

## POLES OF SCIENCE

WHEN Galileo began his study of falling bodies, he did not have a mind entirely free from preoccupation. The ancients who had given attention to these things believed that the temperature, color, and smell of the bodies made no difference, and he agreed. But they also supposed that the distance and the time occupied by the fall were of no importance, and he questioned this. So, by abstracting what seemed to him relevant in the problem before him, and performing experiments, he was able to formulate a law: The distances freely falling bodies traverse are proportional to the square of the time of their fall.

From this example of the practice of science, a definition comes easily: "Science may be defined as ordered knowledge of natural phenomena and the rational study of the relations between the concepts in which those phenomena are expressed." (William Dampier.) Scientific knowledge, then, is a collection of concepts, more or less related, constructed from what have appeared to be the relevant abstractions concerning the nature of things. It must be added, of course, that scientific knowledge works; it is capable of being applied.

It is now an often-told story how the impressive achievements made possible by scientific discovery led to the view that the "real" world could be entirely defined by the complex web of abstractions found relevant by physical and other scientists for giving an account of natural phenomena, with the result that all other aspects of human life have been left without a corresponding discipline. For this reason, science is rapidly becoming a scapegoat for the problems of the world, since so much of what is obviously wrong with human affairs can be traced to the misuse of capacities which science has made possible. This swing of popular opinion is making

itself felt in many ways, with growing resentment of the scientist as a man isolated from the concerns of ordinary human beings, busy with his incomprehensible theories, which are as likely to end in some new destructiveness as in another "miracle cure." The scientists themselves are not unaware of this rise of feeling against them. According to a recent *Saturday Review*, "The AAAS [American Association for the Advancement of Science] will hold a major meeting next fall to review the nature of its mission and will almost certainly broaden its efforts to convince the public that science is not the bane of mankind."

What may be overlooked by this anti-scientific mood is the very genius of the modern age, which led to the origin of science, and which gives strength to even the criticisms of the practice of science in the present. After all, it was Galileo who wrote, more than three hundred and fifty years ago: "Methinks that in the discussion of natural problems we ought not to begin at the authority of places of scripture, but at sensible experiments and necessary demonstrations." This determination to go to experience instead of authority *is* the genius of modern man, and its importance is not diminished by the gradual development of a scientific "establishment" which has taken on authority in matters concerning which science has no knowledge or jurisdiction. It should be noted that the complaint against science has never been in terms of the actual day-to-day practice of proper scientific investigations or determinations, but has to do with unsupported conclusions and metaphysical judgments, and with the social impact of the applications of science in various ways. It is science as adapted by industry, science as exploited by government and the military, science as a stultifying influence on the humanities, ethics and philosophy, and science as

responsible for the dehumanization of the practice of medicine that has been condemned. Not science per se, but science as the armament of irresponsible, Faustian enterprises, and science as a priestly secular authority, is being called to account.

By whom? Actually, and often most effectively, by scientists themselves. The ecologists are scientists. Barry Commoner is an example. The organic gardening movement had its origin in the work of Sir Albert Howard, a British botanist. The best critics of modern medicine, starting with Alexis Carrel, have been scientists or practicing physicians. Reformers in psychology such as Jung, Fromm, Horney, Rogers, and Maslow were trained in scientific disciplines. Reformers in economics such as Schumacher and Mishan have backgrounds in classical economics. The nuclear physicists are often the severest critics of the uses of nuclear physics. If history may be called a social science, then several distinguished social and philosophical critics of our time are men of science who turn their powers of analysis on the general tendencies of the age—men such as Lynn White, Jr., Theodore Roszak, and William Irwin Thompson.

Can we generalize further about the present criticism of science? Called into serious question is the application to man of assumptions that were built up in scientific theory in relation to *things*. The attack is on a scientific ideology—a conception of man and nature with no place for transcendence, aspiration, intrinsic values, totally lacking in comprehension of the sacred, which denies substance to subjective being and refuses any independent reality to moral principles or ideas.

