmed and began regaining weight after drinking only water treated by her for less than a week.

"I finally found out," said Alla, "why all the sheep on the farm were doing so poorly, when the director admitted to me that he actually loathed sheep. The animals had become sensitized to his hostile feelings. It's just as with people: real communication never takes place with words, only through feelings."

Berezin looked from Alla to us and then grinned at Alla. "Tell them about the pond," he said, as if to imply we'd heard nothing yet.

Alla smiled. "It was a narrow body of water, only fifty meters wide but a kilometer long. The water in it was rank, muddy, and covered with a thick film of algae and a proliferating growth of weeds. I asked if some of the water could be put in bottles for me to treat, then poured back into the pond. That was done in May and by June the whole pond was clean and has remained so to the present day."

But to a physicist, mathematician, and engineer, like Berezin, the most impressive of Alla's feats involved not animate organisms, living things, but electronic instruments. "She has," he said with pondered emphasis, "been able to repair persistent malfunctions and breakdowns in highly complex instruments, both with the VMV method or solely with her mind. And this raises a fundamental question about consciousness: is it limited to the living, or is it more basic, perhaps a crucial part of the universe since its inception?"

It all started, Alla told us, when her friend Vladimir Vassilyevich Lezhnin, an electronics engineer, called her from Kazan—capital of the Tartar hordes before they were reduced to submission by Ivan the Terrible—where he was working as a senior supervisor for the GNPI-VI computer center. A delicate instrument used to monitor heart conditions had broken down to the point where a team of repairmen could do nothing to set it to rights. Alla sent Lezhnin samples of cotton wool and a bottle of water, all treated in her special way, and asked him to sprinkle certain key parts of

the instrument. Within moments, said Lezhnin, the machine began to function perfectly.

"But in my absence, when my friend tried the same method on another machine," said Alla, "it broke down completely. He was going about his work in a mechanistic, formal, indifferent, and heartless way, with no *soul input*: and when I told him so it helped him diagnose what was the matter with other instruments. He found that by concentrating lovingly on his maintenance work he could, in many cases, get the malfunctioning machines to run again smoothly. He is a very open-minded person, unlike so many scientists I have met in laboratories who believe that only their kind of theory works, not my kind of practice. Some of them have only to come near a sensitive instrument for it to begin acting up."

When the Kazan computer center began having serious trouble with some of its most sophisticated computers, Lezhnin again turned to Alla for help. Involved were two similar computers, models SM-1403 and SM-1600, which work at speeds of 400,000 operations per second. They have adjunct equipment such as memory blocks to increase the reliability and quality of their output, and drum-type alphabet-numeral printing devices capable of producing 500 lines of 132 symbols per line per minute.

Much in demand, the machines operated twenty-four hours a day in a "multi-terminal regime" on shared time. As a result of their intensive use, the number of malfunctions and breakdowns, as carefully recorded in the engineering log, began to rise sharply. Information transcribed on disk packets could not be consistently read out, and there were "floating failures," when the machines would not supply what was needed.

On Alla's recommendation, the machines were wiped free of dust with cloths impregnated with her treated water, and tufts of cotton wool drenched in the same water were applied to key places in their construction. In the words of Lezhnin's official report: "The quality of the magnetic-tape and disk readouts greatly improved as did the morale of the work force responsible for maintaining the machines in proper working order."

In Lezhnin's analyses of what seemed to be miraculous goings-on, he referred to a complex cybernetic system's being significantly affected by the "climate of the operator-machine relationship." It reminded him of the father of a boyhood friend who could repair television sets despite only three years of elementary schooling. With no idea of how the sets functioned, Lezhnin said, the man could unerringly select, from an array of parts, whatever tube, condenser, or resistor was necessary to his task.

The most satisfying explanation for this elusive concept—as

well as Alla's effects on animate and inanimate objects "transmitted over distance"—has been advanced by an inventor, neo-natural philosopher and cosmologist, Arthur Middleton Young. Exasperated with the ravages inflicted on the human psyche by increasingly reductionist thinking in science, and long before the birth of the so-called "new-age consciousness movement," Young set up, in 1952, his Foundation for the Study of Consciousness, first of its kind in the United States, to delve into the mysteries of clairvoyance, precognition, and other forms of "seership" as well as the apparent ability of the human mind to affect matter at a distance. Abjuring any reliance on "fields" to explain psychotronic abilities, Young points to the power of intent, harnessed to will.³

Young's is a sobering thesis, but one that is now supported by Robert G. Jahn, professor of Aerospace Sciences at Princeton University, and his colleague, Brenda J. Dunne, manager of an "anomalies research laboratory" at the same university. They have pursued ten years of rigorous research evidencing the power of mind over matter, as described in their book *Margins of Reality: The Role of Consciousness in the Physical World*.

Among two dozen extraordinary insights by leading physicists dug up by Jahn and Dunne and quoted in their book is one by the English astrophysicist Sir James Jeans. In his *Physics and Philosophy*, Jeans wrote that the theory of relativity showed that electrical and magnetic forces are not real at all but merely mental constructs from our misguided efforts to understand the motions of atomic particles. "It is the same with the Newtonian force of gravitation," added Jeans, "and with energy, momentum and other concepts which were introduced to help us understand the activities of the world. All of them prove to be mental constructs, and do not even pass the test of objectivity."

And Alex Podolinsky in one of his lectures to Australian farmers took up the same theme: "We have not even the justification to speak of a particle picture of reality, neither have we the justification to speak of a ray picture. These are all working hypotheses with which we try to explain what is in the background of matter. But as such there is no matter; it has been exploded away. And if there is no matter there certainly is no space in the sense of matter, and so there is no time. These three pillars of Kant have vanished."

For Jahn and Dunne, it was Duke Louis Victor de Broglie (whose predictions that the electron particle had wave properties won him the Nobel Prize in 1929) who may have hit upon the most unsuspected explanation of the power behind the seemingly in-

³ See Arthur Young's *The Reflexive Universe, The Geometry of Meaning, and Which Way Out?*

explicable capacity of consciousness to meet and relate with, or affect, matter at a distance. "If we wish," wrote de Broglie, "to give philosophic expression to the profound connection between thought and action in all fields of endeavor, particularly in science, we shall undoubtedly have to seek its sources in the unfathomable depths of the human soul. Philosophers might call it love...that force which directs all our actions, which is the source of all our delights and pursuits. Indissolubly linked with thought and action, love is their common mainspring and, hence, their common bond. The engineers of the future have an essential part to play in cementing this bond."

Flying away from Moscow, we compared Alla's extraordinary mental powers with Michaelle Wright's extraordinary communication with the devas and the nature spirits, wondering what possible connection there might be with the sonic, supersonic, and very high frequencies of thought communication. It reminded us of Kudryashova's modest statement in her candle lit office that her doings were really based solely on a feeling of *purity* and *love*—the same prime ingredients of Steiner's Spiritual Science. Could it be, we wondered, that these very best intentions were the ultimate explanation for Alla's telekinetic powers? If, dominating the projection of her "mind-powers," they can produce such a bonanza of wheat and borscht, might they not produce for the world at large the even greater prosperity of peace between the two planet's superpowers, brutish, bellicose giants, deprived, like Wagner's Fafner and Farsolt, of the benefits of Freyja, goddess of love?

Appendix A

LIGHT FROM THE EAST

To appreciate the agricultural wisdom of Rudolf Steiner and Alex Podolinsky requires an insight into the hermetic tenets of a spiritual movement Steiner first belonged to in Germany at the turn of the century, and of which he became general secretary, the Theosophical Society, founded in New York in anno Domini 1875. Derided as fey or far-out, members of this century-old institution have most recently been credited by orthodox scientists with stunning and prophetic breakthroughs in the discipline of particle physics. This has led to a reevaluation of the tenuous overlap between the domain of physics and the realm of metaphysics.

During the second half of the nineteenth century a vein of ancient knowledge from India and Tibet, tapped by a handful of adventurous Europeans, startled the Western world into realizing that certain secluded Orientals, whose notions of science had been ignored or derided, might, after all, have understood more about electricity than Faraday, more about physics than Tyndal, and a lot more about agriculture than Justus von Liebig. Millennial Hindu and Tibetan doctrines threatened to lift a veil of matter from the eyes of Victorian Englishmen enough to shock them with a glimpse of life disrobed, as beautifully spiritual as the present age of Kali Yuga is materially gross.

Occult philosophy, a system of knowledge cultivated in secret since remotest antiquity and handed down to initiates "selected for their strength of character and purity of purpose," showed a comprehension of the forces in nature quite different from—and in many cases in advance of—those described by contemporary European and American scientists.

Occultists could deal not only with such unusual physical phenomena as "anti-gravitational devices or machines which could fly beyond the atmosphere," but with the inherent and powerful capacities of the

human spirit, itself capable of examining these marvels of nature from within or without the human body, at will.

Some of the newly rediscovered wisdom of the Orient, already partly familiar to the West, had been kept alive by the priests of Dynastic Egypt, the magi of Chaldea, aesthetic Jewish Essenes, Christian Gnostics, and third-century neo-Platonists who combined elements of Oriental mysticism with Judeo-Christian concepts. But the bulk of what now came out of the East seemed stunningly original.

The reputed masters of this Eastern arcana were said to be a group of highly advanced beings known as adepts, credited with being able to communicate with each other or with chosen mortals from either in or out of a physical body, by telepathy or by actual materialization. Organized into such secret societies as the Great White Brotherhood, they had functions that were described as "the education of mortals in the secret, ageless wisdom of the past." Acting as spiritual teachers and inspirers of mankind, they were held to constitute an inner government of the world.

Such adepts were credited with superhuman powers over nature, the ability to assume or discard a body at will, using bodies as mere vestures. Other adepts were said to be able to remain in the flesh for vast spans of time, mostly in secluded retreats in the Himalayas, Tibet, China, Egypt, Lebanon, the meridional Carpathians, the jungles of Yucatan, even in "England's mountains green," appearing to whomsoever they chose.

To become such a teacher, many previous lives were deemed a prerequisite—as many as several hundred; after which the adept, having achieved perfection of body and soul, could become "immortal" and have access to "all knowledge" and to the entire "akashic record," or cosmic history, without the need for laborious scientific research.

Reputed adepts in Tudor England were ~~St. Thomas More~~, beheaded by Henry VIII for his defiance in upholding the Roman Catholic Church (which canonized him in 1935), and ~~Thomas Vaughn~~, alchemist and mystic. Another famous "master" was the historical and legendary Comte de Saint Germain, supposed reincarnation of the English baron and philosopher, Francis Bacon, essayist (and possible co-author of Shakespearean texts), later player of a mysterious role in the New World, whose seventeenth-century body, believed to be buried in Williamsburg, Virginia, was unaccountably missing when the vault was opened.

To pass on the tenets of this ancient wisdom to maturing humanity, the system required that lesser humans be chosen by higher adepts to act as vehicles for transmitting the "Secret Doctrine." One such individual, according to her own account, was an aristocratic Russian maiden, Helena Petrovna, fathered in Ekaterinoslav in 1831 by an army colonel, Peter von Hahn, whose ancestors had settled in the Romanov domains during the reign of Catherine the Great, and whose mother was a Russian princess, descended directly from Rurik, a Norse adventurer who founded the first of Russia's ruling houses.

From childhood, Helena claimed to have lived simultaneously in two worlds, one physical, the other spiritual. In the latter she claimed to have been accompanied by invisible companions, and to have been "contacted" by a Tibetan master, whom she named Koot Hoomi, who told her that when she was ready he would appear to her in the flesh.

In her autobiography, written many years later, Helena recounts that one night in London, when she was sixteen, strolling by moonlight along

Hyde Park's Serpentine, she ran into an Indian Rajput prince whom she instantly recognized as her master—also strolling in his earthly form—who told her she would ultimately come for training to his ashram beyond the Himalayas.

Back in southern Russia, aged seventeen, Helena was married by her family to Nikifor Blavatsky, an army general more than thrice her age, at that time vice-governor of the province of Yerevan in Armenia. Kept in ignorance—as was then the custom—of the physical details that marriage might entail, the young bride, rather than submit to her aged husband, ran away in disguise, never to return. Her autobiography colorfully describes a quarter century of wanderings in Europe, Egypt, America, Mexico, India, and Java, performing feats of "apparent magic" from drawing rooms to circuses. But corroborative evidence is scarce, as is evi-



Helena P. Blavatsky at "Maycot,"
Norwood, London in 1887.

dence of her reputed journey to the forbidden reaches of Tibet. There she claimed to have spent four years in the vicinity of the famous Lamasery of Shigatze on the Brahmaputra River, near where the oldest known text, *The Book of the Secret Wisdom of the World*, was said to be in the safekeeping of the Teshu Lama.

The inference is clear that it was from this book—described as set down on palm leaves treated by some long-forgotten processes to make them impervious to air, water, or fire—a work far older than the ancient sacred Hindu writings and the canonical Vedas, and one credited with having given rise to fourteen volumes of commentaries, that Helena wanted one to believe she had acquired her knowledge of arcana. True or not, from some such source she did acquire an encyclopedic grab-bag of astounding data.

Back in the West, with what she felt was a life mission to perform, but no clear idea of how to begin, "because a chela, or student disciple of a master, far from being treated as an automaton, is left to perform sug-

gested tasks in the light of his or her own sagacity, in perfect freedom, unlike soldiers in a military hierarchy." Helena settled in London, where she became involved in spiritual seances. Her intention, she declared, was to found a society with the central purpose of investigating spiritualistic phenomena—at that time a popular fad—but with the higher aim, as she defined it, of leading its members "beyond those limited interests to a real knowledge of the inner nature of man and the universe." For her efforts to reveal to mankind the dreadful materialism into which she saw it sinking, she says, she was at once attacked by the spiritualistic movement in the first of many campaigns to calumniate and misrepresent her efforts, attacks which were to last throughout her earthly life.

In Paris in 1873, she says she received from her masters instructions to go to America. Penniless, and with no great prospects, she arrived in New York City to take a job embroidering neckties until she was claudicially informed to proceed to Chittenden, Vermont, to view some fantastic spiritualistic happenings reportedly occurring in the home of a family called Eddy. The reading public, avid for stories about current mediums and their feats, was at that time agog with the mysteries of spiritualism, especially since Hoarce Greely had attested as genuine in a column in *The New York Tribune* the materialization of spirits by the Fox sisters of Hydesville, New York.

In Vermont, Helena Blavatsky met her spiritual match in the form of a civil war veteran and experienced journalist, Colonel Henry Steel Olcott. Captivated by the current vogue for spiritualist seances, he had gotten himself assigned by *The New York Graphic* to cover the events at the Eddy home largely because of his reputation for integrity and for his known accuracy in reporting sensational events. A graduate of Harvard, Olcott had already by the time he was twenty-five made himself such an expert in experimental agriculture he had been invited to become Director of the United States Agricultural Bureau in Washington. Founder of the first scientifically-based American experimental farm in Mount Vernon, New York, Olcott had also published the first textbook in America on Chinese and African sorghum, and from his European travels to study the latest developments in farming had produced an impressive report published in the *American Cyclopaedia*.

A promising career, it had nearly ended at the age of twenty-seven in 1859. As agricultural editor of the *New York Tribune* and foreign correspondent for the London *Mark Lane Express*, Olcott was sent to Harper's Ferry, Virginia, to cover the hanging of abolitionist John Brown. Arrested, and condemned to be hanged as an intrusive reporter, young Olcott was only released when his captors discovered him to be a fellow Freemason.

Back in New York City following the Civil War, Olcott became a successful lawyer specializing in customs, internal revenue, and insurance cases. As Special Commissioner for the War Department to investigate that perennial plague of the body politic, corruption among army contractors, he was awarded the rank of colonel for his successful services.

From his Vermont experiences with the Eddy brothers, veteran Olcott was to produce a remarkable book, *People From The Other World*, in whose nearly five hundred pages, thoroughly illustrated, he did his best to validate the amazing mediumistic feats he witnessed, including the levitation of bodies, the rising off the ground of heavy objects without human or other physical contact, the appearance of luminous objects, self-luminous or visible by ordinary light, phantom forms and faces, weird sounds, including exotic musical instruments, plus the voices of materi-

alized spirits, recognized by the audience as speaking in their own living tones. Most impressive to Olcott was the fact that for Helena Blavatsky's benefit the Eddys summoned spirits authentically dressed in Russian costumes who could converse with her in authentic Russian dialects, and play for her Armenian tunes, which the Eddys could not possibly have known.

Only a year younger than Madame Blavatsky, of whom he wrote, "In the whole course of my experience, I never met so interesting, and, if I may say it without offense, eccentric a character," Olcott found in her a spiritual master whose efforts at spiritualizing the world he would support for the rest of his life, abandoning his former mundane pursuits, becoming a teetotaling vegetarian in pursuit of adeptship.

Most impressed by Madame Blavatsky's own extraordinary talents as a medium, which he described as totally differing from any other he had met—"instead of being controlled by spirits to do their will, it is she who seems to control them to do her bidding"—Olcott teamed up with the rebellious lady to form an occultist society in New York City to "diffuse information concerning those secret laws of nature which were so familiar to the Chaldeans and Egyptians, but are totally unknown by our modern world of science." He proposed that the society study mesmerism, spiritualism, "the Odic force," and the universal ether, or astral light. For her part, Madame Blavatsky saw the society as a vehicle for imparting to the world the Ancient Wisdom she believed it was her calling to present anew on instructions from her bodied and disembodied Indian and Tibetan avatars.

Thus was engendered the Theosophical Society, whose declared object was "to collect and diffuse knowledge of the laws which govern the universe." Its early members included Thomas Edison, inventor of the electric light bulb, and General Abner Doubleday, supposed originator of the game of baseball. The term *theosophy*, or "divine wisdom," was used to refer to the strain of mystical speculation associated with the Kabala and the writings of such earlier occultists as Agrippa, Paracelsus, and Robert Fludd. Olcott spoke of "freeing the public mind of theological superstition and a tame subservience to the arrogance of science."

In the heart of Gotham, Blavatsky and Olcott lived together in a Greenwich Village suite on Irving Place over the entrance to which presided the stuffed head of a lioness. With its Bohemian atmosphere, the flat became known as "The New York Lamasery," a mecca for Kabbalists, spiritualists, platonists, and seekers after the marvelous, a haunt where William Q. Judge, secretary to the Society, wrote of "amazing feats of magic, hundreds of which I witnessed in broad daylight or in blazing gas-light from 1875 to 1878." Into this menage Olcott's sister was obliged to move to maintain the appearance of propriety for the couple, Olcott, the father of four children, having by this time been divorced by his wife.

For two years Olcott stood over Blavatsky as she sat at her writing table, chain-smoking, to compose a fifteen hundred-page book containing startling theories concerning the evolution of humanity and of religion, all of which she claimed was conveyed to her by direct astral communication from her master in Tibet. A veritable encyclopedia of occult wisdom, displaying a lapidary command of English prose, well beyond Blavatsky's normal vocabulary, it was written so fast, according to Colonel Olcott, that as the pages were cast to the floor, he was unable to keep up with them, and so got the order mixed, a volume fascinating in its content, but somewhat random in its presentation, the monumental Isis

Unveiled, "A Master-key," as its subtitle infers, "to the Mysteries of Ancient and Modern Science and Theology."

Olcott, convinced that the book—which postulates man as a spiritual being, and chronicles the human race through eons of karma—was inspired astrally or telepathically by highly evolved masters, described how Blavatsky's pen would fly over the paper until she would stop, "look out into space with the vacant eye of the clairvoyant seer, shorten her vision as though to look at something held invisible in the air before her, and begin copying on her paper what she saw."

Ten days after the publication of *Isis Unveiled* in 1877, it had sold out its first edition, and three subsequent printings were gone within the next half year. Later described by occultist Manly P. Hall as "the most vital literary contribution to the modern world," the book created a worldwide interest in the newly-formed theosophical movement. Contemptuous of both scientific materialism and the weaknesses of a Western religion incapable of uniting Christian peoples in peace, the book was either pilloried or ignored by orthodox scientists and religionists. It also engendered well-documented attacks of gross plagiarism to which Olcott replied by admitting that Blavatsky's writings did contain "a large number of citations from other authors without giving credit," but claimed the act was not willful or conscious plagiarism because she drew the material from "the Astral Light," a metaphysical record available to all.