Science in relation to matter and its motions is one thing; in relation to man and his becomings, it is something quite different. To model and manipulate matter in the service of man may be good; to model and manipulate man in the service of thing-centered social systems may be immeasurably evil. Science, the judgment goes,

must be practiced in the service of man's human qualities, and at the outset this may mean the practice of self-limitation and restraint.

For the fact is that the good of man is not yet really understood. Even comparatively simple things like flood control can become intensely "controversial" (see Arthur Morgan's recent book, *Dams and Other Disasters*). The difficulties of settling what is good for man, in order to give unambiguous instructions to the scientists or technologists, may be partially illustrated by some useful material contributed to the November/December *Humanist* by Lawrence Kohlberg. In this discussion Dr. Kohlberg distinguishes between moral psychology and moral philosophy. "Moral psychology," he says, "considers what moral development *is*. Moral philosophy considers what moral development ought to be." His intent and hope is to integrate the two—the "is" and the "ought"—in order to obtain a basis for moral education. But first of all he sets the problem by outlining three different theories of moral education:

The first is the "common-sense" theory behind traditional moral education. According to this theory, "everyone knows what's right and wrong," or at least most law-abiding adults do. Adults, then, know a set of facts like "stealing is always wrong" or "helping others is good." These facts may be taught on the basis of the teacher's superior knowledge and authority, just as the facts of arithmetic are taught. Not only are children ignorant of moral facts; they are weak and easily tempted to lie, cheat, fight, disobey, and so forth. Children, then, need not only to be taught moral facts; they need to be taught to practice moral behavior and habits, and to be appropriately rewarded for moral behavior and punished for yielding to temptation.

In opposition to this traditional view, another has developed: the relativistic-emotional approach, which is popularly considered *the* view of child psychology and child psychiatry and is perhaps the most thoroughly elaborated by psychoanalysis. In his social and moral personality, the child is seen as primarily a creature of emotions and needs. Morality, in turn, is no absolute which the child must be measured against, but represents the relativistic rules and standards of the child's culture. The child

eventually must adjust to these rules in a realistic manner as part of his mental health, and will do so if his home and school environment are meeting his inner needs in a fairly adequate manner.

Dr. Kohlberg next describes what he has named the cognitive-developmental or progressive view of moral education, founded on the thinking of John Dewey, Jean Piaget, and himself. This view holds that—

. . . at heart, morality represents a set of *rational principles of judgment and decision* valid for every culture, the principles of human welfare and justice. The lists of rules and commandments drawn up by cultures and schools are more or less arbitrary, and hence their teaching tends to rely upon authority rather than reason. Moral principles, however, represent a rational organization of the child's own moral experience. We customarily attempt to deal with other adults as reasonable creatures in moral matters, and we need also to see that the child can be a reasonable being, that he thinks for himself and considers fairness and the welfare of himself and others. We tend not to draw fully upon the reasonable side of the child in moral matters because, although the child does reason, he reasons in a different way than the adult. His way of thinking about fairness or human welfare is not the adult's; it represents a different stage of moral reason.

Extended research with groups of children led Dr. Kohlberg to the conclusion that all children pass through several stages in moral reasoning, and that moral judgment can be stimulated by helping the child to reach the stage above his present level, whatever it may be. In the course of this work he found evidence to confirm what Piaget had said: "In contrast to a given rule imposed on the child from outside, the rule of justice is an immanent condition of social relationships or a law governing their equilibrium." By asking children a variety of questions which required reflection on moral issues, Kohlberg found that there are six basic types of moral judgment, corresponding to developmental stages in moral attitude or "philosophy."

The stages are:

1. Orientation to punishment and reward, and to physical and material power.
2. Hedonistic orientation with an instrumental view of human relations. Beginning notions of reciprocity, but with an emphasis on exchange of favors—"You scratch my back and I'll scratch yours."
3. "Good boy" orientation; seeking to maintain expectations and win approval of one's immediate group; morality defined by individual ties of relationship.
4. Orientation to authority, law, and duty to maintaining a fixed order, whether social or religious, which is assumed as a primary value.
5. Social-contract orientation, with emphasis on equality and mutual obligation within a democratically established order; for example, the morality of the American Constitution.
6. Morality of individual principles of conscience that have logical comprehensiveness and universality. Highest value placed on human life, equality, and dignity.