Ill-at-ease in New York, and convinced that India and Tibet were the true sources and reservoirs of the hidden and immemorial wisdom, Blavatsky and Olcott heeded the suggestion of their spirit master, Koot Hoomi, to move to India, where, in 1868, accompanied by two adherents, they settled, first in Bombay, and then in Adyar, near Madras, taking over an old summer estate on the Indian Ocean.

Immersed in the ancient wisdom of the subcontinent, Madame soon launched into another massive work, based, she said, on information divulged to her by master Koot Hoomi, information which "appeared before her as writing, pictures, and symbols." Begun in 1885, the work was published in 1888 as *The Secret Doctrine*, soon to become the bible of Theosophy, offering to the Western mind an interpretation of the sacred writings of the Hindus and their predecessors, "passed on," said its author, "by generations of seers from higher exalted beings."

In two volumes, totaling fifteen hundred pages, the book claimed to be based on the "Stanzas of Dzyan," a mysterious ancient religious text, unknown in the West. The first volume, *Cosmogogenesis*, deals with the creation of the universe; the second, *Anthropogenesis*, deals with the history of the earth and the evolution of humanity through a succession of "root races."

To Blavatsky and Olcott the "secret doctrine" contained the "alpha and omega of universal science," and was the keystone to all knowledge both ancient and modern. "What we desire to prove," wrote Blavatsky, "is that underlying every ancient popular religion was the same ancient wisdom-doctrine, one and identical, professed and practiced by the initiates of every country, who alone were aware of its existence and importance."

As analyzed by Bruce J. Campbell in his *Ancient Wisdom Revived*, the secret doctrine was based on three fundamental principles: (1) the existence of one absolute Reality, the infinite and eternal cause of all; (2) the periodicity of the universe: its appearance and disappearance in cycle; and (3) the identity of "all Souls with the Universal Over-Soul, and the

pilgrimage for every Soul or spark through the cycles of incarnation."

Goals of the Theosophical Society—branches of which were being organized in other countries—were described as "the study of comparative religion, philosophy, and science, as applied to the investigation of the unexplained laws of nature and powers inherent in man with the ultimate aim of forming the nucleus of a Universal Brotherhood of humanity."

In Adyar, the two founders were joined by Charles W. Leadbeater, a Church of England clergyman who had been attracted to Theosophy in the early 1880s while serving as curate in a Hampshire parish. Admitted into the Society's London Lodge together with Sir William Crookes, the celebrated English physicist, discoverer of the element thallium, and editor of *Chemical News*, Leadbeater wrote a letter to Blavatsky's master, Koot Hoomi, asking to become a *chela*, or student, to which, after a long waiting period, he received an answer which contained little specific advice or instruction but ended with "Our cause needs missionaries, devotees, agents, even martyrs, perhaps. But it cannot demand of any man to make himself either. So now choose and grasp your own destiny, and may our Lord the Tathagata's memory aid you to decide for the best."

Giving up his post as clergyman, Leadbeater sailed to India to devote himself wholly to the movement. As a leading member of the society he was soon describing how under Koot Hoomi's supervision and the direct help of another master, Djwal Kul, he was able to break through to continuous "astral consciousness, with the body awake or asleep," and thus was able to investigate "the constitution of superphysical matter in the structure of man and the universe, and the nature of occult chemistry."

In this state of consciousness Leadbeater claimed to be able to see the gross physical body of a plant, animal, or man as being held together by an "etheric" counterpart, a sort of energized sheath that serves as a blueprint for the organization of the gaseous, liquid, and solid elements of the physical body, "ether," in theosophical parlance, being matter in a finer state than gaseous, usually invisible to normal sight, but still definitely physical.

During these periods, Leadbeater testified: "I have on many occasions seen the masters appear in materialised form at the Headquarters in Adyar. The materializations were frequently maintained for twenty minutes, and on at least one occasion considerably over half an hour."

That Leadbeater was an authentic disciple of the master Koot Hoomi was attested to by another English theosophist, Annie Besant, who declared she had constantly met Leadbeater "out of the body and seen him with the master." An ardent free thinker and Fabian Socialist, Mrs Besant had become a theosophist overnight when asked by William T. Stead, editor of the *Pall Mall Gazette*, to review *The Secret Doctrine*, of which he could make no sense. Devouring its fifteen hundred pages, Annie Besant was "dazzled, blinded by the light in which disjointed facts were seen as parts of a mighty whole, and all my puzzles, riddles, problems seemed to disappear.... In a flash of illumination I knew that the weary search was over and the very truth was found."

Less appreciative, the British Society for Psychic Research, after an adverse investigation of Blavatsky's supposedly magical practices, called her "one of the most accomplished and interesting impostors in history." Undismayed, a captivated Besant sought her out to become her acolyte, her lieutenant, and, after her death in London in 1891, her successor as head of the Theosophical Society.



Annie Besant in 1885.

Behind her Blavatsky left a large following of more than 100,000 devoted adherents with branches all over the world, who acclaimed her affectionately as "White Lotus Lady"—white lotus in India being the flower which rises from murky depths to break above the water into sunlight, symbol for the illumination of the spirit freed from the prison of the body.

Appendix B

SEEING IS BELIEVING

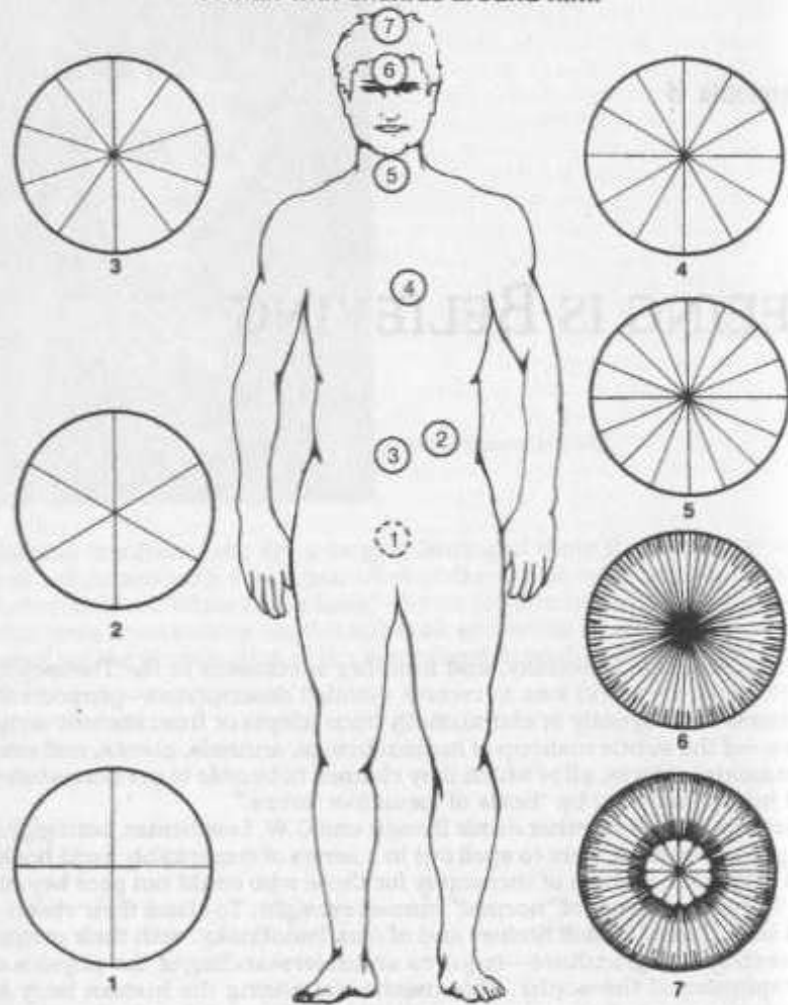
From Madame Blavatsky, and from her successors in the Theosophical Society, the world was to receive detailed descriptions—purportedly obtained clairvoyantly or clairaudially from adepts or from ancient scriptures—of the subtle makeup of human beings, animals, plants, and even "inanimate" objects, all of which they claimed to be able to see surrounded and interpenetrated by "fields of formative forces."

Separately and together Annie Besant and C.W. Leadbeater, both highly adept clairvoyants, were to spell out in a series of remarkably lucid books and articles the tenets of theosophy for those who could not peer beyond the limited spectrum of "normal" human eyesight. To share their vision—and later that of Rudolf Steiner and of Alex Podolinsky, with their recipes for revivifying agriculture—requires an understanding of the physics or metaphysics of theosophy. This means visualizing the human body as being composed of seven interpenetrating bodies or "sheaths," each one more refined as it approximates a divinely guiding "spark."

The three finest sheaths, known to theosophists as *Monad*, *Buddhic*, and *Causal*, constitute a tripartite segment of the whole, postulated by all the great religions as the essence of an immortal being. The more materially mortal sheaths, following *grosso modo* the Hindu pattern, are described as *mental*, *astral*, *etheric*, and *physical* bodies. These disintegrant bodies are seen to fade away at death, one after the other, leaving the immortal trio to reincarnate in another set of "material" sheaths, at least until their bearer has become wise enough not to be viced into such a dying game.

Responsible for this fateful situation is what the Greeks called "Lethé," or the waters of a river in the other world which cause forgetfulness of the past, so that the true self, in contact with its four deciduous bodies, becomes amnesiac and largely unconscious of its divine and immortal nature. And there's the rub! Closest to the physical body theosophists

A man with chakras around him.



The Seven Chakras. (From *The Chakras*, Charles W. Leadbeater, The Theosophical Publishing House, 1927)

see the *etheric* or subtle energy body which keeps the physical one together. Next in finesse to the etheric body is the *astral* or emotional body, described as the vehicle for feeling and desire, a body in which pleasure and pain are antipodal—the one attractive, the other repellent. Even more refined and interpenetrating is the next human sheath, or *mental* body, described by theosophists as consisting of "such stuff as dreams are made on," the medium for thought-up pictures. By means of this quatrains of bodies, the spiritual thinker, or real person, can, according to theosophists, operate in this physical world, his thought producing emotion, which produces force, which in turn moves the body. Were it not for the interaction of these interpenetrating bodies, say Leadbeater

and Besant, there would be no means for physical action and no connection between impacts on the physical body and perception of them by the mental body. All seven bodies—clearly derived from Hindu philosophy, but clearly equally experienced by clairvoyants—can, say theosophists, interpenetrate each other like radio waves, without distorting their several frequencies.

Occult science maintains that in plants, animals, and humans, the etheric body serves as the matrix for cell tissue, interpenetrating the physical body, producing its shape, and extending about one-sixteenth of an inch beyond the skin. The function of this etheric body is visualized as the force that molds and holds the body in shape, and is best understood when it is remembered that in a relatively brief space of time, in a rhythm of about seven years, most if not all of the physical substance composing the human body will have ceased to belong to that body, transient molecules of matter, marshaled by the etheric power into cells, organs, and entire limbs, only to be scattered in the life process to the other kingdoms of nature, to be replaced by newer substance. Yet the body, constantly transmuted in its components, keeps whole its unity of structure as perceived by human eyesight. To occultists, that which renders possible this vision of the human body, eternally metamorphosing, is the etheric forces that interpenetrate and interweave the physical.

In humans, this etheric body is seen by clairvoyants as mainly lavender in color, with other colors running through it, of which orange predominates. Its vital energy is seen as coming from the sun in the form of prana. A concept basic to both Hindu and theosophical thought—and not all that easy to assimilate—prana is said to be the sustaining, apparently "intelligent" highly active "life force," radiated by the sun. Dual in nature, prana is described as both superphysical and physical, the two forms meeting in every cell. Within the cell, the etheric double is seen as being responsible for the absorption, specialization and distribution of this vital force.

Blavatsky speaks of the sun as the storehouse of prana, operating in seven different forms in the seven different planes. On the physical plane, she says, prana builds up all the minerals and is the controlling agent in the chemico-physiological changes in protoplasm that lead to differentiation and the building of the various tissues of the bodies of plants, animals, and man, all of which show the presence of prana by the power of responding to stimuli. Existing in different forms in different planes, astral prana is said to blend with physical prana to create nerve-matter, which is fundamentally the cell, giving the power to feel pleasure and pain. As a result of thought, the cells develop into fibres, the prana pulsating along these fibres being seen as composed of physical, astral, and mental prana. By means of the etheric body, prana is described as running along the nerves of the body, enabling them to act not only as carriers of external impacts, but also as the motive force originating from within. Without prana, say theosophists, the body would be nothing but a collection of independent cells.

Clairvoyants view prana entering the human body through the seven flower-shaped vortices—familiar to the New Age as "chakras" by the Hindus, the word meaning wheel or revolving disk in Sanskrit—about four inches in diameter, close to the surface of the etheric body, connected by what appear to be "stalks" to the seven glands of the physical through which the prana can flow.

The function of the etheric body, in theosophical terms, is not only to hold and control growth, keep the true shape of the body when it is injured or needs repair, but to function also as a connecting link with the next finer body, emotional (or astral) body, and through it to the mind and ego of the person, the etheric body's chakras forming the link between physical and superphysical consciousness. Impacts on the physical body coming from without are conveyed by vibrations of prana as motion on the physical plane, as emotion or sensation in the next finer astral body, and as perception in the still finer mental body.

When a thought or perception causes the throat to tighten with self-consciousness, or the stomach to sink with dismay, these emotional vibrations in the astral body connect through the etheric chakras to the physical glands and nerve centers, resulting in physical sensation. Likewise, the etheric double can be shocked or damaged by noxious "astral" emotions such as anger or jealousy. The etheric also becomes separated from the physical body by death, accident, anesthesia, or hypnotism, though a thread is said to connect it firmly to the physical body until the actual moment of demise.

Etheric matter, as described by theosophists, though invisible in ordinary light, is still considered purely physical, and can therefore be affected by heat and cold, or by powerful acids. Being subject to densification, etheric matter can also reflect light so that it can become visible, affect a photographic plate, and even be tangible, say theosophists. In persons who have lost a physical limb, but can still feel pain where the limb should be, clairvoyants see the etheric counterpart still persisting, much as Kirlian photography shows the ghostly etheric outline where a segment has been cut from a living leaf.

According to Leadbeater, many human beings are endowed with etheric vision, and almost everyone can develop it. Full and controlled possession of etheric sight is described as enabling man to see through physical matter; a brick wall has the consistency of a light mist, the contents of a closed box can be accurately described, and a sealed letter read. With a little practice, says Leadbeater, it is possible to find a specific passage in a closed book. Remarkable psychics, such as the painter Ingo Swann, have effectively demonstrated this ability in controlled experiments at Stanford Research Institute in California.

When the faculty of etheric sight is perfectly developed, it is completely controllable, say theosophists, and can be used or not, at will, making it as easy to change from ordinary to etheric vision as to alter the focus of the eyes—the change being in reality a focusing of the consciousness of the inner, or "real" self.

With etheric vision, the earth becomes somewhat transparent, so that etheric eyes can see into it to a considerable depth, much as through fairly clear water. A creature burrowing could be seen, or a vein of coal or metal could be distinguished, if not too far below the surface. Etheric sight also describes several entirely new colors in the etheric band, quite different from, and more splendid than, those in the spectrum as we know it.

With etheric sight, the physical bodies of men and animals become, in the main, transparent, so that the action of the internal organs can be seen, and to some extent diagnosed for disease.

Even more extraordinary is the theosophists' claim that etheric sight can make visible to sensitives many other "entities" with etheric bodies, such as those frequenting the lower orders of nature spirits, including

fairies, gnomes, brownies, and so on, in great numbers and varieties.

At death the etheric body is described as withdrawing from the physical body like a violet mist which gradually condenses into the counterpart figure of the expiring person. Many ordinary bystanders watching someone die have noticed it as a gray mist. Occultists say that the cloud of etheric matter at first does not go far, but usually floats over the denser body of a person for a few days before dissolving.

At the turn of the century, a French medical doctor, Ippolite Baraduc, obtained some extraordinary photographs of a light cloud hovering over the just dead body of his beloved wife. Many successors, also dabbling in the medium, have produced remarkable prints.

All objects, animal, vegetable, and mineral, from a planet to a fly, from a cloud to grain of sand, say theosophists, are interpenetrated by a counterpart body of etheric matter. These etheric bodies are then vivified by the next finer sheath, the astral or desire bodies, which impart to them sensation.¹

More lasting than either the physical or etheric, the astral body, appears, in clairvoyant sight, as ovoid, usually some eighteen inches larger than the physical body. Astral bodies are described as being in continual motion, "with clouds of color melting into one another, rolling over one another, appearing and disappearing as they roll, the surface of the luminous mist resembling the surface of violently boiling water, the varied colors, corresponding to human emotions, feelings, passions, seldom pure."

Leadbeater says that, whereas a developed man has only five rates of vibration in his astral body, the emotionally unstable can have as many as a hundred, the whole surface being broken into a multiplicity of whirlpools and cross-currents battling each other in a mad confusion of unnecessary and weakening emotion.

In the case of the spiritually developed person, clairvoyants see a much larger astral body composed of the finest particles, in brilliant sparkling colors. The aura of the Buddha is said to have extended three miles in radius; and a friend's clairvoyant view of the present Dalai Lama on a visit to Cambridge, Massachusetts, showed a great dome of golden light covering several city blocks. In principle, there is no limit to the extent of a highly spiritualized aura.

During sleep, the astral body of the theosophist, and of all humans, in their lexicon, serves as an independent vehicle for conscious action; after death, it is said to separate itself from the physical body to move freely in the astral plane.

Whereas all men are deemed to possess an astral body and many to use it regularly in sleep, few are clearly aware of the phenomenon or can consciously control its function. Others have repeatedly reported that they can become fully awake and vividly conscious on the astral plane, leading active lives in their astral bodies, alternating between the physical and the astral plane. Literature abounds in appealing descriptions of the Topper-like nightlife of astral travelers.

¹ Not only the animal and vegetable kingdoms but even minerals are described as having etheric doubles, with Pranic life-currents playing through them to awaken out of latency the finer astral matter in their atomic structures, producing what theosophists call a "thrill of desire." In minerals, says Leadbeater, desire expresses itself as chemical affinity. And certainly the attraction between poles is basic to chemical reactions, forming bonds as powerful as any. And it may be—judging from the latest discovery of "monopoles," (free energy)—that all of physical matter consists of nothing but monopoles, variously attached and conjoined.

Astral bodies are seen to be transparent, so they make no shadows. Astral sight is said to differ from etheric sight in that it is more extended, four-dimensional, so that an object is seen from all sides at once, every particle in the interior of a solid being as plainly open to view as the outside, free from the distortion of perspective. A rock seen with astral sight would be no mere mass of stone, the whole of its physical matter being visible instead of just a very small part of its outer shell.

Inexperienced visitors to the astral world are warned they may find it difficult to understand what they are seeing, especially as the entire astral body is endowed with perception, so that one may perceive with any part of the body in any direction.

Leadbeater describes inhabitants of the astral plane as having the power of changing their forms with protean rapidity, and of "casting practically unlimited glamour over those with whom they choose to sport."

Communication in the astral world, as described by its inhabitants, is not by thought transference but by formulated thought—halfway between thought transference and the concrete speech of the physical world. It is therefore necessary, says Leadbeater, silently to formulate the thought into words, for which two parties must have a common language. Other travelers speak of purely non-verbal communication as even more effective.

A prominent characteristic of the astral plane, as described by those who can retain a memory of it, is the ease with which two of the densest of the astral bodies can pass through each other. People on the astral plane describe passing through one another constantly, as well as through "fixed" astral objects.

Leadbeater says that on the astral plane one never "touches" the surface of anything; one does not feel hot or cold; but on coming into contact with the interpenetrating substance one would be conscious of a different rate of vibration, which might be pleasant or unpleasant, stimulating or depressing.