Commenting, Dr. Kohlberg says:

The stages are not defined by particular opinions or judgments, but by ways of thinking about moral matters and bases for choices. Stages 1 and 2, which are typical of young children and delinquents, are described as "pre-moral," since decisions are made largely on the basis of self-interest and material considerations. The group-oriented Stages 3 and 4 are the "conventional" ones at which most of the adult population operates. The final "principled" stages are characteristic of 20 to 25 per cent of the adult population, with perhaps 5 to 10 per cent arriving at Stage 6.

By thinking about these stages, which, as Dr. Kohlberg suggests, apply as much to adults as to children, we are able to see the problems involved in securing genuine consent to a scientific program devoted to "human good." It seems obvious that the most valuable contributions will be made by those who stop short of objective definitions, except for the most elementary needs, doing all that they can to provide both the freedom to grow and the sort of environment that provokes reflection about moral issues. This would mean a basic reluctance to codify rules of human behavior, except at the lowest levels of

conduct. Adopting a plan of this sort might indeed be called "scientific," since it would be based upon actual experience of how people change and mature. Such a plan would of course allow for the fact that people grow only at their own pace.

Dr. Kohlberg has a simple counsel for scientific practice in this area:

Being able, through wide practice, to take another's viewpoint, to "put yourself in his place" is the source of the principled sense of equality and reciprocity. Perhaps the best summary of the situation in everyday language comes from E. M. Forster, who thought that most of the trouble in the world is due to "the inability to imagine the innerness of other lives."

Such recognitions are surely a part of science the science of human understanding.

The practice of science means, as Galileo said, going to experience instead of to authority. So, if we are interested in science for the good of man, we need first to understand man, and we are by no means ready, as yet, to simplify human nature as the physicists abstracted from external nature. And any simplification we do should be in order to *release* people from external controls, not to facilitate their manipulation. Human science is thus a sort of opposite of physical science.

Actually, there has been extensive observation of human behavior from the viewpoint of "doing good." One of the earliest known treatises on government is Lao-tse's *Tao Te Ching*. Holmes Welch's manual, *Taoism* (Beacon paperback), is especially good in explaining the subtlety of Laotse's advice to rulers, and since the *Tao Te Ching* is easy to find, we shall quote from Mr. Welch's commentary, omitting all but brief passages from the *Tao*.

Lao Tzu recommends government by non-interference. Governments must bypass the dilemma of action, recognizing in particular the futility of trying to control so complex a thing as a nation. . . . Government controls—and these include laws—defeat themselves for another reason. They are a

form of aggression on the nature of man. . . . "The more laws you make the more thieves there will be." This is like the American Indian dictum: "In the old days there were no fights about hunting grounds and fishing territories. There were no laws then, so everyone did what was right." Lao Tzu believes that man's original nature was kind and mild, and that it has become aggressive as a reaction to the force of legal and moral codes. . . . "Banish human kindness, discard morality, and the people will become dutiful and compassionate." "It was when the great Tao declined that human kindness and morality arose. . . . It was after the six family relationships disintegrated, there was 'filial piety' and 'parental love.' Not until the country fell into chaos and misrule did we hear of 'loyal ministers'." Thus Lao Tzu reverses the causal relationship which most of us would read into such events. It was not that people began preaching about "loyal ministers" because ministers were no longer loyal; rather ministers were no longer loyal because of the preaching, i.e., because society was trying to *make* them loyal.

The wise ruler does not try to *make* his people anything. He "carries on a wordless teaching" because he knows that "he who proves by argument is not good."