To the astral body the densest rock offers no impediment to movement: "Truly one may leap from the highest cliff, plunge into a raging volcano, sink into the deepest abyss." As part of the astral scenery there are said to be materializations of the past, with a living photographic representation of all that has happened, reflected from a higher plane. The full records of the past, say occultists, are actually on a higher level and are only imperfectly reflected on the astral plane, fragmented and distorted as reflections on a ruffled surface of water.

Suddenly-disembodied humans on the astral plane are said to be likely to find a Dantean scenery peopled by the ghosts of the dead, the astrally-traveling bodies of sleepers, a world of nature spirits, and a confusion of the astrally materialized thought-forms of both sane and aberrated humans.

"A visitor to the astral world," says Leadbeater, "will be impressed by the ceaseless tide of elemental essence, ever swirling around him, menacing often, yet always retiring before a determined effort of the will, and he will marvel at the enormous army of entities temporarily called out of this ocean into separate existence by the thoughts and feelings of man, whether good or evil. Hosts of them advance threateningly, but return or dissipate harmlessly when boldly faced."

These "false" elementals are to be distinguished from what occultists call true elementals, those consisting of the four elements of fire, air, water, and earth, which they describe as forming a hierarchy of nature

spirits, the lower ones with only etheric bodies, the higher ones with astral and mental bodies, responsible for the construction of forms in the mineral, vegetable, animal and human realms, translating vital energies into plants, and vital energies into the cells of animals.

Animals are said by theosophists to possess all three of the lower bodies—physical, etheric, and astral, but as yet only germinal egos of individuality. Plants, less developed than animals and humans, are said to have only physical and etheric bodies, their astral or emotional bodies being only partly evolved. To flower and reproduce, says Leadbeater, plants must have the astral brought to them by insects, birds, and nature spirits.

Animals with astral bodies apparently stay only a short time on the astral plane, the vast majority, except for certain domestic pets, not having yet fully "individualized." When an animal dies, according to theosophists, the monadic essence which has been manifesting through it flows back into the animal "group-soul" whence it came, bearing with it such advancement or experience as has been attained during its earthly life. Leadbeater, in an impassioned antivivisectionist plea, like that of his contemporary visionist Bernard Shaw, maintains that the astral plane is filled with the shrieking terrified forms of millions of animals butchered in slaughterhouses or killed for "science" or for "sport." Shaw quipped that when he died he would be "followed not by mourning coaches but by herds of oxen, sheep, swine, flocks of poultry and a small traveling aquarium of live fish, all wearing white scarves in honor of the man who perished rather than eat his fellow creatures."

The astral world of the theosophist—all around us, above, below, within, but intangible, they say—is normally imperceptible to the physical body that imprisons us because our physical particles are too gross to vibrate under the action of astral matter.²

What motivates the astral body to sensation and thus to action in the physical world is what occultists call the "mental" body. This body is seen by clairvoyants as also ovoid, its matter not evenly distributed throughout the egg but partly gathered more densely within the physical frame. When thought waves from the thinker strike this mental body, the vibrations tend to communicate to the astral, etheric, and physical matter in waves, as a bell communicates to the surrounding air.

By means of this quaternary of bodies—physical, etheric, astral, and mental—the spiritual thinker, the real person, can, according to the ancient Indian philosophy (in which theosophy is rooted) operate in the world of the physical, his thought producing emotion in a kind of "quantum of action," which produces force, which in turn moves the body. As Leadbeater and Besant interpreted the matter, were it not for the interaction of these interpenetrating bodies there would be no means for ex-

² Ancient sources maintain that just as an involucre of skin protects the human body from being overpowered by cosmic rays, so a web composed of "a single layer of physical atoms, closely woven, much compressed," acts as a barrier to unwanted forces moving in either direction between the astral and the half-physical etheric body. This web is said to be intended as a protection by nature to prevent premature opening of communication between the astral and the physical plane. Otherwise, theosophists warn, all kinds of experiences from the astral plane may overwhelm the consciousness of an individual operating on the physical plane. If astral existences seek to introduce forces that men or women on the physical plane cannot cope with, this atomic shield serves, they say, as a safeguard against emotional shock, which could drive them mad until they have become initiates.

erter physical action and conversely, no connection between impacts on the physical body and their perception by the mental body—as in anesthesia.

Next comes the triumvirate of truly "spiritual" bodies, Causal, Buddhic, and Monadic: immortal vestures for the "I" of the being.

The "causal" body, first and most easily available of the trio, is described by theosophists as a storehouse—a kind of "bank account"—for the totality of man's experience in various incarnations. It is considered the cause of all the effects that manifest on the planes below: its thinking directly motivates the mental body, which in turn affects the astral, the etheric, and the physical. It too is represented as ovoid, surrounding the physical body and extending about eighteen inches beyond it, a mere film, just sufficient to hold itself together and make for a reincarnating entity. Vibrations aroused in this casual body are said to manifest as colors of the most delicate hues, "beautifully beyond all conception." In the spiritually developed, it becomes a glorious iridescent film filled with lovely colors, typifying higher forms of love, devotion, and aspirations toward the divine. It is also depicted as being filled with "living fire" drawn from a still higher plane—the Buddhic—with which it appears to be connected by a quivering thread of brilliant light.

Whereas in the "causal" plane one recognizes divine consciousness in all human beings, in the "Buddhic" the "I" is no longer seen as separate from the "you," as if all were but leaves on a single glorious tree. Finally the "monadic" sheath is described as "pure spirit," associated, like the "Buddhic," with attainments far above those accessible to normal human beings.

Thoughts generated by the causal body can have a life of their own, called by occultists "thought forms." Thought, they say, gives rise to vibrations in the matter of the mental body, which throws off a vibrating portion of itself shaped by the nature of the vibrations—much as fine particles laid on a disk are thrown into a form when the disk is made to vibrate to a musical note. This thrown-off mental matter is said to gather from the surrounding atmosphere "elemental essence of the mental world," thus becoming a temporary "living" entity of intense activity animated by the idea that generated it. Elemental essence is described as a strange semi-intelligent life energy all around us, vivifying matter of the mental plane, which readily responds to the influence of human thought. That is why occultists sometimes call thought forms "artificial elementals" to distinguish them from nature spirits made of the elements of fire, air, water and earth.

Anyone who can "imagine," say the theosophists, has the power to create thought forms that persists and can be very powerful—"good" thought forms perpetuating as active beneficent powers, evil ones as maleficent demons. Thought forms are said to be visible to a hypnotized person, who can see and feel them as actual objects: they can also be projected onto a piece of blank paper or a film.

According to occultists, many thought forms, the result of popular fancy, have a semi-permanent existence, having coalesced from the products of the imagination of countless individuals. Man, they say, is continually peopling space with a world of his own, crowded with the offspring of his fancies, desires, impulses, and passions, a current which reacts upon a sensitive or nervous person in proportion to its dynamic intensity.

Contact with the astral world, says Leadbeater, has a salutary effect

on human beings in that it brings home to them the enormous responsibility they have for their own thoughts and emotions, which can have such a powerful effect in the world. He says it is significant that many of the higher types of thought forms assume shapes closely resembling vegetable and animal forms. From this he deduces that the forces of nature work along lines somewhat similar to those along which human thought and emotion work, the whole universe being a mighty thought form somehow called into existence by some great mind.

Elementals and nature spirits can, in this fashion, create etheric bodies—facsimiles of Goethe's archetypal plants—to be quickened by pranic outpourings from the cosmos and given feeling by the incorporation of astral matter. The vegetable kingdom, says Leadbeater, is much more developed than the mineral in its capacity to use the lower astral matter. "Plants are quick to respond to loving care and are distinctly affect by man's feeling towards them. They delight in and respond to admiration: they are also capable of individual attachments as well as of anger and dislike."

Leadbeater describes the sensations of plants as being a diffused feeling of well-being or discomfort, recognizable in most plants as the result of growing activity of the astral body, which causes them to probe and grow toward what is pleasant to them, such as sun, air, rain, music, or steer away from that which they consider unpleasant. Steiner maintains that astral feeling is brought to plants by the nature spirits that control them.

A great number of "eyewitness" accounts of experience in the astral world have been published in the West by persons who claim to be able willfully and deliberately to move in the "second body."³

A thorough treatment of his own astral experiences has recently been presented by Robert A. Monroe, a former businessman and president of two corporations dealing in cable TV and electronics. In *Journeys Out of the Body* (Doubleday, 1971) and *Further Journeys* (Doubleday, 1985), Monroe details a series of trips starting with limited excursions to the ceiling of his bedroom, from which he confusedly looked down to see a stranger sleeping next to his wife, a shock that brought him scrambling back into his sleeping body.

Through a series of exercises, Monroe gradually learned to project himself even further, accurately describing activities of his friends and neighbors, observed while in his independently astral state and thus invisible to them. Soon he was experiencing an increasingly complex series of phenomena in what he calls the "Second State," including his discovery that the sex act is a true intermingling or fusion, "not just at a surface level, and at one or two specific bodily parts, but in full dimension, atom for atom, throughout the entire Second [or etheric] Body."

³ One of the earliest, Oliver Fox, an Englishman, gave detailed reports in his *Astral Projection*, first published in *Occult Review* in 1920, of his out-of-body experiences, but they were thought too fanciful for his post-World War I contemporaries and consequently attracted little attention beyond London's "psychic underground."

Slightly better known in his time was Sylvan Muldoon, who, together with the psychical researcher Hereward Carrington, wrote in 1938 *The Case for Astral Projection*.

Robert Crookall, a British government geologist and lecturer in botany at Aberdeen University, spent more than a quarter century collecting 160 case histories of natural out-of-body experiences as well as those enforced by anesthesia, which he presented in 1960 as *The Study and Practice of Astral Projection*.

The moment, says Monroe, induces "unbearable ecstasy, then tranquility."

Better to analyze the extraordinary phenomena of out-of-body travel, Monroe organized his own research institute on a hundred-acre farm near Virginia's Blue Ridge Mountains, where he developed a stable of sensitive "explorers" who, under strictly controlled conditions, describe their adventurous explorations.

But, by dint of repetition, Monroe and his explorers encountered whole new worlds of other beings, of a less-material matter than the physical, usually more advanced and more ethical beings, with whom Monroe found he could discourse with a nonverbal form of communication, "a quantum jump beyond a talking moving color picture...direct, instant experience and/or immediate knowing transmitted from one intelligent energy system and received by another."

All of Monroe's and his explorers' contacts are described as benevolent, and the *Weltanschauung* they developed as a result of their wide-ranging explorations makes for a more cheerful future, devoid of the gruesome hells concocted by clerics, a cosmos in which other entities are loving and compassionate, and in which all souls are eventually saved as they develop and improve spiritually through a series of incarnations in this earthly school of very hard knocks.

Here then is the magical world of immortal spirits described by Blavatsky, Besant, *et al.*, validating the ancient *Secret Doctrine*, a world in which, as Monroe puts it,

We can create time as we wish or the need arises, reshaping and modifying within the precept itself. We can create matter from other energy patterns, or change the structure thereof to any degree desired, including reversion to original form. We can create, enhance, alter, modulate, or eradicate any precept within the energy fields of our experience. We can transform any such energy fields one into another or others except for that which we are. But we cannot create or comprehend our prime energy until we are complete.

Appendix C

THREE QUARKS FOR MUSTER MARK

The most stunning validation of the power of clairvoyants to probe and accurately describe realms where science dares not tread was produced, at the turn of the century, by the two theosophical leaders Annie Besant and Charles Leadbeater. With intensive yoga training under expert guidance, they claimed to have acquired the faculty known in the extensive literature of Indian yoga as *siddhi*, or psychic power. It enables the yogi to develop an inner organ of perception with which to display "knowledge of the small" in a visual form.

For many millennia, Oriental yogis have used this form of perception, described as "magnifying clairvoyance," the equivalent to the modern "micro-ps." The technique is described as not consisting in the actual magnification of the small object under observation, but, conversely, in "making oneself infinitesimally small at will."

With this faculty of extrasensory perception the two theosophists claimed to be able to see and describe the inner makeup of all the then-known chemical elements.

The results of this amazing investigation they incorporated, some hundred years ago, into a large illustrated volume entitled *Occult Chemistry*. Replete with detailed drawings of the constituent subatomic particles of all the then-known ninety-two chemical elements, the theosophists' opus accurately describes them all, from hydrogen to uranium, along with many of their yet to be discovered isotopes.

Early twentieth-century scientists who came across *Occult Chemistry* felt justified, after a mere cursory inspection, in rejecting it as fantasy. But recent discoveries in particle physics show that Leadbeater and Besant were evidently describing in accurate terms the inner makeup of elements now theorized to consist of such particles as quarks and subquarks, considered to be the very basic substance of the physical world, not even postulated before the 1970s.

To validate this apparent flight of fancy has taken the determined efforts of an English physicist, Dr. Stephen M. Phillips, authority in particle physics, equipped with all the requisite degrees from recognized academies—a B.A. and M.A. in theoretical physics from Cambridge University; a M.Sc. from Cape Town University; and a Ph.D. in particle physics from the University of California.

In his recently produced *Extra-sensory Perception of Quarks* Phillips validates and vindicates the amazing claims of the theosophical couple. Carefully documented, clearly illustrated, and strictly scientific, his book analyzes, on the basis of modern theoretical physics, the extraordinary clairvoyant talents of Leadbeater and Besant.

It was 1895 when Leadbeater first directed his clairvoyant vision upon the atoms of the chemical elements, soon joined by Annie Besant in what was to become a long series of investigations, lasting on and off for thirty-eight years. In their task they were aided by a colleague, C. Jinarajadasa, later president of the Theosophical Society, who acted as recorder during the experimental sessions, while their friend and fellow



Annie Besant and Charles W. Leadbeater in 1900 when they were both fifty-three.

theosophist Sir William Crookes, the renowned chemist and inventor of the forerunner of what today is the television tube, provided specimens of elements.

Starting with the lighter elements, hydrogen, oxygen, and nitrogen, the investigators gradually extended their field to cover all those known at the time, plus several others, as yet undiscovered by science. They also analyzed a number of typical inorganic and organic compounds, depicting them in admirably aesthetic detail.

Often sitting cross-legged on a rug with a pad in her lap, Annie Besant would sketch, while Leadbeater, lying prone under the ministrations of a masseur, would visualize the interior of his atoms.

When some of the rarer elements were located for him in a museum, Leadbeater even found it unnecessary to carry out his detailed clairvoyant examination of the element in situ in the museum. Once he had memorized the position of the specimen, he could find it again later by

visiting the museum in a "more subtle than physical body," yet still be able to dictate his observations to Jinarajadasa.

In his *Inner Life*, Leadbeater describes how "etheric sight" can be used for magnification. "The method is to transfer impressions from the etheric matter of the retina direct to the etheric brain: the attention is focused in one or more etheric particles, and thus is obtained a similarity of size between the organ employed and some minute object being observed."

By 1907 some sixty elements had been analyzed, with variations being noted in neon, argon, krypton, xenon, and platinum, showing, as science developed, that what the theosophists were seeing were isotopes—the same element but with a different atomic weight—the existence of which was not yet postulated. Only in 1913, five years after their published results, was the name isotope first given to an atom differing in mass from its basic element. Neon (atomic weight 20) and a variant meta-neon (atomic weight 22) were described in *The Theosophist* six years before Frederick Soddy introduced the concept of isotopes to science.

As members of the scientific community were obliged to admit, there was no scientific reason in 1908 for suspecting a second variety of neon and no earthly purpose in fabricating it.

That same year the two theosophists published their interesting discovery that there were nucleons of two types, protons and neutrons. This was three years before the nuclear model was even proposed, and twenty-four years before the neutron was actually discovered.

By 1909 Leadbeater and Besant had studied twenty more elements, including what they called ilinium, only recognized by science as promethium in 1945. By 1932 they had described elements 87 and 91 subsequently recognized as astatine and protoactinium.

To appreciate the difficulties in relating this research to the contemporary state of science, says E. Lester Smith, D.Sc., F.R.S., who wrote the introduction to Phillips's book, it is sufficient to consider hydrogen. "Its atom as 'seen' by E.S.P. contained eighteen of what Leadbeater and Besant called *ultimate physical atoms*, grouped into six spheres of three apiece, spheres that appeared to be arranged at the corners of interlacing triangles." No subatomic particles, says Smith, were known then—or indeed are known now—eighteen of which could make up the greater part of a hydrogen atom, possibly its nucleus.

As Phillips tells the story, one day he was browsing in a bookshop in Los Angeles, where "by chance" he saw and bought a copy of an old theosophical book, *Kingsland's Physics of the Secret Doctrine*, which contained a few of the *Occult Chemistry* diagrams. Back in England Phillips found a copy of the third edition of *Occult Chemistry*, and, as he puts it, was hooked. The first pointer to a possible reconciliation between what the theosophists described, and what modern physics concedes, says Phillips, came when quarks were first postulated, requiring subdivision of the proton into three bound quarks. But the theosophists had further subdivided their atoms into six smaller units connected by a "very thin line of lighted force." As Phillips points out, "Between three and eighteen there still remained a factor of six to be bridged."

Smith remarked that this unsatisfactory state of affairs involved Phillips in some abstruse mathematical calculations, which led the particle physicist finally to suggest that quarks must be subdivisible, each into three subquarks: new particles to which he gave the name of omegons. If his theory were accepted, the number of ultimate particles per proton would be tripled to nine, still allowing for a factor of two. The major break-

through made by Phillips was to realize that the theosophists' diagram of a hydrogen atom represented not one atom but some kind of compound nucleus containing two protons, a mirror-image phenomenon, which resulted from their having to slow down the atom sufficiently to be able to observe it.

When the quark idea was first proposed in 1964 by Murray Gell-Mann and George Zweig of the California Institute of Technology, only a very few people took it seriously. Believing in quarks, said Professor Harold Fritsch, seemed to require the acceptance of rather too many peculiarities, not only the unconventional electric charges of quarks but quite a few other mysterious features as well.

In view of this attitude, what was later to be accepted by science as one of the great theoretical breakthroughs of the century had to be first ushered in as a joke during an amateur cabaret show at Aspen. As Barry Taubes reports the story in *Discover*, Murray Gell-Mann jumped up from the audience on cue and babbled wildly what seemed like nonsense about how he had just figured out the whole theory of the universe, of quarks, of gravity, and of everything else. As he raved with increasing frenzy, two men in white coats came on to drag him away, leaving the audience in laughter.

Even the manner in which the new particles were named was enough to incite ridicule. The word "quark" in German describes a special kind of soft cheese, and is also synonymous with "nonsense." Gell-Mann claimed it was the number three that led him to introduce the word, there being a passage in James Joyce's *Finnegans Wake* which reads:

Three quarks for Muster Mark!
Sure he hasn't got much of a bark
And sure any he has it's all beside the mark.

Reaction in the theoretical physics community to the quark model was also far from benign. "Getting the CERN¹ report published in the form that I wanted," wrote Gell-Mann (later to receive the Nobel Prize for physics), "was so difficult I finally gave up trying. When the physics department of a leading university was considering an appointment for me, their senior theorist, one of the most respected spokesmen for all of theoretical physics, blocked the appointment at a faculty meeting by passionately arguing that it was the work of a "charlatan." To which Gell-Mann added, modestly: "The idea that hadrons, citizens of a nuclear democracy, were made of elementary particles with fractional quantum numbers did seem a bit rich. The idea, however, is apparently correct."

Gradually the quark model developed from a bold hypothesis into a viable theory, until by the end of the 1970s six different kinds of quarks had been established, plus corresponding antiquarks. To add to the Alice-in-Wonderland atmosphere of particle physics, each kind of quark was called a flavor, with names such as charmed, strange, up, down, top, and bottom. Furthermore, each flavor came in three different colors, though physicists were quick to point out that the colors they had chosen—red, blue, and green—had nothing to do with our ordinary perception of color; the choice was just another one of those "whimsical concepts applied to unfamiliar aspects of the microworld."

Then John H. Mauldin in his *Particles in Nature* pointed out that it looked as if there were eighteen distinguishable quarks (or thirty-six,

counting antiquarks), adding that "the supposed simplification of elementary particles seems in danger of extinction."