No doubt a fine program for the good of man could be worked out, with Lao-tse as guide—a program that would help to put people on their own, making them less dependent. Science and scientific technology could contribute much to a program of intermediate technology, such as E. F. Schumacher has been advocating for a number of years. Car manufacturers in Detroit could make fewer cars and devote their production line to making three-wheeled mechanical donkeys for the trails of South America, which would mean emancipation from toil for hundreds of thousands of poor peasants and farmers. Ivan Illich has the plans for this donkey (see *Deschooling Society*). Publishers could take the advice of George Russell and put literature back on the gold standard by issuing about five per cent of the books they now publish—only the ones worth printing. Newspapers could refuse advertising, fashion experts could go to work as dressmakers and tailors for people in communities. A whole lot of things that would be good for everybody

could be done—with reasonable time for adjustments—in even just a few years. Scientists could take counsel from Florence Nightingale, who said—"The one thing hospitals ought not to do is spread disease"—and refuse to design any more bombs.

The problem, obviously, is not science, but human intent and consent.

There is a sort of knowledge which scientific educators could devote themselves to spreading, with great benefit to all. The question is, will anyone admit that it is knowledge? Lao-tse put it rather obliquely.

In the *Tao Te Ching* we read: "The more knowledge people have, the harder they are to rule. Those who seek to rule by giving knowledge are like bandits preying on the land." What can Lao Tzu mean by this? Does he simply refer to the political fact that a people who are ignorant of how miserably oppressed they are, as well as of how to organize against their oppressors, will be unlikely to revolt? He refers partly to this. Lao Tzu liked the violence of revolution no better than any other kind of violence. But revolution is not his chief concern here. Rather, it is the damage to man's character which results from ambition and greed. . . . What he wants to keep the people ignorant of is "rare, valuable goods" that will give them "sleepless nights" and cause them to "feed life too grossly." He wants to keep them ignorant of the thrill of power, which will tempt them to violent struggle for high position.

But this is likely to be precocious knowledge for us—for the people of a democracy where every man is a ruler. For here it would mean that we need to outgrow the flashy sort of knowledge, the kind of skills which serve the appetites and pleasures of an acquisitive society. A Thoreau would have no quarrel with Lao-tse, but the rest of us—we, like Dr. Kohlberg's children—will have to proceed toward so strange a utopia at a slower rate. We have a few "stages" yet to go through.

Do matters like these come under the heading of any sort of "science"?

## *REVIEW*

### CONFERENCE ON ENERGY

ONCE upon a time—back in the days when publishers weren't owned by banks and conglomerates and had not yet been weaned of their weakness for good books—some really "relevant" material used to find its way into respectable print. There are of course a few such publishers left, but they are fast disappearing. and the time may come when literate and intelligent readers will be reduced to the various forms of *samizdat* produced by a multi-level counter-culture.

Meanwhile, a lot is owed to the publishers who, through the years, have always budgeted for at least *some* books that are likely to lose money—books that ought to be printed simply because they are important and good. Not everything good can be popular. And in an economy geared to the dynamics of mass marketing, the impressive rhythms of production and distribution generate a spontaneous disdain for books or anything else of limited sales possibilities.

These vagrant thoughts occurred as a result of a reading of the lithographed typescript report of an international symposium on Energy, Man and the Environment, held early in February of last year by the Gottlieb Duttweiler Institute, in Rüslikon-Zurich, Switzerland. We kept wishing, all through its pages—nearly a hundred, made up of ten papers presented—that the report could be in the hands of all the high school students in the United States—and in the rest of the world, too. But the public school systems are not likely to "adopt" such material, and the free or alternative schools don't have the funds to buy texts of any sort, so there is no demand, even though there might be urgent need for just this kind of research perspective. The papers amount to what Garrett De Bell was talking about when he said that the schools don't provide the studies that are necessary for getting at the ecological problems of the world in an effective, do-something-about-it way. Actually, textbook publishers are probably the least likely to respond directly to human need of this sort, since their marketing problems are defined by either political or professional/academic

considerations. Students don't have much of a choice.