Thus, says Phillips, not without satisfaction, "the new patterns derived by application of the rules of theoretical physics tally perfectly with the diagrams which illustrate *Occult Chemistry*."

To explain how the theosophists accomplished their remarkable feat, Phillips described the altered state of mind in which they experienced visual images of objects too small for human sight to discern. Their perception, says Phillips, was from a point of view in space that gave the illusion that the observer had shrunk in size commensurate with the objects he was viewing.

Accordingly, the experience of a person in this state is not that of passive spectator peering down a microscope, but "is characterized by a vivid, subjective sense of actually being in the microcosmos, of being suspended in space amid particles of great dynamical activity."

While functioning in this state the investigator, says Phillips, retains full control of his intellect and can converse normally with people around him, able to describe to them what he "sees." But he has to apply certain techniques of yogic meditation as he concentrates on the interior of some specimen substance that is placed in front of him. With eyes open or closed, the investigator experiences images, says Phillips, but in practice his concentration is aided by keeping his eyes closed so as to eliminate distracting images due to his normal sight. The images experienced are three-dimensional, may be colored, and usually exhibit rapid, complex motion.

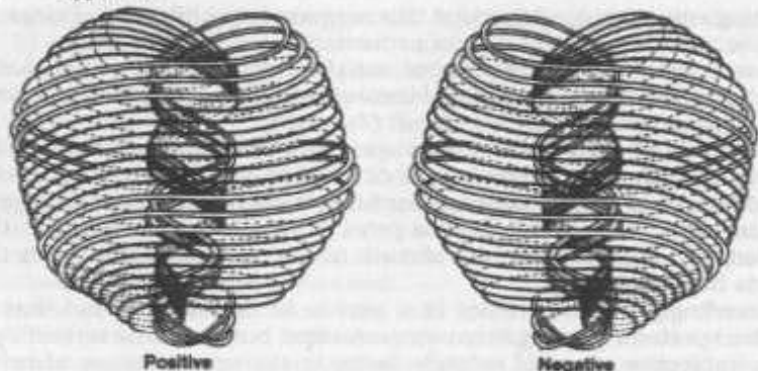
The first chemical atom selected by the theosophists for examination, that of hydrogen (H), carefully scrutinized, was seen to consist of six smaller bodies contained in an egglike form. The atom rotated with great rapidity on its own axis, vibrating at the same time, its internal bodies performing similar gyrations. The whole atom spun and quivered and had to be steadied for exact observation, forming two triangles, each containing three smaller bodies, described by the observers as "ultimate physical atoms" which could not be further reduced without disappearing from the physical plane into what they casually referred to as "the astral matter of another dimension."

The two theosophists claimed they could not only observe such atoms but could disintegrate them into their constituent bodies, and these in turn into smaller groups, until everything was finally broken up into what they described as free *ultimate physical atoms*, "not the atoms of which the chemist speaks, but the ultimate atoms out of which all the chemists' atoms are made." For these, Phillips coined the term *omegons*.

The modern scientific notion of a chemical atom is that it consists of a nucleus, into which nearly all the mass of the atom is concentrated, composed generally of positively charged protons and neutral neutrons. The nucleus is minute in relation to the whole atom; the rest of the atom is almost empty, containing only the very small and light electrons circulating in their prescribed orbits. The lightest element, hydrogen, is simpler than this, having a single proton or hydrogen ion as its nucleus, and one orbiting electron. As Smith points out, this picture contrasts starkly with the occult diagram depicting eighteen ultimate physical atoms in the hydrogen atom, with no electrons in evidence.

To Leadbeater and Besant, their ultimate physical atom appeared as "a little miniature sun," the basic constituent of all physical matter, dual in nature, having a positive and negative mirror image, ovoid, with ever-

¹ European Center for Nuclear Research, near Geneva.



An ultimate physical atom or UPA as seen and described by Besant and Leadbeater, positive and negative images of each other: the UPA is described as having ten whorls or currents flowing in parallel, spiral-shaped, closed, continuous curves. Three brighter whorls flow currents of different electricities. According to the two Theosophists, force pours into the heart-shaped depression at the top of the UPA and issues from the same point, changed in character by its passage. The UPA is seen to pulsate regularly, incessantly spinning on its own axis like a top. (From *Occult Chemistry*, by Leadbeater and Besant)

diminishing spirals, or "spirillae," consisting of millions of dots of energy whirling in and out from a fourth-dimensional astral plane, entering the male or positive atom, exiting the female or negative atom. Each atom, as observed, was seen to have three proper motions of its own: spinning on its axis like a top, describing a small circle with its axis like a top, contracting and expanding like a heart. To examine these atoms, says Leadbeater, required making an artificial space for them by willfully "pressing back and walling of the matter of space."

In most cases, "bright lines" or "streams of light" are seen both to enter and to leave each ultimate physical atom. These lines were regarded by the investigators as "lines of force." Force, they said, "pours into the heart-shaped depression at the top of the ultimate physical atom and issues from that point, and is changed in character by its passage." This was noticed in both (+) and (-) ultimate physical atoms, mirror images of each other, but definitely not, according to Leadbeater and Besant, electrons.

Because atoms were in such vigorous motion in all conceivable modes, it was necessary for the investigators to slow them down by a special effort of will power (or psychokinesis) before observation and counting of components were possible. Both Leadbeater and Besant claimed they could sufficiently retard the inner and external modes of motion of atoms and molecules to be able to observe them indefinitely. As observers they found they could facilitate the examination by applying further psychokinesis to dismember the atoms, in stepwise fashion, into smaller groupings of ultimate particles, but that at each step a considerably greater power of "magnification" was needed.

"The object examined, whether an atom or a compound," wrote Besant and Leadbeater, "is seen exactly as it exists normally, that is to say, it is not under any stress caused by an electric or magnetic field."

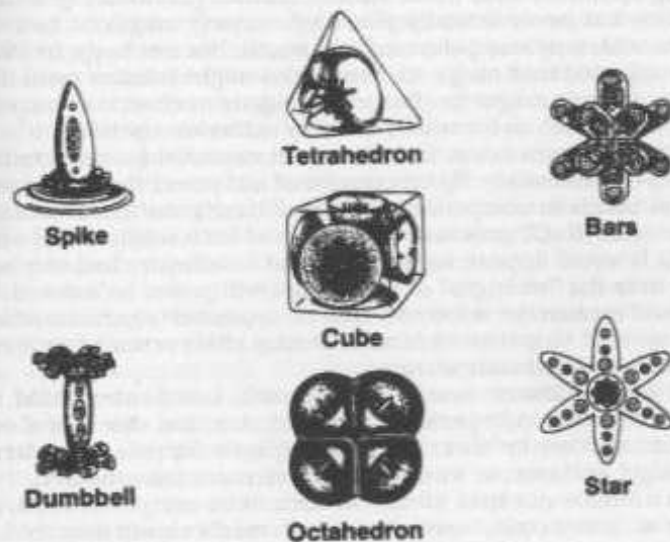
Phillips says the investigators could vary the sizes of the images at will, and that there appeared to be no limit to the level of magnification

attainable, although a practical limit was set by the ability of the viewer and by the strain felt when viewing magnified objects. Unlike some other forms of extrasensory perception, the state could be induced or terminated at will.

The much-larger atoms of chemistry Leadbeater and Besant classified into seven basic types according to whether they displayed the shape of spikes, dumbbells, tetrahedrons, cubes, octahedrons, bars, or stars.

As Smith points out, the five Platonic solids, the only completely regular solid geometrical figures, are all to be found in these archetypal atoms and molecules. Their external shapes follow those of the three simplest Platonic solids, tetrahedron, cube, and octahedron.² And in *Occult Chemistry* Besant and Leadbeater also discerned the infinite Fibonacci Series and the related Golden Section favored by Greek philosophers as representing the ideal proportion.

When the investigators disintegrated chemical atoms, they reported that their constituent funnels, bars, spikes, and star-arms always separated and disappeared, releasing the contents as free bodies. When this happened, says Phillips, the 'walls' enclosing groups of particles might change in shape, but individual groups did not break up or suffer any deformation, although their arrangement in clusters of groups might change.



The seven fundamental forms of the elements as "seen" and described by Besant and Leadbeater in their *Occult Chemistry*.

Both Leadbeater and Besant subscribed to the theosophical view that, in the physical plane of our normal reality, physical matter exists in seven distinct states: the solid, liquid, and gaseous ones of which man has sensory awareness, and an "etheric" state, visible only to psychics, consisting of four substates, as different from one another as are solids, liquids, and gases. These they described as: the etheric, which acted as a medium for electricity; the super-etheric, a medium for light; the sub-

² for the groups of divalent, trivalent, and tetravalent elements respectively.

atomic and atomic, the latter a medium for transmission from brain to brain.

Never having had any concept during the time of their investigations (1895-1933) of atomic nuclei composed of protons and neutrons, Leadbeater and Besant, says Phillips, believed that what they were studying when they disintegrated chemical atoms was what they called the "etheric" state of these atoms. Accordingly, they named the various states represented by the ever-smaller bodies released during successive stages of disintegration "ethers" 4,3,2, and 1, the last being the final state of freed "ultimate physical atoms."³

As analyzed by Phillips, on the basis of recent developments in theoretical particle physics, what the theosophists were seeing in the first stage of disintegration—in what they called ether 4—was the chemical atom being separated into its two component protons. Next, in ether 3, they were seeing each proton broken up into a diquark, or strongly bonded pair of quarks. In ether 2, the diquark was being split into two free quarks; finally, all quarks were broken up into free omegons, each embedded in a spherical domain of superconducting vacuum. These omegons, or ultimate physical atoms, according to Phillips, are trapped inside quarks by the same mechanism that confines quarks inside observable protons and neutrons. Thus he describes the ultimate physical atoms or omegons as being identified with those elusive entities previously postulated by physicists but never actually observed, namely magnetic monopoles—magnets with only one pole, north or south, but not both. In 1931 Paul Dirac suggested that magnetic monopoles might exist as point like entities with a single magnetic charge, analogous to electric monopoles, notably the electron, so far unobserved by orthodox science.

The investigators found that it was not essential for them to have the elements in a free state. By an exercise of will power they could sever the chemical bonds in compounds to release their constituent atoms. Thus common salt (NaCl) provided specimens of both sodium (Na) and chlorine (Cl). It would appear, says Smith, that Leadbeater had very sensitive control over the "strength" of the special will power he exerted. This in turn could explain the selectivity that he appeared to exercise when looking for specific elements—a kind of tuning effect resembling the tuning of a radio to a particular station.

Most extraordinary, according to Smith, Leadbeater could use his abilities on occasion to perform apparent chemical changes of one molecule into another by sheer will power (psychokinesis in modern parapsychology) and even to transmute one element into another.

Each ultimate physical atom was seen to be composed of ten parallel strands of "coiled coils," each of which formed a closed loop that twisted spirally around and down the surface returning to its starting point via a narrower helix at its core. The coiled formation of each strand or whorl

³ According to Phillips, when a person with micro-psi powers examines the interior of materials in the solid or liquid state, he reports generally that he observes many chemical atoms in close association, instead of single, isolated chemical atoms, which may be either bound together in regular lattice arrays extending beyond the range of his vision, or be separate, belonging to distinct groups. The composition and pattern of these groups seem to be characteristic of the compound under examination, inasmuch as the same combination of chemicals atoms always becomes visible to the observer whenever he examines a sample of the chemical, irrespective of whether its identity is known to him. The chemical atoms belonging to these groups are those of the elements present in the compound.

was found by Leadbeater to consist of precisely 1,680 turns or "spirillae," the ten whorls divided into groups of three and seven, the three major whorls being thicker and brighter than the others, carrying "currents of different electricity," each whorl consisting of billions of tiny light sources or bubbles. Further analysis, with their greatest power of magnification, revealed the bubbles to consist of nothing but empty space.

Jinarajadasa described Leadbeater's inexhaustible patience in counting the number of turns in each of the coiled strands, always coming up with 1,680, or 16,800 per atom. Annie Besant, less interested in such counting, concentrated upon the lines of force playing between the ultimate physical atoms in their smaller groupings. To Phillips's surprise, her sketches showed whorls virtually identical with diagrams published in the 1970s by theoretical physicists showing the "lines of force," or strings as they are now called, between quarks in smaller groupings.

In recent, unpublished research, Phillips has shown that his family of ten omegons, or subquarks, corresponds with the psychic's ten whorls, that Leadbeater's numbers can be derived from his omegon theory, and—adding further substantiation to the theosophists' insight—no possible alternatives to that theory can give rise to these numbers.

One of the strongest pieces of evidence supporting the primary claim that Besant and Leadbeater were indeed able to describe the composite character of quarks and protons through their use of micro-psi vision, one of the eight siddhis of yoga, says Phillips, was their representation of the elementary particle of baryon, with noncomposite quarks as end points, an observation that was to precede the whole latest breakthroughs in physics known as the string theory. A string model was first formulated in which strings were tightly knit bundles of so-called "color flux" (lines of force analogous to the magnetic field around a magnet) with a quark at one end of the string and an antiquark at the other. More significantly, and surprisingly to Phillips, in 1984 it was discovered that a theory of superstrings formulated in ten-dimensional space-time would be free of anomalies, provided that the symmetry of the non-gravitational forces acting between superstrings is one of two possible types: one has superstrings with free end points, which interact with one another by joining their ends to create a new superstring of the same type; the other, closed superstrings, which interact by touching at some point and join to form a new closed superstring. For some time, says Phillips, the second type was not thought to be a physically realistic model because it interacts only gravitationally. But in 1985 a new kind of closed superstring was discovered, called the "heterotic superstring," which has not only become the most studied model by physicists, but has very remarkable similarities with Leadbeater's description of an ultimate physical atom.

"Psychic observations of the structure of the basic constituents of matter," says Phillips, "are shown to be in striking agreement with superstring theory, which has emerged recently as a potentially consistent quantum field theory unifying gravity with strong and electro-weak interactions." To which Phillips adds an explanation that wanders into the multidimensional space of modern theoretical physics: "They provide clues to the solution of the 'compactification problem' by revealing the topology of the curled-up, six-dimensional space in which superstrings must be embedded for their consistency with quantum mechanics. Most importantly, the observations indicate how the rapidly-evolving theory of superstrings should be developed."

When the micro-psi observer concentrates on the interior of a crystal or a metal, a specimen of which is placed before him, another revealing phenomenon occurs: he often claims to notice a gray mist or fine haze of light enveloping it, sometimes followed by discharges of rays or streams of "points of light" shooting out from the material in all directions. With greater magnification, the mist becomes particulate, being found to consist of myriads of similar points of light in chaotic motion.

As Phillips sums up the situation: the work of Leadbeater and Besant in the first two decades of the twentieth century, in which they described ultimate physical atoms as "spinning like a top," as having a "regular pulsation and changing shades of color," as "wobbling when external magnetic fields are switched on," as "arranging themselves in parallel lines," as "having external electric fields, and surrounding magnetic fields," and finally as "being connected by a very thin line of lighted force," bears such a striking resemblance to current ideas (some only a few years old) about "spinning, colored magnetic monopoles that are confined by strings or bundles of color flux lines, squeezed into a narrow tube by the ambient, superconducting vacuum," that the only conclusion he could come to, strange as it might seem, is that the work carried out by Annie Besant and C.W. Leadbeater over a hundred years ago is in fact consistent with many ideas currently being discussed by physicists, despite the fact that most of the theosophists' work was completed well before the era of modern nuclear physics.

"How," asks Phillips, "can two individuals describe the microcosmos in a way that is found, fifty or more years later, to harmonize with both experimental and theoretical elementary particle physics?"

It was a question which he, as an academic scientist, was unable to answer. But the mere fact that he was compelled to ask the question should be compelling enough to encourage a closer view of the world as seen and described by clairvoyants with the benefit of their "etheric" or "siddhi" vision.

Appendix D

STEINER AND ANTHROPOSOPHY

Just as Madame Blavatsky's physical body was being lowered into the grave in London on a warm spring day in May of 1891, in Vienna a young Austrian of thirty was obtaining his doctoral degree by taking issue with the philosopher Emanuel Kant in a thesis entitled *The Fundamental Problem of a Theory of Knowledge*.

The fledgling doctor of philosophy who was described as "having appearance of white blood streaming through the veins of his dark skin," was to marry Goethe's concept of levity-gravity with the Theosophists' concept of "etheric force" and produce with the result a startling new picture of the earth, its inhabitants, and especially its plant life flourishing in an interplay of cosmic and terrestrial influences.

Clairvoyant from childhood, Rudolf Steiner had a hard time convincing his family that beyond the visible world of matter there lay another whole world of the spirit, which he could see without difficulty. From the age of seven Steiner had been able to distinguish between things "seen" and "unseen," both of which were equally real to him, validated by his inner experience of the abstract relationships of geometric forms, which he found quite as real as the table at which he worked—giving substance to the Platonic idea that the deity geometrizes, and to Helena P. Blavatsky's statement that "nature ever builds from form and number."

At eighteen, in the summer of 1879, as he later recounted in his memoirs, Steiner met a person on his daily train ride to Vienna from his small home town where he lived, with whom he could at last share his spiritual world, Felix Koguzki, a herb gatherer who collected medicinal plants in the woods near Vienna to sell to apothecaries in the city. With this untaught peasant Steiner was able to share the secrets of his "other world," the solitary one in which he had lived so long. He also learned from the herb gatherer more of the mysteries of nature which had persisted for centuries in that region of Austria, unaffected by modern ma-

terialistic trends in thinking, including perhaps, the art of tone-singing. That same year, 1879, Steiner enrolled as a student in the Technical College in Vienna, to study, among other subjects, biology, chemistry, and physics—determined to acquire a thorough training in science, if only to validate his inner vision. In his spare time, devoted to studies of optics, botany, and anatomy, Steiner discovered Goethe the scientist, as distinct from Goethe the poet and philosopher. It was then that he realized that science, as taught in the academies, negating the spirit, could understand in nature only that which was dead; never the living process. Goethe's scientific writings about nature indicated to Steiner a way of research into the organic realm by means of which a bridge could be built between nature and spirit.

By *spirit* Steiner did not mean anything to do with spiritualists or mediums. Like Madame Blavatsky, he considered the average spiritualist approach to be mediated through a dulled, trance-like condition of the soul, in which all those contacted were merely discarded astral "shells" of the defunct, whereas his own way of communing with the spirit world brought him to a heightened and enhanced state of consciousness in which he could see beyond the astral. But, when he tried to share his experience of the spiritual world, few at first seemed interested in listening, preferring to talk of spiritualism. "Then it was I," says Steiner, "who did not wish to listen. To approach the spirit in this way was repellent to me."

Steiner insisted that a new, exact and scientific form of clairvoyance would have to be included in man's approach to science if the half-truths of materialism were not to drag the world into a materialist and mechanist disaster.

Steiner found that Goethe in his scientific investigations, which were accompanied by intense and imaginative contemplation of what he had meticulously observed, was able to deploy a method of cognition which transcended Kant's limitations of knowledge.

By this time Steiner had become a theosophist, then under the leadership of Annie Besant, and had been made General Secretary of the German Theosophical Society. But, when Mrs. Besant put forward a plan to present a young Indian boy, J. Krishnamurti, as the reincarnation of Christ, Steiner felt he could not follow, and even when a package deal was offered him in which he was to be presented as the reincarnated John the Baptist, Steiner indignantly refused. Failing to obtain his support, Mrs. Besant expelled Steiner and the entire German section of the Theosophical Society, including all its branches, canceling the diplomas of more than a thousand members. Fourteen German lodges remained loyal to Besant; the rest went with Steiner.

Unperturbed, Steiner set up instead an organization of his own known as the Anthroposophical Society, to practice what he called Spiritual Science. By Anthroposophy—a word coined from the Greek for "man" and "wisdom"—Steiner meant that man in this life could achieve a state of consciousness in which he could experience the spiritual world of which everyone is a member, witting or unwitting. His new society gained rapid influence in Germany and grew to a large membership throughout Europe.