Among the contributors to the report are E. F. Schumacher, W. A. Mordy, John Esposito, and John W. Gofman. Schumacher starts out by looking at a common assumption of Western economics—the idea that when energy is taken from some basic resource of the planet, the return, after costs, is income and not a portion of capital. The neglect of what is really happening as we use up irreplaceable energy resources leads to the delusion that we have "solved" the production problem. We haven't solved it at all, because we are exhausting our capital—and ignoring the fact, which makes our figures look good. This failure to distinguish between income and capital requires exposure again and again. Dr. Schumacher says:

Every economist and businessman is familiar with this distinction and he applies it conscientiously and with considerable subtlety to all economic affairs—except where it really matters, namely, irreplaceable capital which man has not made, but simply found, and without which he can do nothing.

You would not have considered a firm to have solved its problems of production and to have achieved viability, if you saw it was rapidly consuming its capital. How, then, could we overlook this vital fact when it comes to that very big firm, the economy of Spaceship Earth and, in particular, the economies of its rich passengers?

One reason for overlooking this vital fact is that we are estranged from reality and inclined to treat as valueless everything that we have not made ourselves. Even the great Dr. Marx fell into this devastating error when he formulated the so-called "labour theory of value." Now, we have indeed labored to produce some of the capital which today helps us to produce—a large fund of scientific, technological, and other knowledge; an elaborate physical infrastructure; and innumerable types of sophisticated capital equipment, etc.—but all this is but a small part of the total capital we are using. Far larger is the capital provided by Nature and not by man—and we do not even recognize it as such. This larger part is now being used up at an alarming rate, and that is why it is an absurd and suicidal error to believe, and act on the belief that the problem of production has been solved.

The second point of Schumacher's paper relates to what he calls the "quantum jump" in industrial production since 1945—accompanied by the recently

acquired capacity to compound substances which Nature does not know how to break down and dispose of. The resulting acceleration in pollution is known to us all. Finally, the methods of production impose patterns on our lives which eat into the very substance of our humanity—a wearing away of excellences and decencies that is reflected in the schools, the cities, and the mental and moral disorders of the time. So, Dr. Schumacher concludes, we are spending three forms of capital and at the same time claiming yearly increases in the Gross National Product. An about-face is called for in each of these crucial relationships.

Prof. Mordy's paper should be intensely interesting to readers ignorant of the extent to which quite small changes in the temperature of the earth, produced by human activity, can affect the weather and the climate for extended periods of time. And who has had any idea that—

From the small island of Manhattan, more than six times as much energy at the present time is given off to the atmosphere and waters thereabout than is received from the sun, that is, 630 watts per square meter given off, to 93 watts per square meter received. While Manhattan is a very small area there are other areas that we can point to as well. Moscow, with an area of 13 times that of Manhattan, gives off approximately four times the incident solar radiation.

John Esposito wrote the Ralph Nader study, *The Vanishing Air*, and is connected with the Center for the Study of Responsive Law in Washington, D.C. His paper deals with the relationship between pollution and the energy-producing industries in the United States. He says at the outset:

It is becoming clear to American environmentalists that the causes of pollution are deeply woven into the commercial fabric of industrial society. The neophyte environmentalist quickly learns that when man tugs on one thread holding together his ecosystem, everything else is attached—including himself. Sometime thereafter, he learns that when he tugs on a thread which seems to hold the solution to a problem, you the businessman are attached. Environmentalists are coming to the realization that we cannot have a healthy environment and business as usual. Consequently, as the movement matures, you can expect a rising demand for fundamental changes in the ways in which you are organized to provide the fruits of industrialism to consumers.

Ecology has been referred to as the "subversive science," and not without good reason. More people are taking the short step that begins by asking questions about the waste products of a particular industry and which ends up by raising questions about the very legitimacy of that industry's existence—at least as it is presently organized. This is because the science of environment teaches that one of the most dearly-held precepts of Western industrialized society is incorrect: unrestricted growth for its own sake is not progress but suicide.