Basic to Steiner's vision is the fact that the inner, spiritual man, can live—as occultists have been aware for many millennia—in complete detachment from the physical organism, perceiving and moving within higher realms.



Rudolf Steiner.

Clairvoyance, as developed by Steiner, would reveal spiritual facts to those with spiritual vision as clearly as men's ordinary senses reveal to the intellect the facts of the physical world. This special clairvoyance—which Steiner claimed could only be developed by modern man, was to be no "hangover from an ancient past—dreamy, unclear, atavistic, dying in the present-day world"—but a clear-cut faculty capable of providing the means by which lucid answers to scientific problems could become readily available.

The tenets of anthroposophy concerning spiritual life were developed by Steiner into an impressive array of literature and lectures. In twenty-eight published books and some six thousand lectures taken down by his followers in shorthand, Steiner detailed "cosmic history" and the "wisdom of the world." His object was in no way to keep spiritual facts concealed, but to open up the "secret" and the "occult" to the whole of mankind. His intention was to deepen man's understanding by showing how both man and the world have originated from a divine-spiritual cosmos. "There slumbers in every human being" said Steiner, "faculties by means of which he can acquire for himself a knowledge of higher worlds."

It was clear to Steiner as it was to the theosophists, that the spirit of man, for its ethical development, must live repeated lives on earth, and that the deeds of earlier lives bear fruit—through the laws of Karma—in later incarnations. But he also taught that the highest spiritual development of man is that which leads to a modification of his physical body, arguing that one cannot be an adequate philosopher if one cannot efficiently chop wood.

Steiner's Spiritual Science was directed at this world: it aimed at developing the spirit for the upbuilding of both man and the world, leading to an increased, not a decreased, valuation of life in the physical now. Then why, with such a genius in our midst, do only devoted anthroposophists appear to have much of a notion of what the master really taught or meant? A short passage from Colin Wilson's biography of Steiner gives a clue:

Of all the important thinkers of the twentieth century, Rudolf Steiner is perhaps the most difficult to come to grips with. For the unprepared

reader, his work presents a series of daunting obstacles. To begin with, there is the style, which is formidably abstract, and as unappetizing as dry toast. The real problem lies in the content, which is often so outlandish and bizarre that the reader suspects either a hoax or a barefaced confidence trick....The resulting sense of frustration is likely to cause even the most open-minded reader to give up in disgust.

Colin Wilson, who concluded that Steiner was "one of the greatest men of the twentieth century," and it would be impossible to exaggerate the importance of what he had to say, twice refused to write his biography, and was only prevailed upon when a replacement author found by his publisher committed suicide rather than finish the job.

Wilson suggests that like Gurdjieff, Steiner may have written and spoken in a deliberately complicated style to force the reader to make enormous mental efforts. But the trouble lies more in the use of words, the recondite meaning of which differs from the conventional, a meaning which it is possible to parse only after much scattered exploration of endless Steiner texts—running perhaps to a million pages.

Had he, like L. Ron Hubbard, simply invented new words to describe "spiritual" concepts unfamiliar to his listeners, anthroposophy might have spread as rapidly and as successfully as scientology. Even so, as Wilson says, the rise of the Steiner movement between 1900 and 1910 was "one of the most remarkable cultural phenomena of our time."

As a place from which to spread his teachings, Steiner built—with abundant donations from cosmopolitan proselytes—a stunningly strange structure with twin domes and avant-garde wood carvings at Dornach in Switzerland, which he named after his mentor, the Goetheanum.

Steiner's architectural design of the partially overlaid domes, one of which was bigger than St. Peter's, was considered by experts to be the work of a mathematical genius. Large enough to seat a thousand persons, the main building was also used for the enactment of deeply spiritual mystery plays. But unaccountably, and to the dismay of his devotees, the building was burned to the ground, they say by a disenchanted catholic fanatic, to be replaced by an undaunted Steiner with an equally striking structure in concrete, the present seat of anthroposophy. There pupils prepare themselves for initiation by a life of contemplation and ritualistic enactments, in peaceful surroundings, much as in the mystery Schools of the pre-Christian era.

All over Europe anthroposophical groups sprang up, to be lectured to by Steiner in places as far apart as Rome, Oslo, Oxford, and Prague. The lectures covered an enormously wide range of subjects, from cosmogenesis and the essence of the Christian myths to the therapy of eurythmics, and care for the mentally handicapped. But basic to an understanding of the logic of his famous lectures on agriculture is his description of what he called "etheric formative forces."

In 1883 Steiner was selected by the Berlin publisher Joseph Kuerschner as the best talent available for preparing an edition of Goethe's scientific writings on nature. And three years later Steiner produced his own first work, *Theory of Knowledge Implicit in Goethe's World-Conception*, an essay which went deeply into Goethe's whole manner of thinking. Another three years, and Steiner was asked to go to Weimar to the Goethe-Schiller archives where new manuscripts had become available, to take part in collaboration with a group of eminent scholars in the preparation of a new edition of Goethe's complete works.

Appendix E

PLANETARY POWERS

The earth by itself, says Steiner, is only feebly able to transmit to plants the reproductive process that growth requires; it has no power to do so without assistance from the cosmos. "It requires the cosmic forces shining in upon the earth via the Moon, and in the case of certain plants, via Mercury and Venus. With the Moon's rays the whole reflected Cosmos comes onto the earth, so that the force of growth may be enhanced into the force of reproduction."

All three bodies closest to the earth, says Steiner, affect everything connected with the inner force of reproduction and of growth in plants, producing one generation after the other on the flourishing surface of this planet.

These reproductive forces of moon, Mercury, and Venus, as Steiner explains their effect on plants, work indirectly through the limestone content of the earth and are rayed back upward from below the surface, causing plants to produce what grows annually, culminating in the formation of new seed from which more plants can grow. Direct radiation from the cosmos, on the other hand, is seen as working in the air and water above the earth's surface, so that all that goes on in the plant, throughout summer and winter, is essentially a kind of digestion, which must be drawn down into root and soil for mutual interaction below the surface.

The distant planets—Mars, Saturn, and Jupiter—which revolve outside the circuit of the sun, are seen clairvoyantly to work on the siliceous element in the soil, which constitutes 28 percent of the earth's crust, forces that are then rayed up from under the surface. While these cosmic forces working on the silica are drawn up, all that is being digested above ground, says Steiner, must be drawn down into the soil by its limestone content. "Rock, sand, and stone receive the light into the earth and make it effective there. But there must be a constant interaction

between what is drawn in from the Cosmos by silicon, and what takes place in the digestive system above ground."

In biodynamic agriculture, what the plant roots chelate from the soil depends on the extent to which "cosmic life and cosmic chemistry have been seized and held by means of stones and rock, which may well be at a considerable depth." The way the soil grows inwardly alive and develops its own chemical processes, depends, says Steiner, above all on the composition of the sandy portion of the soil. "Those plants in which the root nature is important need a siliceous ground to thrive in, even if the silicon be only in the depths. All that is connected by way of silicon with the root nature must be able to be led upward through the plant, must flow upward, so that there is a constant interaction between what is drawn in from the cosmos and what takes place in the plants."

It is for this purpose, says Steiner, that clay exists in the soil. "Everything in the nature of clay is a means of transport for the influences of cosmic entities within the soil, to carry them upward from below. Clay is the carrier of the cosmic upward stream."

What comes from the distant planets, says Steiner, works on the plant above the earth to make the plant thick and bulky. And the fruiting results from the forces coming from these planets: "If you have apricots or plums with a fine taste, this taste, just like the color of the flowers, is the cosmic quality which has been carried upward, right into the fruit. In the apple you are eating Jupiter. In the plum you are actually eating Saturn."

A simple but vivid experiment to demonstrate Steiner's notion of the source of color in flowers is described by Al Schatz in his book *Teaching Science With Soil*. There are many species of hydrangeas, but one, *Hydrangea macrophylla*, native of Japan, where it grows to a height of twelve feet, has flowers that can be made to change color, thereby giving information about the soil in which they are growing.

If a stalk with a pink flower is placed in a solution of aluminum sulfate, the flower gradually turns blue. Even more amazing, if the stalk of a pink hydrangea is placed one half in water with aluminum sulfate and the other in plain water, the bloom turns half blue and half pink. Blue flowers can be turned pink if their stems are immersed in a solution of citric acid. Schatz explains that this is done by chelation: the citric acid binds and holds the aluminum, pulling it out of the blue chelated complex. Schatz explains that the most effective way to change the color of hydrangea flowers is to change the type of soil in which they are planted. Landscapers can change the color of hydrangeas by varying the pH of the soil.

In primeval times, according to Steiner, man knew how to transform one plant into another. If he wanted cosmic forces not to shoot up into the blossoming and fruiting process, but to be held back in the root, he would place such a plant in sandy soil. "In siliceous soil the cosmic is held back, actually caught. But one must be able to see at a glance whatever in the plant is cosmic and what is earthly."

Green plant leaves would not be green unless the cosmic forces of the sun were living in them. It is even more so, says Steiner, when you come to the colored flowers:

Therein are living not only the cosmic forces of the Sun, but also the supplementary forces from the distant planets. When we contemplate the rose, in its red color we see the forces of Mars. When we look at the

yellow sunflower (so-called because of its shape, not its yellowness) we see the forces of Jupiter. Supplementing the cosmic force of the sun, the forces of Jupiter bring forth the white or yellow in flowers. In chicory, with its bluish color we see the influence of Saturn supplementing that of the Sun. So Mars accounts for the red in flowers, Jupiter the yellow, Saturn the blue; the green is essentially the Sun.

There is a great difference, says Steiner, between the warmth that is above the earth's surface in the domain of sun, Venus, Mercury, and moon, and the warmth which makes itself felt within the Earth, which is under the influence of Mars, Jupiter, and Saturn.

In its effect on the plant, we may describe one as leaf and flower warmth, the other as root warmth. The two warmths are essentially different, and in this sense, we may call that warmth above the Earth dead, and that beneath the surface, living. The warmth beneath the Earth is most alive in winter.

The air too, says Steiner, is permeated by a subtle vitality.

Both air and warmth take on a living quality when they are received into the earth. The opposite is true of water and of the solid earthly element, which become more dead within it, but also more open to receive the distant cosmic forces. The air beneath the surface contains more carbon dioxide, and the air above, more oxygen.

Steiner analyzes the role of nitrogen in agriculture and its influence in all of farm production, saying that men recognize only the last excrement of its activities, the most superficial aspects in which it finds expression. "Nitrogen as it works in Nature has four sisters, whose workings must be understood to understand its function and significance." The quartet consists of sulfur, carbon, hydrogen, and oxygen; and to Steiner they "represent what works and weaves in the living, or the apparently dead, which is only transiently dead." Together they unite to make protein, from Proteus, the Greek sea god who could assume many different forms.

Here Steiner's anthroposophical spiritual science reverts to a basic concept: that not only the earth and the cosmos but all the physical elements of which it is composed are, to some extent, living and sentient. A far-out conceit, perhaps, but no wilder than Steiner's notion of antimatter, propounded by him over half a century ago, now popular among the orthodox.

"Nitrogen," says Steiner, using the poetic imagery of spiritual science,

is everywhere moving about like a corpse in the air. But the moment it comes into the Earth it is alive again, just like oxygen. Nay, more, it becomes sentient and sensitive inside the earth. Strange as it may sound to the materialist madcaps of today [he is speaking in the 1920s], nitrogen not only becomes alive but sensitive inside the Earth; and this is of the greatest import for agriculture. Nitrogen becomes the bearer of that mysterious sensitiveness which is poured out over the whole life of the Earth. It is nitrogen which senses whether there is the proper quantity of water in a given district. Nitrogen is conscious of that which comes from the stars and works itself out in the life of

plants, in the life of Earth. Nitrogen is the sensitive mediator, even as in our human nerves and sensing system it is nitrogen that mediates for our sensation. Nitrogen is the very bearer of sensation.

Our chemists, says Steiner, speak only of the corpses of the substances—not of the real substances, “which we must rather learn to know as sentient and living entities, with the single exception of hydrogen. Precisely because hydrogen is apparently the thinnest element—with the least atomic weight—it is the least spiritual of all.”

Yet hydrogen serves an essential function in the world of spiritual science in that all that is living in physical form upon the earth, says Steiner, must eventually be led back again into the universe, to be purified and cleansed in the universal All. Carbon, hydrogen, and nitrogen, which occur in leaf and flower, calyx and root, are everywhere bound to other substances in one form or another, and can become independent again, says Steiner, only when hydrogen carries them outward into the far spaces of the universe, separates them all, and merges them into a universal chaos. Alternatively, it drives these fundamental substances of protein into the tiny seed formation and there makes them independent, so they become receptive to the inpouring forces of the cosmos. “In the tiny seed-formation there is chaos, and away in the far circumference there is once more chaos. Chaos in the seed must interact with chaos in the farthest circles of the Universe. Then the new being arises.” Which is as rational an explanation as any of how an oak tree is manifested from an acorn. How different, says Steiner, is carbon in its living activity as it passes through the human body or builds up the body of a plant from the carbon we find in nature, as coal or graphite.

In effect, carbon is the bearer of all the creatively formative processes in Nature. Whatever is formed and shaped, be it in plant—persisting for a comparatively short time—or in the eternally changing configuration of the animal body, carbon is everywhere the plastician. Yet time and again man has the faculty of destroying the form as soon as it arises, by excreting the carbon, bound to oxygen, as carbon dioxide. Carbon in the human body would form us too stiffly and firmly, stiffen us like a palm. But our outbreathing constantly dismantles what carbon builds. In plants it is fastened in a firmer configuration.

Man, says Steiner, needing to create something more solid as a basis and support—a sort of scaffolding—for his existence, yet allow what is living in the carbon to remain in perpetual movement, creates an underlying framework in his limestone bony skeleton. Meanwhile carbon, building the manifold forms in nature, as the hidden plastician, makes use of sulfur in the process, allowing Steiner to produce another of his inspired but imponderable dicta: “It is on the paths of this carbon, moistened by sulfur, that the spiritual being which we call the Ego of man moves through the blood.”

Sulfur, says Steiner, is the element that acts as a mediator between the physical and the formative power of the spiritual that is spread throughout the Universe. “Sulfur is the carrier of the spiritual. Hence its ancient name, akin to phosphorous, of ‘light-bearer.’ Sulfur and phosphorous have to do with the working of light into matter. The chemist of today knows little of these substances, little of their inner significance in the working of the cosmos as a whole.”

In oxygen, according to Steiner, lives the lowest level of the supersensible world. But circulating inside of us, the oxygen is not the same as where it surrounds us externally. “Physicists,” says Steiner, “know only dead oxygen. That is the fate of any science that considers only the physical: it can understand only the corpse.” Somehow Steiner’s oxygen must find its way along the paths mapped out by the carbon framework. The mediator, he says, is nitrogen; nitrogen guides the life into the form embodied in the carbon. “Everywhere in the animal kingdom, and even in the plant world, and in the earth, the bridge between carbon and oxygen is built by nitrogen.”

Heady stuff, but it opens a whole new world of physics, dragged in from the realm of metaphysics, one in which the “chemical” elements act out their roles in an ever-changing pageantry, swapping costumes as warranted by script or as choreographed by some invisible director.

In the various Steinerian preps—the half-dozen remedies recommended by Steiner to “quicken” compost with cosmic forces—the elements are enabled to perform as stars as they heal the wounds of Mother Earth.

The function of BD 500 is clear enough: it invigorates the soil and gives sustenance to roots. A lucid explanation of the function of the quartz crystal in 501, ground to dust and buried for a year, is provided by Edmund Harold in his *Focus on Crystals*. According to Harold, the Indians of North America considered the powers of the quartz crystal to be sacred, and to solve the problem of sheltered hillsides with a scarcity of sunlight, which prevented the successful growth of crops, they used the power of crystals. This they would do by selecting a large crystal, which they ground into small particles and placed in large hollow cow horns to be buried in the earth for a year. When retrieved, the fine crystalline powder was scattered over the hillside at the points where the sun’s rays did manage to penetrate. This served to magnify and proliferate the sunlight, providing light for all crops subsequently planted. Steiner takes the method one step further, spreading not the crystal powder, but its homeopathically potentized essence.

Preparation 502—yarrow blossoms stuffed into a stag bladder and buried during the winter—is described by Steiner as being so powerful, with an effect so quickening and so refreshing, that it will make good again any exploited earth. For eons the power of yarrow has been known to man. When Achilles found that with the juice of yarrow he could heal the wounds of his soldiers as they lay in pain on the plains of Troy, the flower became known as *strattotes* (of the soldiers), and by Achilles’s Hellenophile Roman imitators as *Achillea millefolium*, because of its many leaves. Its homeopathic sulfur content, combined in a model way with potash, is said by anthroposophists to enable the yarrow to ray out its influence to a great distance through large masses, helping to bring sulfur in the correct proportion to the remaining substances of growing plants. In Steiner’s Germanically poetic terms: “Yarrow contains that with which the spirit always moistens its fingers to carry the different constituents to the plant’s organs—carbon, nitrogen, etc.” The moistening substance he refers to is the subtly quickening and essentially “light-bearing” sulfur.

To prepare the yarrow according to Steiner’s recipe one should harvest that part of the plant that is used medicinally, the upper umbrella-shaped inflorescence, press it strongly together, and sew it into the bladder of a stag. Why a stag? Because, says Steiner, the stag is an animal intimately related not so much to the earth as to its environment, to the

cosmos and its astral forces. Why a bladder? Because in the processes that take place between the kidneys and the bladder "we have the necessary forces, connected to the forces of the cosmos."

A weed, or wild flower, yarrow grows in pasture and along hedgerows, but can go for years without flowering, just spreading like grass. It has, as the Latin implies, thousands of deep green leaves finely cut into a multitude of very small parts. When it does flower, its scent is not expansive, but contractive: it has a bitter taste, which makes it as useful as hops in the brewing of beer. White or occasionally delicate pink blossoms, growing from a grayish-green stalk, appear from early summer to the middle of September. Tough and full of life, yarrow is so quick to regrow when picked that the Austrians say "it grows under the tooth of the animal that eats it."

Pfeiffer's analysis of the finished yarrow preparation, 502, showed that it acted as a biocatalyst with a stimulating effect on the plants' use of sulfur and potassium. This, in turn, affected the buildup of protein and carbohydrates. The bacteria count (as determined by Pfeiffer by the plate counting method on bee-agar-peptone, after forty-eight hours at 291 degrees Centigrade) was impressive. It showed the raw yarrow blossoms contained 30,000 aerobic bacteria per gram, whereas the finished preparation contained a phenomenal increase of up to 910 million aerobic bacteria. And, whereas the microflora of the raw yarrow consisted mostly of dust bacteria, the final preparation had an entirely different flora, mainly actinomycetes and bacteria belonging to the bacillus type, essential for the fixing of nitrogen. The increase in nitrate nitrogen after processing was as much as thirty-five times!

But to Steiner all of this was a secondary, derivative result: the main object of the preparations is to bring into them, and thus to the compost heap, "the creative, enlivening forces of the cosmos," forces he considered much more important than mere substances.

In the Middle Ages, when yarrow was used to purify blood, the herb was renamed *Supercilium veneris*, or eyebrow of Venus, presumably because, as Culpeper points out, yarrow is "under the governorship" of Venus, as, indeed, are kidney and bladder, according to Paracelsus and his masters the Egyptians.

A Viennese physician, Dr. Karl Koenig, barely in his twenties when Steiner gave his Koberwitz lectures, was so swept away by Steiner's suggestions for revitalizing the world's agriculture, he called the event comparable to what had happened in the Persian Epoch, when grain was developed from grass, a feat attributed to the incarnate Zoroaster.

A passionate pursuer of both embryology and histology, Koenig was gripped by Goethe's notion of the metamorphosis of form, a phenomenon he attributed, following Steiner, to what they both called "the formative forces in nature," forces which they came to identify with thought. "Outside, in nature," said Koenig, "these formative forces work in such a manner that they let come into existence all organic forms. Inside, in the human soul, they are the formers of our thoughts and ideas."