Dr. John W. Gofman, M.D., formerly director of the Biomedical Division, Lawrence Radiation Laboratory of the AEC, is doubtless a major thorn in the side of the AEC, since he is possibly the man who has done more than anyone else to warn the public against the hazards of nuclear energy production. In this paper he records his strong opposition to nuclear energy development in its present form, anywhere in the world. He gives his reasons, which are based on the biological hazards involved. He says at the end:

. . . while I have big opposition to the present version of nuclear power plants I feel even worse about the breeder program because that means going over to a plutonium economy. People have varying degrees of insanity, the height of insanity is to go to the breeder and a plutonium economy. Plutonium is the most toxic element known to man and it turns out that at small particles like a micron of plutonium dioxide for every 10,000 particles that get inhaled you are going to have approximately one lung cancer. One person doesn't have to inhale it, it can be spread through many people over many generations, and with plutonium having a half-life of 24,000 years it can get resuspended, settled on the ground and resuspended and settled in the lungs and we'll have built in lung cancer for the next 200,000 years if we go to handling 100 tons of plutonium per year, which is what the breeder program promises . . . the reason why I don't worry about forgoing nuclear energy and being opposed to nuclear power is I believe that there are far more attractive alternatives.

Several of those attending this conference give evidence of being among the really useful critical and formative thinkers of the time. The young who are going to have to deal with the future need above all to have contact with what they have to say. The problem is how to spread such thinking around.

## **COMMENTARY**

### **A GREAT TROPISM**

IN Wendell Berry's recent book, *A Continuous Harmony*, there is a passage of appreciation of the wisdom in *Black Elk Speaks*—a quality which might have had more attention in our "Children" article. Berry speaks of the cyclic conception of life of the Sioux, in contrast to the linear view of the Western idea of progress, which leads to exclusive emphasis on utilitarian values. For the Sioux, good does not result from manipulating causes to get the effects we want, but from a harmony of interrelationships among all forms of life, which move in circular paths. The utilitarian outlook is quite different:

Any organism that is not contributing obviously and directly to the workings of the economy is now endangered—which means, as the ecologists are showing, that human society is to the same extent endangered. The cyclic vision is more accepting of mystery and more humble. Black Elk *assumes* that all things have a use—that is the condition of his respect for all things—but he does not know what all their uses are. Because he does not value them for their uses, he is free to value them for their own sake: "The Six Grandfathers have placed in this world many things, all of which should be happy. Every little thing is sent for something, and in that thing there should be happiness and the power to make happy." It should be emphasized that this is ecologically sound. The ecologists recognize that the creation is a great union of interlocking lives and processes and substances, all of which are dependent on each other, because they cannot discover the whole pattern of interdependency, they recognize the need for the greatest possible care in the use of the world. Black Elk and his people, however, were further advanced, for they possessed the cultural means for the enactment of a ceremonial respect for and delight in the lives with which they shared the world, and that respect and delight afforded those other lives effective protection.

Western man once had a similar idea, in the conception of the Great Chain of Being, but our acquisitive empire-builders and our science-minded scholars made short work of the traditional reverence for the reciprocity and interdependence of all life. But now the time has

come to recover the feeling of *meaning* in the world. Already there are clues to the deep organicism of this awakening in the extraordinary and apparently spontaneous change in taste, in the longings and hopes of the most promising members of an entire generation. This great tropism of the heart needs now to be understood by the mind, for with understanding we shall all know better what to do.

## CHILDREN

### . . . and Ourselves

#### A WANDERING THEME

READING in an attractive book for teen-agers (*ought* there to be special books for teen-agers?), we began thinking about how plainly the "reality principle" of the time is changing, and how rapidly. This book, *Eyes in the Fishbowl* (Atheneum, 1968), by Zilpha Keatley Snyder, is about a boy of thirteen who "has a bad case of genius" on the guitar, and whose Walden Pond is a big department store. The store turns out to be "haunted," although in a playful, innocent way by ghostly children "who lost their childhood" and come at night to the store to play. This isn't a sticky "spiritualistic" romance about children; it just moves along on the assumption that there are more worlds than one. The normality of everything that happens keeps the story healthy and it's as much fun for an adult to read as any teen-ager, perhaps more. In fact, we have no idea whether young people like a book of this sort, but suspect that they do. Older readers may find it recalling Robert Nathan's *Portrait of Jennie*.