In his *Earth and Man*, Koenig explains why yarrow needs to be enclosed in the sheath of a deer's bladder, and why the preparation must be exposed to the sun throughout the summer before being buried throughout the winter, to be ready for use only after a full year's cycle underground. All organs, says Koenig, are a kind of scripture—kidneys, livers, hearts, lungs, being separate scripts written by the formative forces of nature. "Kidneys are the organs which pave the way for the entrance

of astral forces into the organism. The kidneys pull the astral into our body, and the bladder opens up and takes hold of these astral forces."

But why a stag's bladder? The stag or male deer, seen anthroposophically, is an animal in touch with cosmic forces, sensitive through its antlers to the whole cosmos around it. In Kolisko's words: "A stag is not phlegmatic like a cow. It is very nervous; it has great vivacity, awareness. It uses its antlers as a sense organ, far-reaching, with which it communicates with its environment. The slightest noise alarms the stag or deer, whereas a cow wouldn't even turn its head."

In humans the trait is known as hypersensitivity, and the horns on Michelangelo's Moses—or better, his antlers, as they are fluted—may be symbols of the antennas through which he received his commands from higher authority.

As Koenig puts it, with reference to the stag: "You must imagine that the tops of the antlers are continuously piercing through the Maya work, bringing the animal into direct contact with the astral forces all around it."

Antlers are bone, raw living bone, the most developed organ in the animal kingdom, whose marrow is the source of blood and life. Grown in the spring, antlers are shed in winter, a process that is repeated yearly as they become richer in form, with an additional prong for each successive year. Horns spiral inward, seeking a central point; antlers spread outward, branching into slender ramifications, growing like a plant towards the sun, rhythmically with the season, grained like a tree, exposed to the surroundings when their sensitivity is most in demand.

Protected by skin and fur during winter and spring, antlers are rubbed bare during the mating season, to become highly sensitized to radiations from the cosmos. By means of this "skeletal antenna," says Koenig, the stag can receive incoming forces from the cosmos, forces that are then transmitted to the kidney, which, as Lievegoed reiterates, is governed by Venus—as is the yarrow.

Detailing the functions of the various biodynamic preparations, Lievegoed says the stag bladder is "more able to unfold its Venus activity, to create the space wherein the formative forces of distant planets can manifest their activity, forces which penetrate the element of earth."

During the summer, says Lievegoed, the bladder of the dead stag, stuffed with yarrow, hung up in the open, sucks into itself the forces from the planets beyond the sun, which are active, homeopathically, in the silica process of the warm atmosphere.

It is all part of the same game described by Steiner in which "spirit" descending into "matter" organizes it and gives it form.

Hugh Courtney, who has become an expert at producing the Steinerian biodynamic preps, claims that all of them together represent the forces of the solar system brought to earth, and he identifies each "prep" with one of the system's orbs. The purpose of preparing them and injecting 502 to 507 into compost, says Courtney, is to bring the planetary forces as a whole into what he sees as a unified living substance of compost with which to fertilize the earth. The earth itself is identified with the 500, whereas 501, the light-bearing quartz, is identified with the sun; 502 is seen as the yarrow of Venus; 503 the camomile of Mercury; 504 the nettle of Mars; 505 the oak bark of the moon; 506 the yellow-flowered dandelion of Jupiter; and, as the last of the compost preps, valerian, the purple of Saturn. Courtney identified 508, or equisetum, with the cometary forces, demonstrating visually—and in the manner of



Picture obtained by Lily Kolisko with her method of capillary dynamolysis using silver nitrate and stag's urine. Observers regularly recognized the urine as coming from a stag because of the clearly depicted antler.

Paracelsus—that a frond of the plant held horizontally does look very much like a tailed comet rushing through space. Courtney also suspects that additional preps may yet be found and developed which will have the attributes of the unseen planets Uranus, Neptune, and Pluto, as well as of the postulated but as yet undiscovered Ringold in far outer space. There may also be, he says, an intra-Mercurial planet, closer to the sun, though modern astronomy considers it unlikely.

On the more basic side of the question, Kolisko, to discover any difference there might be between unprepared yarrow and that exposed to the forces of the sun in summer and the earth in winter, used her capillary dynamolysis. When yarrow flowers were placed in different animal bladders, her method soon showed that compared with the bladder of a cow, horse, or pig, the stag produced superior "radiating" forces. The more animals Kolisko studied, the more convinced she became that the stag was unique.

She says she would try to get a stag's bladder as soon as possible after the animal had been killed because she wanted it in perfect condition, with its contents, so as to study the formative forces of the urine by means of her capillary analysis.

Using silver nitrate, she obtained marvelous effects: the stag revealed itself clearly through the formative forces in its urine. Visitors asked to identify from the design on the filter paper the animal whose urine it might be uniformly recognized it as a deer or stag.

Kolisko says the capillary dynamolysis revealed an active connection between the antlers and the deer's excretions, a phenomenon she explained by saying: "The formative force streams through the kidney system, penetrates the urine, is impregnated into the bladder, and is thus conveyed to the yarrow during the process of its fermentation." Kolisko got a stag bladder with its content of urine still fresh, emptied the bladder, and immediately filled the emptied space with yarrow. When she dug it up the following spring a faint smell of stag urine still lingered. To see how long the yarrow preparation retained its potency, Kolisko kept some in its original bladder for all of eight years, noting that it continued to retain a slight smell of urine. Compared with a fresh batch, the best results were from the eight-year-old yarrow. For her compost she would only take what she needed, a little at a time, no more than a pinch between two fingers.

Whereas with yarrow one is mainly dealing with potassium influences, says Steiner, if one wants to get hold of the calcium influences, one needs another plant "which also contains sulfur in homeopathic substances and draws them into an organic process." By this he means camomile, or *Matricaria chamomilla*, rich in sulfur.

The name *Matricaria*, derived from mater, indicated to Culpeper that it be used to ease the pains of childbirth. It was also a well-known remedy for "all pains and torments of the belly."

That, no doubt, is why Steiner says that camomile be buried, not in a bladder, but in the intestine of an ox.

The pretty white flowers of camomile, which grow everywhere in meadows, blooming from May to June, exhale the characteristic aroma of the familiar tea. At the beginning of October, says Steiner, obtain fresh bovine intestines from the butcher and stuff them with camomile blossoms to make a sausage. These must be buried in good soil covered by snow in winter, but where the sun can shine on the ice crystals to melt them away in order for the cosmic forces to get to the sausage from both above

and below the soil. The preparation, says Steiner, helps stabilize nitrogen in the compost heap and later raise a healthy crop. One gram of the resulting 503, dug up in spring, can affect a whole heap.

It also helps plants find the right relationship between silica and potassium, enabling the soil to take in the right amount of silica from the atmosphere and from its cosmic surroundings. Plants affected by the preparation, says Steiner, become especially sensitive to the presence of silica in their surroundings, and have an uncanny capacity to use it in the right way.

For preparation 504, Steiner recommends collecting as many common-or-garden stinging nettles as possible when they flower in June or July, the young shoots not too woody, harvesting the whole plant but for the roots. They are to be allowed to fade slightly before being buried in the soil, just as they are, without benefit of sheath other than perhaps a little peat moss to isolate the plants from immediate contact with the soil. The nettles must stay buried all of one winter and all of one summer, by which time they will be ready for the compost heap where Steiner says their function is to keep its nitrogen content from evaporating.

Another biodynamic way of using stinging nettles—which Steiner called the jack-of-all-trades of herbs—is by making a liquid manure to enhance the vegetative growth of plants, especially during dry weather. A paste can also be made of nettles as a protective cover on the bark of trees and shrubs. This is done by mixing it with equal parts of fine clay and fresh cow manure. Before the coating is applied, the bark should be scraped and brushed to remove dead, loose parts. Trunks and branches that have received the treatment become smooth and clean after a few days, and the tree grows healthy.

Preparation 505, the spookiest of the lot, oak bark buried in the skull of a domestic animal, is most like medieval witchcraft. A brownish silver-gray, smooth and shiny on the outside and reddish brown on the inside, the bark is extremely rich in calcium, about 78 percent, and in older trees there is even more. When fresh it smells of tannic acid, is slightly bitter to the taste, and is a powerful astringent.

Its phosphoric-acid content is about 29 percent. In human disease it was, and still is, used against bleeding, vomiting, and diarrhea.

In the spring, when the skull is dug up, the oak bark will be found to have turned to a crumbly black substance that smells like fresh soil, full of life, teeming with microorganisms, and with a highly activated calcium content. To establish whether it was really necessary to use an animal skull, Kolisko buried oak bark from the same tree in the same spot, but in an earthenware pot, covered tightly with a fitting lid. Dug up in the spring, the oak bark from the skull came out smelling like living soil; the earthenware pot contained the same reddish-brown oak bark as had been put into it in October.

Kolisko says she tried the skulls of many domestic animals—cow, ox, calf, horse, pig, sheep—all of which worked well, but found it essential to use the skull in a fresh and undamaged condition, never split in halves. The brain, she says, should be pulled out with a wooden stick through the natural occipital opening.

Tested with capillary dynamolysis, the unprepared oak bark rose for Kolisko in the filter paper to produce an insignificant wavy border of light-brown color. The prepared oak produced intensive reddish-brown colors. The most beautiful result was obtained with gold chloride: a dark purple, pointed, flamelike form radiated with light purple shades that

turned to orange and brown.

One of the most efficacious of the preparations, as useful to humans when eaten *naturel* as when placed into a heap of compost, is the Frenchman's *dent-de-lion*, or 506. With deeply serrated leaves that yield a bitter milky juice if broken, the "weed" grows in meadows and pasture land with roots that go deep into the earth. When the seeds ripen, its large yellow-gold flower turns into a small ball with long reddish seed-pods beneath it. Culpeper says dandelion is under the government of Jupiter, that it has an opening and cleansing quality good for liver, gall, spleen, and especially such diseases as yellow jaundice.

Steiner describes the plant as being gifted with the capacity for regulating the relation between silicic acid and potassium in the plant organism. Its ash contains a large amount of silica and calcium. His recipe is to collect the flowers before they go to seed, let them fade slightly, or dry them, keeping them in a cool place until the beginning of October, preferably covered with peat moss. They must then be pressed tightly together to fill the mesentery of an ox—a mesentery being the large sheath of skin that surrounds the internal organs of an animal. Steiner warns that the mesentery must be in perfect condition, without damaged parts or holes. Surplus fat may, however, be cut off, but care must be taken not to break the tender skin. Wrapped around the flowers, the sheath is tied with string, or delicately sewn. When ready, the flowers can be clearly seen peeping through the skin.

The result is buried about two feet below the surface in the fall so that it spends a winter exposed to the strong earth forces, which Steiner says stream through the soil at that time of year.

In the spring the resulting soft friable material is ready to be used in the compost heap. Again, only a minute amount is needed—about a teaspoon for ten tons of compost. It is the forces, not the substance, that is supposed to be at work.

Valerian, which Steiner wants to help the plant find its right relation to phosphorus, is the last of the compost preparations, or 507, and it grows in many different locations, especially where the ground is marshy, near the edge of ponds, on the borders of woods, or between bushes where sunbeams do not penetrate directly. It is perennial, with a brown root as thick as a finger, which spreads laterally. The leaves are highly divided, dentated, or winged. The stalk rises a yard or more and branches at the top, with many small white and purplish flowers.

Culpeper saw the plant as under the influence of Mercury, useful against fevers and distempers. It is alexipharmic (serving to ward off poison), sudorific (sweat-producing), and cephalic (good for disorders of the head); it is also good for hysteria and epilepsy. The dried root, which has a characteristic perfume, has such remarkable therapeutic qualities that in England it is called "all heal." In the Middle Ages branches were hung outside old country houses as a protection against evil spirits, bad witches, and demons.

Steiner wants the flowers placed in lukewarm water and then squeezed out to produce a concentrated tincture that can be kept a long time. Highly diluted, to the seventh or eighth potency, it is sprinkled on the compost heap so that its phosphorus content can be properly used by the soil.

Kolisko says that it is quite obvious from her experiments that the valerian extract has a powerful vitalizing effect on compost, helping in its fermentation. Stored in a glass jar, a dark brown and strong-smelling

tincture, it is so powerful it can easily shatter its container.

Last of the Steinerian preparations, 508, horsetail, *Equisetum arvense*, is made into a tea to be used as a field spray or prophylactic to help prevent rust and other fungal diseases. The plant, which looks exactly like its name, is widespread and common on rough ground, but also on cultivated places. It prefers dry locations to moist ones.

Biodynamic farmers say they can hardly use too much of it. Horsetail has pale brown, unbranched fertile stems, which disappear as the plant grows taller and are replaced by green barren ones. These are used for the tea, and can be differentiated from the stems of "marsh" or "shady" horsetail by the places in which they grow.

One collects the barren shoots and dries them as quickly as possible by spreading them in a thin layer in a shady place. The tea is prepared by slowly boiling the shoots in a covered vessel of rainwater, about four ounces of the dried herb per gallon. Sprayed frequently, especially on garden crops, and in cold frames, hot beds and greenhouses, it is used against mildew, rust, monilla, scab, and soil-borne pathogenic fungi.

Sensitive crystallization tests showed a general improvement in the quality of plants as a result of treatment with 508. Relative protein content, and ratio of vitamin C were both improved. Kolisko noted that applications made during the morning hours were more effective than during the afternoon.

Dr James A. Duke, of the USDA, has listed the extraordinary quantity of elements and compounds to be found analytically in the various Steiner "preps." These are listed in full in the appendix. For a quick *aperçu*, his wife Jane has drawn them as they might appear on an apothecary's shelf. With the six ingredients, 502 to 507, Steiner told his audience at Koberwitz in June of 1924, as he ended his now famous lectures on agriculture, one can produce an excellent fertilizer, whether from liquid manure, or ordinary farmyard manure, or from compost. Then he added with a smile: "I know perfectly well that all of this may seem utterly mad. I only ask you to remember how many things have seemed utterly mad which have nonetheless been introduced a few years later."

He was referring, at that time, to the newly developed electric train. But the list, as it develops, is as long as history, and every bit as unexpected.

Appendix F

HOW TO AND WHERE TO

How to Make a Biodynamic Compost Pile

Compost, the primary product of a biodynamic farm, is remarkably easy to produce, especially as the required inoculants, the BD preparations 500 to 507, can be readily obtained from Josephine Porter Institute for Applied Bio-Dynamics, Inc., Box 133, Woolwine, Virginia 24185.

The following recommendations are an amalgam gratefully taken from the writings of various biodynamic practitioners.

Select a piece of ground that is well drained, and partly shaded, not directly in the sun. The ground should be dug down about eight inches to make a trough of loose earth about four to five feet wide by six long, though it can be any length. The long sides should be oriented north-south so that both finished sides receive an equal amount of sunlight to ensure even fermentation.

The pile should be built up to about four to five feet high, narrowing toward the top. It is constructed in layers, like a cake, each layer being sprinkled with a fine spray of water or valerian-steeped water.

The first layer should be made of twigs, about the diameter of a dime, such as might be trimmed from an apple tree. This is to ensure good drainage.

Then comes a layer of hay, weeds, and fresh garden debris, about eight inches thick.

Materials of any length or thickness, such as straw, hay stalks, tall weeds, corncobs, or corn stalks, should be chopped or shredded if fast fermentation is required.

Next comes a layer of manure—cow, horse, chicken, or whatever. For lack of manure, a good old compost can be used.

Layers of soil should not be more than an inch or so thick. Layers of

leaves and grass should be less than two inches thick so as not to compact.

Another layer of fresh green material can follow: cut grass, weeds, and kitchen wastes such as tea leaves, coffee grounds, vegetable trimmings, meat and fish scraps, floor sweepings, vacuum-cleaner contents, old woolen goods, and even old sacks. Dried blood, hoof or horn meal and pea and bean waste can also be added.

Then add another layer of manure, and so on.

If lime is added to the pile, dolomitic lime is recommended. George Corrin, an English biodynamic expert on composting, recommends only a small sprinkling being usually required, "like dusting icing sugar on a cake."

When the pile is four to five feet high, finish it off with sides sloping at an angle of 70 degrees until it is two feet wide at the top.

Inserting the BD preparations

Take a bar or broom handle and make six holes in the sloping sides (three on each side) twenty inches deep about six or eight inches down from the top and spaced equally apart. Into five of these holes insert a pinch, or better still a pellet, of each of the preparations 502 to 506. Each must go into its own hole, with no mixing. Cover the five holes. (With one set of preparations the most that can be treated is a fifteen-ton pile.)

Stir twenty drops of valerian juice (507) into one gallon of lukewarm rainwater or good quality water, alternating one way and then the other, for twenty minutes, as with BD 500 and 501.

Divide the gallon in half. Pour one half into the sixth hole. Spray the remainder in a fine mist from a clean sprayer over the entire pile.

Finally, for protection against the sun and against too much rain, cover the pile with an inch or two of straw or peat moss and a burlap bag.

The finished pile should remain moist at all times, holding water like a damp sponge, but not accumulating water so that it runs out or collects at the bottom. Fifty to sixty percent moisture by weight is required for proper fermentation. Each particle of fiber should be almost shining wet.

It is vital that the pile be so constituted that air can circulate in and through it. Its aerobic fermentation means that air, or rather oxygen, can reach all parts of the compost pile at all times. As the activity of microorganisms yields carbon dioxide, this must find its way out to the atmosphere. Only aerobic fermentation yields a product with all the beneficial effects on soils and plants. When fermentation is aerobic, few or no flies will breed on or even approach the pile.

The pile is now ready to start fermenting and decomposing, not rotting.

To test whether the material in the heap is behaving as it should requires some attention—the use of the senses of sight, smell, and touch, and the power of reasoning.

In the new pile an enormous growth and increase in the activity of microorganisms will begin. Their metabolism yields heat, which will develop in the first three days up to a temperature of 150 degrees, or more.

Composts that contain much soil will seldom get very warm; composts with much manure, young plant tissue, and garbage will become very hot. A higher moisture content keeps the temperature lower. It is

best to keep the pile between 120 and 140 degrees. If the pile falls to half its size during the first few days, too much air has entered and it has burned like a bonfire.

To reduce heat, make crowbar holes all over the pile to let in air, and dry it out. A gray mold indicates too much heat. To cool the pile, turn the hose into the holes for a while. After a few days, close the holes.

A pile will cool off in fifteen to twenty-one days. If it is turned, so that the top is on the bottom, and the inside is on the outside, it will heat up for another fourteen days. But a pile in proper condition from the start should not need turning.

Earthworms are a sign of good progress. A good pile will be wriggling with worms, which will disappear when the decomposition is complete, leaving their capsules and a tremendous amount of very valuable castings.

Three stages take place before the pile becomes humus:

The original smell disappears and the material takes on a woody odor. This may happen in only a few days.

The color becomes uniformly dark brown.

The original texture disappears and the pile looks like rich soil.

In the first phase, the crude source material is broken down by microorganisms, bacteria, and fungi into its original proteins, amino acids, proteids, cellulose, starches, sugars, and lignin. In the second phase, the microorganisms transform the broken-down source material to build their own bodies. In the third phase, as they die, they produce humus of two kinds, lasting or perishable. The stable kind builds up soil; the perishable burns it up.

Best results are obtained from the finished product in about two to three months. Thereafter, the humus will keep indefinitely with protection from sun and drying winds, and with sufficient moisture. Ripened compost can be stored for several months.

If used before stage three, do not plow under, but mix with topsoil so the air continues to have access.

A second pile on the same foundation will generally do better than the first, and have even more earthworms; they will stay in the ground and invade the next pile.

Application of Compost

Compost is applied in the spring and fall to provide a high number of living organisms to the soil with each shovelful of compost.

In the garden one works the compost into the surface layer, two to four inches down, or puts it into rows for seeding, or the holes for planting.

For row crops on the farm, it is worked into the topsoil or broadcast on grasses and hayfields. It should not be dug in deeply, but spread by shovel or muck spreader and worked into the soil with a rake, cultivator, or disk harrow.

Average applications of five to twenty tons per acre are usual every four years in rotation. Ripened composts for basic soil improvement are worked into the upper two-to four-inch topsoil layer in amounts of fifteen to thirty tons per acre. Partly-processed garbage compost for land reclamation and for combating erosion can be applied in a layer half to

two inches thick, the equivalent of 40 to 160 tons per acre.

According to Pfeiffer, an old rule suggests that good compost can be applied at any time on any crop and in any amount. But the better the quality of compost, the less is needed.

How to Use and How to Make Maria Thun Barrel Compost

Barrel compost is a homeopathic supplement to regular biodynamic organic compost. Its function is to get the beneficial effect of the preps into the soil more often than is possible through ordinary manuring and composting in the normal course of crop rotation. BC is not difficult to make, providing one has access to the required basic materials; otherwise it can be readily obtained from Josephine Porter Institute for Applied Bio-Dynamics, Inc., Box 133, Woolwine, Virginia, 24185.

One unit, properly seasoned, stirred into three gallons of water, sprayed onto land or garden, will cover an acre. Its effect is comparable to that of regular BD compost, though not so long-lasting. Biodynamic farmers consider it essential to use either compost or barrel compost as a precursor to the spraying of BD 500 and 501.

Barrel compost consists of cow manure, ground-up eggshells, and basalt dust, carefully mixed and inoculated with the Steiner preparations 502 to 507. It is seasoned for approximately twelve weeks in a barrel buried in earth. The purpose of injecting the biodynamic preparations into the compost is to assist in the decomposition process of the manure, and to produce a sweet-smelling substance to improve soil structure. Barrel compost is especially useful for changing from orthodox to biodynamic methods, as it enables one to use the biodynamic preparations more frequently.

For those willing to make the effort, a single barrelful is sufficient to spray onto some two thousand acres. Seasoned and properly stored in a cool cellar, it will last a long time.

Potentizing the barrel compost in a bucket of water

Thun recommends putting sixty grams (about a handful) of the finished compost into ten liters (two to three gallons) of water, preferably rainwater that has been exposed to the air, to be potentized by stirring in the same manner as the 500 or 501, but only for twenty minutes.

The resulting potentized liquid will cover about half an acre, or a quarter hectare. Thun claims it to be most efficient when used three times in relatively quick succession, about a week apart. It should be sprayed onto the soil in large drops like the 500. This is most easily done with a bucket and a whitewash brush; it can also be done with a regular sprayer.

Before spraying on pasture or lawn, one may lightly scratch the surface with a harrow to aerate the soil and scatter any cow droppings. Spray first during a waning moon, and if possible on a leaf day. Eight to ten days later, spray the 500. Fifteen days later, with an ascending moon, and toward evening, spray 501. Neither the 500 (which helps the growth of roots) nor the 501 (which helps leaves absorb sunlight) goes well on new soil unless it has first been sprayed with barrel compost, which, says Thun, draws the "formative forces from the heavens into the earth in a balanced, harmonious way, making them more accessible and quicker in their action."

Market gardeners use the barrel preparation as a means to apply the

equivalent of compost to land that does not receive the actual compost in rotation.

On lettuce beds it should be sprayed at the first hoeing.

Farmers, says Thun, have regularly experienced one-third higher yield as a result of using the barrel compost, and have reported obtaining four crops off the same plot of land within one growing season.

For plants under stress, due to drought, insect attack, or other reasons, a "first aid" spray with BC gives dramatic recoveries.

For barns, feedlots, and pens where livestock are kept, use of a BC spray reduces both fly and odor problems.

For getting plants off to a good start, use a seed soak of BC. It is also useful with transplants as a root bath or for watering newly set-out plants.

For rejuvenating fruit trees, the BC is effective in combination with BD 500, applied to the previously cultivated or aerated drip line under the tree.

According to biodynamicist Xavier Florin, the barrel compost is a well-balanced mixture of ferments, enzymes, and trace elements "bathing in superabundant cosmic formative forces," which sprinkled over any soil will detoxify it of chemical additives within two years.

The preparation, says Thun, helps heal the earth of damages caused by the many types of pollution with which it has been saturated. It is also heralded as a defense against strontium 90. The powdered eggshells are said to strengthen the calcium process in plants, enabling them to resist the replacement of calcium by strontium 90. In the 1950s an institute at Freiburg conducted experiments on land that had high strontium 90 levels. Scientists found plants growing on calcium-decomposition soils had less uptake of S-90 than nearby soils rich in silica. Thun says the compost also protects against radioactivity released by atomic explosions and nuclear power plants.

The best seasons for applying barrel compost, says Florin, are while the moon circulates through the constellations from Gemini to Scorpio.

Used with 500 and 501 it is said to eliminate the need for spreading nitrates: soils that did not show calcium or phosphorus in previous analysis will show the presence of these elements after the use of the barrel compost.

How to make Maria Thun's barrel compost

FOR ONE BARREL

Obtain a used barrel of old wood that has lost its tension. A barrel that has contained alcohol (liquor, wine, pickles) or any other preservative must first be filled with water and left to sit for eight days; it must then be washed well with lye made of resin and ash, then rinsed with stinging-nettle water. One quart of stinging-nettle (*Urtica dioica*) concentrate is diluted in ten quarts of water. Empty the barrel and wait for violet fungi to appear on its walls.

The nettles should be harvested on a beautiful spring day before they blossom, and left to dry. A large handful of dried nettles is left to steep in rainwater for a week. Every two weeks thereafter, add a small handful of dried stinging nettle.

Collect fifty gallons of fresh cow manure. It must be fresh, collected within the day, before flies have found a way to lay eggs in it, and be kept

humid until used. The ideal dropping has a solid form and should not be too moist. This is not always easy to find because of modern methods of force-feeding cows for higher milk production. A diet heavy in corn silage does not produce such droppings. For best results use manure from biodynamically pastured cows, but this is not essential. Maria Thun suggests "feeding cows good quality roughage for as long as it takes to give the droppings the desired form."

The manure should be sieved through half-inch hardware cloth to remove any foreign objects or straw.

EGG SHELLS

Collect two to three hundred shells from raw eggs. The dried shells can be very efficiently crushed in an electric or hand coffee mill. Maria Thun emphasizes that the particle size should be consistent and still retain a small-flaked aspect; it should not be a fine powder. She tested duck eggs, snail shells, and many forms of rock powders high in calcium, but the balance between silica and calcium for which she was searching was found best in hens' eggs. She says the inner skin of the shell contains a "young" calcium.

High-production chicken factories produce sick chickens, whose eggs should be avoided. Better results can be expected from organic or biodynamically raised chickens.

BASALT

Thun indicates a particle size of between .2 and .5 millimeters (the consistency of fine sand). If the basalt is too fine, with a floury texture, it will stick together like cement during the mixing process. She recommends "an active decomposition process that does not take place if the basalt is really fine."

The choice of basalt powder was made after Maria Thun used it for many years as an additive to compost and manure piles. It is a volcanic rock that contains all the elements that become clay after their dissolution. She writes: "Basalt brings new decomposition processes into the soil which exert a positive influence on the humus formation in clay soils. Basalt powder sprinkled on litter in barns has a "nitrogen-preserving ability."

Mixing the three basic ingredients: manure, eggshells, and basalt

To be potentized, the preparation needs to be mixed with a shovel on a swept concrete floor (or the bed of a pickup truck).

Thun's proportions are 5 buckets of cow dung (free of any straw) to about 3 1/2 ounces of dry, finely-crushed eggshells and about 18 ounces of basalt powder.

Mix these together with a shovel for an hour, as a mason would mix mortar, only without adding water. The mixing brings air rhythmically into the mass so that 20 percent of the volume is oxygen to support the life of aerobic fermentations in the compost, and 78 percent nitrogen, which functions as an animator of all the processes, fixating itself through the assimilable microbes, a fermentation that will develop its full effect in the soil.

Burying the barrel

A fifty-gallon barrel works best, to be either half or three-quarters filled with the manure mixture.

Knock out the top and bottom: it is essential that the bottom be removed.

Dig a hole in a place protected from excess heat or cold, deep enough to receive two-thirds of the barrel. If the climate is very wet, the barrel should not be buried so deep.

The earth at the bottom of the hole should be as fertile as possible. If you have a poor soil, add some very-well-decomposed compost or fertile soil.

Soil removed from the hole should be banked up around the sides of the barrel to form a slope so that rain will not seep into the hole beneath the barrel. Banking, says Maria Thun, enables the soil forces all around the barrel to work on what is inside.

It is best to dig the hole and install the barrel on a fine day, in the afternoon, preferably during the time of the waning moon. One should absolutely avoid difficult days, says Maria Thun, days of moon nodes (two per month), nodes of Mercury, Venus, and all the other planets.

Filling the barrel

Half fill the barrel with about twenty-five gallons of the manure, egg-shell, and basalt mixture. Make five six-inch holes in the surface and place in each one-half-ounce—about the size of a cherry—of each of the BD preparations 502 to 506. Add to the barrel the other half of the manure mixture and repeat the dose of BD preps in five more holes. Finally, sprinkle the contents with an infusion of 507, or valerian, five drops to a liter of water, previously stirred for twenty minutes. Any of this liquid left over can be sprinkled on the earth surrounding the barrel.

The barrel should be covered, so that rain does not enter. A piece of slate is recommended, held up a couple of inches by a picket at one side so that air can enter freely.

After a month and a half, thoroughly mix the contents with a shovel for about ten minutes to homogenize it and eliminate unaired lumps.

In about two to three more weeks the barrel compost should be ready. Barrel compost, which requires much less time to season than regular compost, can be made at any season, but spring and autumn are preferable.

Storage

The finished compost should be placed in a barrel in a basement or cave. It will keep a long time. After two years it looks like a light humus and still gives good results.

How to Use the Biodynamic Preparations 500 and 501

BD 500 is cow manure that has spent the winter buried in a cow horn. The resulting friable humus like substance is obtainable in the United States from Josephine Porter Institute for Applied Bio-Dynamic's, Inc.

Stirring BD 500

For one acre of land stir 1-1/2 ounces (35 grams) of BD 500 into 4 gallons of water in a plastic or ceramic bucket. The preparation must be stirred by hand or with a stick for one full hour, about twenty seconds in one direction, to form a deep conical vortex down to the bottom of the container, then reversed to form a chaotic mass, which becomes another vortex circling in the opposite direction. The stirring should be done with cheerful intent, not as a chore; and several hands may stir in turn.

Various ingenious methods have been devised for stirring large quantities in more than one container simultaneously. Any system that works will do.

On farms that have mechanical stirring equipment the batches can be larger. The amount of liquid is limited only by the time required to spray it all onto the ground. The freshly stirred preparation should be applied within no more than three hours. Maximum effect can be expected within the initial one to two hours after stirring.

Water for the 500 should be lukewarm. Rainwater is best, collected from gutters and kept in a barrel or tank. Clear river water can be used, but it may contain slightly more inorganic and organic substances than rainwater. Never use chlorinated water.

It is advisable to let the rain or river water stand in an open barrel for two to three days to let the light penetrate. The same applies to tap water, which should be allowed to stand for a longer time and should be stirred several times for a minute or two. It should be kept in wooden barrels or glazed earthenware crocks. Oak barrels are preferred. Farms using more water may use large tanks, but they should have a good finish and be free from rust. They should be cleaned with utmost care, using a clean brush, with hot water and a 2 percent lye or soda solution, but no detergents, then rinsed several times with hot and then cold water.

Spraying equipment

Depends on size of farm or garden. Better not use sprayers that have contained other liquids, especially toxic ones.

On small garden patches, liquid can be sprayed by hand with a whisk broom or whitewall brush, flipped with a snap of the wrist in a wide circle, to distribute fine drops evenly.

Small hand sprayers that form a finer mist are commercially available in many sizes.

The next size is a knapsack sprayer, which suffices for a garden or small farm. There are many larger tractor-drawn or mounted tanks and sprayers that can cover a wide strip. These are arranged so the nozzles face downward, ending no higher than two feet above the surface of the soil; otherwise too much of the fine mist gets blown away.

Sprays applied by pressure sprayers must be strained carefully, or they will clog the nozzles.

For gardens

BD 500 can be applied early in the spring, and again before planting. Soils in cold frames, hot beds and greenhouses are sprayed before sowing or planting. If possible seed drills and holes should be sprayed before

planting.

The rate of application can be higher than on farmland: one portion to cover between two and four thousand square yards.

The stirred 500 is applied directly on the soil, usually ahead of planting; but it is desirable that the application be followed by an early shallow cultivation, such as with a harrow or a garden rake.

500 should be sprayed on in the second half of the afternoon, after a rain, when the soil is slightly moist, never dry, or sealed with a crust. It should not be sprayed around noon, in the heat of the day. It is best if the sky is at least partially overcast (the material then follows the natural daily rhythm of the humidity in the lower atmosphere).

Spraying is not done during rain, and should be postponed if there is possibility of rainfall soon afterward.

During drought conditions a spraying of 500 late in the evening, or (early in the morning) when dew is present, serves to relieve the plants of stress.

BD 500 on the farm

The spray is applied before the last harrowing or cultivating preceding the planting of winter grains or other fall crops, including catch crops. On pastures and hayfields it can be used sometime before a freeze is expected. But more frequently one prefers to treat permanent grasses and hayfields early in spring in order to stimulate growth at the start of the season. On cropland the spray can be applied after the soil has permanently thawed. Mostly one chooses a time during spring cultivation, ahead of planting.

Biodynamic growers prefer to work the soil at intervals in spring in order to control the weeds that germinate from seeds. It is a good measure to include pasture and winter crops in this treatment. It helps strengthen root development of those fields that have suffered from frost or wind erosion.

Storing BD 500

Whether it is made on the premises or obtained from another source, once removed from the horn BD 500 should be stored in a cool and not too dry cellar in an earthenware crock that has a lid of the same material or is covered with a piece of slate or stone. The crock must not be sealed, allowing for the circulation of air.

The container should be placed in a wooden box and be surrounded by a layer of sphagnum or peat moss. The cover of the box, usually made of boards, should have a cushion filled with peat moss on the inner side.

In a dry climate, or during a long dry spell, it may be necessary to keep the peat moss slightly moist, just enough so it does not absorb moisture from the preparation.

In a humid climate, or when the room is rather humid, this is not required.

Those who order the preparations already made should take them out of the traveling container and store them in the same way.

The substances are not dead; if kept under too humid conditions they will go moldy. But they should not be allowed to dry out. Air must have access, but slowly, in order to preserve the microbial life in the preparations.

Root dip with BD 500

This has a soupy consistency. It is composed of equal parts (by volume) of cow manure and subsoil loam, stirred with horsetail tea (one part dried horsetail in twenty parts of water), and stirred 500. Roots and transplants, including vegetables such as cabbages, tomatoes (unless they are already in soil blocks), also the roots of trees and shrubs, will benefit when dipped into this material before they are replanted.

How to Use BD Preparation 501

501 (Josephine Porter Institute for Applied Bio-Dynamic's, Inc.) is ground-up quartz crystal that has been buried several months in a cow horn. It is to be homeopathically stirred into water for a full hour, the same as with BD 500.

The result is sprayed onto the foliage of growing plants, and acts as a supplement to preparation 500, helping to bring sunlight to the leaves.

The amount to be stirred into water to be sprayed on one acre (or 2,000 to 4,000 square yards in the garden) is a bare 1 to 1.5 grams (1/20 ounce) in 4 to 5 gallons of water.

The resulting potentized spray is applied late in spring or early summer. One sprays in the very early morning when a warm and at least partly sunny day may be expected. The proper growth stage is at the time when the organ of the plants one wants to harvest has begun to form. If applied when the sun is too high, it has been known to cause burns on the foliage.

It is important to spray 501 in a fine mist.

To achieve maximum results, spraying of preparation 501 must be preceded by treatment of the soil with preparation 500, which should be preceded by a spraying of barrel compost. The effect of all three sprays is stronger than each alone.

501 is said to have the power to stimulate fruit and seed formation; it is also said to improve the flavor, keeping quality, and nutritional value of crops as well as making them more resistant to disease and insects.

Small grains receive the 501 treatment after tilling, when the stalk starts to elongate.

Subsequent applications can be made as they help prevent lodging.

Corn is treated when the stalk starts to elongate and when one can easily drive through the field.

Alfalfa, other hayfields, and permanent grasses receive the treatment not too long after strong growth has started.

Provided there is enough moisture in the ground and one is not in a dry spell, further applications can be made after cuttings have been taken off the field, or a grazing period is finished.

Garden crops that have to be transplanted should not get the spray until they are finally set out.

Lettuces and spinach should receive only one application in the morning; but to prevent them from bolting, another application can be made in the afternoon, tending to drive the forces back toward the roots, as happens normally in that part of the day.

Flowers, tomatoes, strawberries, and fruit should be treated when the flower buds are visible and ready to open.

Potatoes like 501 when the flower formation starts.

Cabbages of all kinds, and cauliflower, broccoli, and other leafy vegetables that grow much bulk, should respond to repeated applications by growing a finer tissue, developing good taste and keeping quality.

Kitchen herbs, soft fruit, tomatoes, melons, and so on, should have their taste improved by repeated applications.

Apple trees get applications during the last stage of flower buds, then again when the fruit is being developed. Spraying 501 on apple trees can be combined with a stinging-nettle spray.

For greenhouses, where such plants as cucumbers, tomatoes, lettuces produce large amounts of plant matter within a short period of time, repeated applications of 501 are recommended.

Carrots should be sprayed on a root day, spinach on a leaf day, and so on according to the desired result.

Steiner recommended the use of biodynamic preps as homeopathic medicine for the living earth to regenerate the soil. Biodynamicists point out that a remarkable change in the condition of the treated soil occurs, that it becomes more crumbly and fibrous, and retains moisture more easily. The appearance of crops is also improved as they become more resistant to drought and infection. Soil and crops show remarkable improvement, even after a short time. The full effect, however, is said to appear in the course of three or four years. It consists in the continuous increase of the fertility of the soil, and an improvement of the quality and flavor of the produce. Both the plants and the soil in which the forces of life are stimulated are found, according to biodynamic farmers, to provide themselves actively with the required substance by attracting them with the surrounding circuit of forces, just as a healthy organ in the body supplies itself actively with what it needs from the circulating blood and the other juices of the body.

How to Make Biodynamic Preparations 500 and 501

Cow horns can be obtained from any cooperating slaughterhouse, and do not have to come from biodynamically fed cattle. But they should be from cows, not bulls or steers. Cow horns are generally thicker and heavier.

To clean, place the horns in fifty-five gallon drums full of water; cover with plastic to prevent the spread of odors. After a couple of weeks, the thin layer of flesh surrounding the bony core of the horn will rot away; the bones can then be removed, leaving the horns empty. A less smelly method is to leave the horns to dry out. After a certain loss of moisture between bone and horn, the bone will fall out if the horn is struck sharply with another horn. Thereafter the horns may be stored indefinitely.

Manure

In a Northern-Hemisphere temperate zone, cow manure is collected between the fall equinox and the winter solstice. It is desirable that the animals still be grazing, or have part-time pasture or good hay plus some green feed.

In the Western Hemisphere, the horns should be well and tightly stuffed with manure that has been sieved to remove twigs or other foreign objects.

The stuffed horns are buried about two feet below the surface in good rich earth, in the fall, prior to the winter solstice (December in the North-



Sara Sorelle stuffing a paste of ground-up quartz crystal into a cow's horn to be buried for a year to produce BD 501.

ern Hemisphere, June in the Southern), and are left there until the end of winter.

Biodynamic farmer Hugh Lovell of Blainsville, Georgia, recommends placing the horns tip down, pointing toward the center of the earth, claiming the bovine horn to be an antenna that picks up the telluric forces of winter. Hugh Courtney stacks them in a circle, point down; but in Australia they are laid flat in rows, separated by a thin layer of earth. All methods seem to be effective.

Quartz crystals

These are obtainable from any good supply source, especially in Arkansas, where there are several mines. A fine powder is produced by grinding the crystals in an iron mortar and pestle, or by any other available method.

Mixed with water, the powder is stuffed into cow horns and buried at the beginning of summer, before St. John's Day. Dug up in early fall, the finished 501 should be stored in a glass jar and placed in a sunny window.