But what we want to discuss for a little is the change in the sense of reality that is coming over the age. You'll remember all those deadly serious discussions of how it has become impossible for technical and professional journals to keep up with the expansion of "knowledge," and how important micro-photographing has become. Then there is the withering statistic that 36,000 books are published every year. How are we going to deal with this "knowledge explosion"? And so on. Facts of this sort put an end, in theory, to what used to be called "general education." Because of the vast increase in the amount of information available, no one person can hold enough in his head to be called "educated." So there are now elaborate means for "digesting" current research, complete with microfiche records and computer indexes, in the race to keep at least a few experts up to date.

Well, the entire pretentious project of organizing our knowledge may itself be out of date. For when an age changes, the old knowledge isn't knowledge any more. We may have some kind of delusion that what *we* know can't be toppled over, but the fact is that it *is* toppling, has already toppled for a large part of the coming generation. The members of this generation feel differently, think differently, live differently. They even love differently.

They are simply not interested in the old sort of history, the old sort of science, the old sort of "studies." But if you tell them about a fellow who says he knows how to speak ant language, they nod and say, "Of course, that must be possible." To expect the young of this generation to respond to the things that youth responded to in, say, the 1920's is like expecting a child brought up in a socialist family to be excited by a story which turns on the fact that the beggar boy has royal blood running in his veins. There is a simple, almost primitive conviction that the world is alive, breathing, sensitive, and intelligent, and books which don't deal in this reality have no value to the new readers.

Back in the middle sixties we had a letter from a friend who was then teaching history in a middle-class college in a Western state. He enclosed some of the examination papers handed in by his students—a class of thirty. Two of these students started out by saying, courteously, that they weren't going to answer the questions—it didn't seem worth doing, since so many other things were going on that needed attending to. These students, our friend said, were the brightest in the class—the most promising. But they wouldn't take his exam. They admired and respected him, but they wouldn't answer his questions. He thought about this and said in his letter that they didn't really need his course. They seemed to know, anyway, the things they ought to know. He could give them books to read, and they might read them—books by Tolstoy, by other great writers. And they would feel at home with

such writers; but, somehow, that wasn't what they really needed, which was to be out in the world, doing something useful with their lives, so they could hold up their heads and feel some self-respect. They were growing up absurd, and hated it. "And I," he said, "am an academic. I can't *help* them—when that's what I'm for, that's what I really want to do." And then he said, "Maybe I should try to start a brickyard, a bakery or a laundry, and give them all jobs!"

Situations like that one are common enough at a time when the reality principle of a people is changing. Why does such a change take place? Because, we suppose, something wears out at the same time that something else is trying to get born. It is easy enough, intellectually, to point to the ideas that have lost their validity—conceptions like the nation-state, the expanding economy, a high material standard of living, mechanistic notions of causation in human life, acquisition and competitiveness as the motives necessary to a free society. We can see the self-defeating character of these ideas, but then people come along who reject them completely, not by reason so much as by instinct—who can't even *pretend* to live by them—when, in short, we encounter the primitive alternatives to these ideas in the round, in our children and other young people, then we begin to see what it means for the reality principle of a civilization to change.

There was a curious overlapping of worlds in the young peoples' story, *Eyes in the Fishbowl*. Most of the young seem to believe in overlapping worlds, and without having any big "psychic experiences" to convince them of it. This is doubtless just as well, since psychic experience can be badly unbalancing to people who are looking for an escape from this world and its responsibilities. But it seems a healthy thing to think that other worlds are real, even though their meaning may remain undisclosed, save for vague feelings and wonderings.