Biodynamic Preparations 502 to 507

These preparations are used to inoculate a regular compost heap or Maria Thun's barrel compost.

The preparations are obtainable from Josephine Porter Institute for Applied Bio-Dynamics, Inc..

Instructions for making your own BD preparations are derived from

Rudolf Steiner's 1924 lectures, entitled *Agriculture*, with additional hints from various biodynamic farmers.

502. The blossoms of yarrow buried for a year in a stag bladder

Harvest the florets of the common wild white yarrow (*Achillea millefolium*) in spring or early summer, taking the part that is used medicinally, the upper umbrella-shaped inflorescence. They should then be allowed to dry.



Stag bladders stuffed with yarrow flower, hanging in the summer sun before being buried for the winter to produce BD 502.

The dried flowers, moistened with a tea made from the same flowers, are stuffed into the bladder of a male deer, elk, or moose.

A bicycle pump can be used to inflate the bladder, or a small balloon

can be inserted and blown up with a straw through the ureter duct.

When ready to be stuffed, the dried bladder is moistened with lukewarm rainwater. Moist yarrow flowers, pressed strongly together, are inserted into the bladder stretched to capacity. The hole is sewn with thread, and the bladder hung six feet above the ground all summer in a place as exposed as possible to sunlight.

In autumn the bladder is buried not too deep—ten to twelve inches—in good earth, there to spend the winter.

Dug up after having spent a full year in the bladder from the initial stuffing, the yarrow is placed in a cool cellar in an earthenware pot surrounded by peat moss in a wooden box along with the other preparations.

503. Camomile buried in a cow's intestine

Harvest the wildflowers when they blossom early in the year. As the flowers are small, Hugh Lovell recommends harvesting with a cranberry picker or large-toothed comb to pick several at once. Drying is best done in the shade, on paper or cheesecloth. The longer the blossoms need for drying the poorer their quality.

There is an old belief that the most powerful camomile blossoms for healing are those picked before St. John's day. Afterward the witches are accused of wetting and spoiling them.

In the fall, soak the dried camomile in a camomile tea and stuff them like sausage meat into the intestines of a freshly killed cow. These should spend the winter underground and be dug up in spring.

Biodynamic farmers find a mysterious affinity between camomile and calcium in nature. When the finished camomile preparation is added to the compost it is said to guide the calcium forces in the breakdown of raw material.

CAMOMILE TEA

The definition of this "tea" is one teaspoon of camomile to one cup of water.

The tea is beneficial as a seed bath, especially for seeds that succumb easily to damping-off or seed-borne fungi and bacterial plant diseases.

The seeds are left in the tea for ten minutes and then either directly planted or redried and kept for later use. The same tea can, in diluted form, be used in the greenhouse for watering seedlings, with equally effective results.

Pliny suggested using camomile poultice or bath as a cure for headache and illness of the liver, kidney, and bladder. Today it is still considered a remedy for flatulence, stomach pains, catarrh of the intestines.

504. Stinging nettles buried for a year or more

To make the preparation, the mature plants of *Urtica dioica*, stem and leaves, are picked before they are in bloom, then buried for a full year in a good humus soil.

The stinging nettle is a perennial, which grows as tall as six feet, with a square stem and little hairs; the leaves are opposite and alternate. Little blossoms form like grape clusters in the leaf axils and are pollinated by the wind. The tiny seeds—a thousand of them weigh only .15

grams—ripen in August and can be used the same fall to establish a planting of nettles.

Steiner recommends collecting as many as possible common or garden stinging nettles before they flower in June or July, the young shoots are not too woody, harvesting the whole plant but for the roots. They are to be allowed to fade slightly before being buried, just as they are, without benefit of sheath other than perhaps a little peat moss to isolate the plants from immediate contact with the soil. Hugh Courtney favors covering the nettles with a wire mesh, to keep the earthworms from carrying the nettles away and to help find the humus when digging for it the following year.

The nettles must stay buried all of one winter and through the following summer, by which time they will be ready for the compost heap, where Steiner says one of their main functions is to keep its nitrogen content from evaporation.

Underground, the nettles undergo fermentation and turn into dark humus, which is then used to stimulate soil health, providing plants with individual nutritional components such as sulfur, potassium, calcium, and iron. Nettles are able to assimilate iron from the soil and build it into their tissues. Pfeiffer says the most interesting change during the preparation is that the stinging-nettle humus is enriched about one hundred times in molybdenum and vanadium, the trace elements necessary for the activity of nitrogen-fixing bacteria.

The shape of the nettle leaf resembles the heart symbol, indicating to biodynamicists, along with its serrated edge, a relation to the rhythmic forces of the universe. They say that just as the rhythmic system in man, which is centered in the heart, continuously counteracts degenerative forces and strengthens health, so does the nettle radiate healing forces into its surroundings, offering itself as a remedy for many illnesses, including those of plants. In old herbals the nettle is recommended as helpful for ailments of kidney and bladder, skin diseases, and bleedings of all kinds. All herb mixtures sold as blood tonics contain high amounts of nettles.

Another biodynamic way of using stinging nettles—which Steiner calls the jack-of-all-trades of herbs—is by making a liquid manure to enhance the vegetative growth of plants, especially during dry weather.

A paste can also be made of nettles as a protective cover on the bark of trees and shrubs. This is done by mixing it with equal parts of fine clay and fresh cow manure. Before the coating is applied, the bark should be scraped and brushed to remove dead, loose parts. Trunks and branches which have received the treatment become smooth and clean after a few days, and the tree grows healthy.

505. Oak bark buried in the skull of a domestic animal

Take the bark of an oak, not too old, says Steiner, and break it up into very small pieces. He indicated that in Europe the English oak (*Quercus robur*) was most desirable, but as Lovell points out, this oak does not grow in North America and there is general agreement among biodynamicists that in the United States the most desirable is the white oak (*Quercus alba*).

Take the skull of any domestic animal—though Kolisko recommends that of a sheep and discourages the use of a horse or dog skull—and fill it with the oak bark. With a piece of bone of the same animal, such as



Hugh Courtney extracting the finished 506 from a cow's skull that was filled with oak bark and has turned to humus after spending the winter buried in a nearby creek. One teaspoonful will be sufficient for ten tons of compost.

part of the jawbone, close the opening of the skull.

Bury the lot during the winter, not too deep, in soil where the water has access, and cover with peat moss. Much water must stream over the skull. For lack of a stream, the skull should be placed in a barrel with decaying plant substance exposed to rainwater. The object is to create an ambience of slimy, rotting mulch.

In the spring, when the skull is dug up, the oak bark will have turned to a crumbling black substance that smells like fresh soil, full of life, teeming with microorganisms, and with a highly activated calcium content.

Lovell points out that the ash of white-oak bark is upward of 70 percent calcium, and the skull of an animal is much the same.

Store the finished product as the other preps.

506. Dandelion flower buried in a cow's mesentery

Steiner's recipe is to collect the dandelion flowers (*Taraxacum officinale*)



Hugh Courtney with a cow's mesentery filled with dandelion flowers that he has just unearthed and that will produce a quantity of BD 506 sufficient for several thousand acres.

before they go to seed, let them fade slightly, or dry them, keeping them in a cool place until the beginning of October, preferably covered with peat moss.

Tradition has it to pick dandelion flowers fairly early in the morning, just prior to when they open and are visited by bees, to ensure they are at their highest essence, picking the sunniest spots first to beat the bees.

In the fall they must be pressed tightly together to fill the mesentery of a cow or ox, the mesentery being the large sheath of skin that surrounds the internal organs of the animal. Steiner warns that the mesentery, obtainable from any slaughterhouse, must be in perfect condition, without damaged parts or holes. Surplus fat may be cut off, but care must be taken not to break the tender skin.

Wrapped around the flowers, the sheath is tied with string or delicately sewn. When ready, the flowers can be seen peeping through the skin.

The result is buried about twelve inches below the surface so that it spends the winter exposed to the strong earth forces, which Steiner says stream through the soil at that time of year.

In the spring the resulting soft, friable material is ready to be used in the compost heap. Again, only a minute amount is needed—about a teaspoon for ten tons of compost. It is the forces, not the substances, which are said to be at work. Preparation 506 is credited with establishing the proper relationship between potassium and silica, allowing crops to draw on the substances and forces in the broader surroundings, even within the entire district.

Related to Jupiter, 506, is said to promote functions operative in the

liver and the regulatory glands and organs of animal. These functions are related to magnetism, fullness, strength, roundness and attraction.

507. The juice of valerian

The preparation is made from the fresh florets of the valerian plant (*Valeriana officinalis*), commonly known as garden heliotrope. The young blossoms are snipped off on a day in spring, then trimmed from their stems with scissors.

Kolisko wants the flowers placed in lukewarm water, then squeezed out to produce a concentrated tincture that can be kept a long time. Some practitioners use a hydraulic press to extract the juice. Highly diluted, to the seventh or eighth homeopathic potency (twenty to twenty-five drops stirred for twenty minutes into two or three gallons of water) it is sprinkled on the compost heaps so that, according to Steiner, its phosphorus content can be properly used by the soil. Related to the planet Saturn, and to flowering, Lovell says it is burning of phosphorus that is important, that 507 is the warmth giver, and it is sometimes used as a spray to protect against late frosts.

508. Horsetail

Equisetum arvense, or common horsetail, is widespread on rough, bare ground, but also in cultivated places. It prefers dry locations to moist ones. The plant has pale brown, unbranched fertile stems which have disappeared by the time the taller, green, barren ones appear.

PREPARATION

Collect the barren shoots and dry them as quickly as possible by spreading them in a thin layer in a shady place until the herb becomes somewhat brittle.

HOW TO USE HORSETAIL

A tea is prepared by slowly boiling in a covered vessel of rainwater about four ounces of the dried herb per gallon. One can use less water, and dilute the tea, in which case one stirs the solution for about ten minutes.

The tea is used as a prophylactic, mild antifungal agent. One can hardly use too much of it. It is used against mildew, rust, monilia, scab, soil-borne pathogenic fungi. It is a mild agent. One sprays this tea frequently, especially on garden crops. Cold frames, hot beds, and greenhouses are treated before and after having been filled with soil.

The tea can also be added to the water in the watering can. Root dips and tree sprays are made with the tea. During the season when green plants are available one can also prepare an extract by covering freshly picked plants with water and allowing them to ferment for about ten days; the liquid is then diluted and used in the same way as the tea.

One uses the barren stems. These can be distinguished from the stems of marsh or shady horsetail by the places in which the plants grow. Marsh horsetail (*E. palustre*) forms fertile stems. Shady horsetail (*E. pratense*) has distinct fertile and barren stems, but the latter end abruptly with the top whorl of the branches. The stems of the common horsetail

continue beyond the last whorl of branches; also the last jointed section on the branches is longer than the stem sheath. The plant grows from spores. It has no flower. The barren stems appear in early summer after the fertile ones. The plant is recognizable by its finely marked longitudinal ribs on the stem, the marvelous regularity of the nodes and whorls, its clear, almost crystalline form.

Stinging-nettle liquid manure

This liquid, empirically developed by Pfeiffer, was considered by him to be helpful in enhancing the vegetative growth of plants, especially during dry weather. He recommended it for private gardeners in particular, but also for fruit growers and commercial gardeners who can apply it in various ways.

HOW TO USE

Cut stinging nettles (*Urtica dioica*) at any stage of development, except during the time when the seeds are ripening. Cover about two to three pounds of the green material with water. Place the vessel in the garden where the strong odor that soon develops will not be too bothersome.

Use the liquid diluted or undiluted as a foliar spray, beginning about a week after fermentation has started. The strained liquid can be added to the 501 spray. It can also be mixed with horsetail tea and a small amount of liquid seaweed.

Avoid overuse as the high nitrogenous component can stimulate fungus problems.

Paste for tree bark

Mix equal parts of fine clay (loam-clay type) and fresh cow manure. Dissolve this with 1 percent equisetum tea and one portion of stirred 500 until such a consistency is achieved that one can paint the material on the bark with a brush.

Before being coated, the bark should be scraped or brushed to remove dead, loose parts. The bark of trunks and branches that have received this treatment become smooth and clean after a few years. The trees grow healthy.

ANOTHER FORMULA

1 part dried blood, 2 parts Kieselguhr (diatomaceous earth), 3 parts clay, 4 parts cow dung, mixed with equisetum tea and stirred 500. These sprays have been in use for sixty years.

How to Apply "Sonic Bloom"

A spray and sound combination distributed by Earthpulse, P.O. Box 201393, Anchorage, Alaska 99520. Phone: 888-690-1277. Sonic Bloom was invented by Dan Carlson.

For backyard gardens

Pour into a one-gallon jug (plastic or glass), one tablespoon (one-half

ounce) of Sonic Bloom liquid concentrate. Add tap water with force. (Do not use distilled water.) Insert the tube of a misting spray unit and secure the stopper. Shake well. Turn the misting nozzle to fine.

Insert the cassette into a stereo type player. If possible, turn treble to high and bass to medium. Set the volume as high as possible, without distortion (or disturbing your neighbors).

Let the sound play ten minutes before spraying your plants with Sonic Bloom. While you hear classical music, the plants will "hear" a hum that invites them to take in more air, water and nutrients.

Carlson's unique organic foliar feed includes gibberilic acid (a plant-growth hormone), a seaweed extract, and some fifty-five trace minerals and amino acids. Aided by the sound, leaves draw in up to 700 percent more nutrients.

While the sound is playing, spray your plants thoroughly, so that both sides of the leaves are saturated, until the liquid drips from them.

For best results, let the sound continue twenty minutes after spraying. Treat house plants once a week, and flowering or fruiting plants twice a week.

Plants absorb the spray best when treated early in the morning (between 5:30 and 9:30).

Do not spray plants when the temperature drops below 52 degrees Fahrenheit. If it is cold early in the morning, spray Sonic Bloom on plants after 4:30 p.m.

Dew, mist, or heavy fog is ideal weather for applying Sonic Bloom.

All young seedlings of vegetables and flowers should be treated once a week for the first three weeks, then twice a week thereafter until harvest. For head lettuce, wait until the head begins to roll up before spraying.

Fruit and nut trees

To obtain maximum fruit set and size, spray fruit trees:

once before buds form,

once when buds have formed, but not opened,

once when the flowers are fully opened,

once when approximately one-third of the flowers have fallen off,

once when fruit or nuts have formed (about fifteen days after flowers have fallen off)

For commercial application

Use twenty ounces of Sonic Bloom in forty gallons of water (not distilled) at forty pounds pressure, spraying at least five times in a growing season, or about every three weeks.

For farmers

HOW TO TREAT CORN, SOY BEANS OR ALFALFA

To cover one acre of ground, for every six ounces of Sonic Bloom mixture add twelve gallons of water with force for proper agitation. Mount the sound unit, with the speaker facing the rear, on the highest point on the back of your sprayer, using duct tape to attach the unit. The system is designed so the sound waves will assist the sprayed plants to absorb

the greatest amount of nutrients. The sound unit must be on while you are spraying. Turn the volume all the way up.

Spray as early in the morning as possible. Each sound unit has a photo-cell activator, so it must be daylight before it can be used effectively. If you wish to start before dawn, there is an override switch to activate the unit. Do not spray when the temperature drops below 52 degrees.

Sonic Bloom sound boxes of different sizes can be obtained from Earthpulse.

How to Garden in Cooperation with the Nature Spirits

Or how to get in touch with the devas that overlight a garden, and the nature spirits that make it what it is.

For details see *The Perelandra Garden Work Book, A Complete Guide to Gardening with Nature Intelligences* by Machaëlle Wright Small, Box 3603, Warenton, Virginia, 20188.

While waiting for the book you may wish to test your abilities.

Say aloud: "I would like to be formally linked with the devic realm."

Wait a few seconds, says Machaëlle Wright Small: "You may feel sensations like a wave of energy gently wash over you. You may feel absolutely nothing and this will mean absolutely nothing because you are going to verify your connection with this level using kinesiology."

If you are right-handed:

Place your left hand palm up. Connect the tip of your left thumb with the tip of your left little finger (not your index finger).

By connecting your thumb and little finger, you have just closed an electrical circuit in your hand, and you will use this circuit for testing.

If you are left-handed:

Place your right hand palm up. Connect the tip of your right thumb with the tip of your right little finger.

To test the circuit (the means by which you will apply pressure to yourself) place the thumb and index finger of your other hand inside the circle you have created by connecting thumb and little finger. The thumb-index finger should be right under the thumb-little finger, touching them. It will look as if the thumb-little finger are resting on the thumb-index finger. This is the testing position.

Ask yourself a yes/no question to which you already know the answer to be yes. ("Is my name...?") Once you've asked the question, press your thumb-little finger together, keeping the tip-to-tip position.

Using the same amount of pressure, try to pull apart the thumb-little finger with your thumb-index finger. Press the lower thumb against the upper thumb, the lower index finger against the upper index finger.

If your answer is positive (if your name is what you think it is!) you will not be able to pull apart the top fingers. The electrical circle will hold, your muscles will maintain their strength, and your circuit fingers will not separate. You will feel the strength in that circuit. *Important:* Be sure the amount of pressure holding together the thumb-little finger circuit is equal to the amount pressing against that circuit with your thumb-index finger. Also, don't use a pumping action in your thumb-index fingers to try to pry your thumb-little fingers apart. Use an equal, steady, and continuous pressure.

Play with this a bit. Ask a few more yes/no questions that have positive answers. If you are having trouble sensing the strength of the cir-

cuit, apply a little more pressure. Or consider that you may be applying too much pressure, and pull back some. You don't have to strain your fingers for this.

Once you have a clear sense of the positive response of the circuit, ask yourself a question that has a negative answer. Again press your circuit fingers together and, *using equal pressure*, press again the circuit fingers with the thumb-index finger.

This time the electrical circuit will break, and the thumb-little finger will weaken and separate.

Because the electrical circuit is broken, the muscles in the thumb and little finger don't have the power to hold the fingers together. In a positive state, the electrical circuit holds, and the muscles have the power to keep the circuit fingers together.

Play with negative questions a bit, then return to positive questions. Get a good feeling for the strength between your circuit fingers when the electricity is in a positive state, and the weakness when the electricity is in a negative state. You can even ask yourself (your own system) for a positive response and then a negative response. ("Give me a positive response." Test. "Give me a negative response." Test.) You will feel the positive strength and negative weakness. Now it is just a matter of trusting what you have learned—and practice.

Don't forget the overall concept behind kinesiology, says Machaëlle. What enhances your body, mind, and soul makes you strong. Together, your body, mind and soul create a holistic environment, which, when balanced, is strong and solid. If something enters into that environment which negates or challenges the balance, the entire environment is weakened. The state of that strength or weakness is registered in the electrical system, and through muscle testing it can be discerned.

Once in touch with the devas, says Machaëlle, they guide her in how to design and lay out a garden, advising her what to plant, and where, as well as how to deal with insects.

She then shifts her attention to the nature-spirit level, to receive insight and assistance in processing: that is, in how to bring the garden into ideal form, a process of bringing spirit into form.

When not interfered with by humans, says Machaëlle, the nature spirits tend to the needs of all physical reality, assuring perfection within form.

Aware that all these spirits can take on varied specific forms, visible to humans, Machaëlle does not experience them as a phalanx of little elves and gnomes wielding pitchforks and shovels, but as individuated energy presences, without specific form.

This co-creation of a garden in conjunction with the devas and the nature spirits enables her to fertilize her garden with a mere handful of essential elements, the essence or energy of which is magnified and disseminated by the nature spirits, and to keep insects at bay without the use of pesticides by tithing to them a small portion of her produce.

For those wishing to apply these techniques, Machaëlle Wright gives seminars at Perelandra during the summer.

Note to Appendix F

The authors and the publisher wish to make clear that the description of products and methods in this Appendix are offered for informational purposes. Neither the authors nor the publisher are making nor can make any assurance about the results of their use. Without the tender care or dedicated desire of the farmer to improve himself, the soil, and his crops, these products and methods are not alone the answer.

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