There is another kind of overlapping in the present, the result of the identification of so many

of the young with the American Indians. The symmetries and harmonies of Indian life are fascinating to youngsters who are oppressed almost from birth by an excess of sensuous stimulation and urged by their elders to do what seem a lot of meaningless things. And who, now, is chosen as a symbol of the wonder of Indian life? Not Cochise, the fighting Apache hero, but Black Elk, the Oglala Sioux, who was the last of the preservers for his people of the sacred tribal traditions.

In this turning of the young to the American Indians there may be evident a kind of hungering for the simplicities of some Golden Age of the past, of which, for those who live on the North American continent, the Indians are a surviving remnant and symbol. It is as though we could tear off the sheets from the pad of recent history and start again in some clean and fresh beginning. And there are the Indians, wonderful representatives of the splendor of a stone age culture, to show us the way. Indeed, the faces of these men, in the few photographs we have of Indian heroes, seem cut from stone.

For the Indians, the white men and everything they did must have seemed nothing more than a horrible mistake, something they would have to endure because the white men could not be ignored. Yet the Indians struggled to be true to their ancestral ways and beliefs. What could be more appealing to an alienated generation with much the same views of recent American history? Why should they not feel themselves the natural heirs of the Indian tradition? *So, Black Elk Speaks*, set down by John G. Neihardt and published in 1932, has been through a number of printings. In his preface to the 1960 edition (University of Nebraska Press) Neihardt tells about his first meeting with Black Elk, then an old man (he was born in 1862) on the Pine Ridge Reservation in South Dakota. It was uncertain whether Black Elk would talk to him, but he said to the interpreter: "As I sit here, I can feel in this man beside me a strong desire to know the things

of the Other World. He has been sent to learn what I know, and I will teach him." Then Black Elk gave Neihardt an ornament including an eagle feather to wear while they talked, and they smoked in silence for a while.

Finally, the old man began talking about a vision that had come to him in his youth. It was his power-vision, as I learned later, and his fragmentary references to it were evidently intended only to arouse my curiosity, for he could not speak freely about a matter so sacred before the assembled company. It was like half seeing, half sensing a strange and beautiful landscape by brief flashes of sheet lightning.

Often I broke the old man's prolonged silence by referring to the old times before the evil days began and the white men possessed the land. I recalled great battles, high moments in Sioux history, and he would respond politely; but it was increasingly clear that his real interest was in "the things of the Other World."

It is of particular interest that an old African sage, of the Dogon people, in 1946 sent for a French ethnologist working in the area, and spent thirty-three days expounding to him the world system of religious and philosophical beliefs of the Dogon people. The scope of what he dictated to the French scholar "completely invalidated all the conceptions we had formed about the mentality of the Negroes or the mentality of primitives in general." The fruit of these researches is available in *Muntu—the New African Culture*, by Janheinz Jahn (Grove paperback). Apparently, such wise old men feel a strong impulse to transmit the wisdom and lore of past cultures to the representatives of the new, now that there is evidence of an honest hospitality on the part of Europeans and Americans in respect to their knowledge.

So, at various levels, there is this return to the past, or rather a bringing forward of the insights and knowledge of the past, and an extraordinary effort at synthesis in connection with new beginnings. It may be noted, also, that a rather remarkable sequel to *Black Elk Speaks* has been provided by another writer, Joseph Epes Brown, in *The Sacred Pipe* (a Penguin paperback issued

as part of the Penguin Metaphysical Library edited by Jacob Needleman, 1971, \$1.45). Brown visited Black Elk in 1947, five years before he died, and was rewarded with a systematic exposition of the Sioux religion. Mr. Brown adds enormously to his report of what Black Elk told him by providing footnotes relating elements of the Sioux beliefs to the great philosophical religions of the East and to Western philosophical conceptions. For example, in Black Elk's account of the giving of the sacred pipe to the Sioux by the holy woman of long ago, the woman says of the pipe: "With this you will, during the winters to come, send your voices to *Wakan-Tanka*, your Father and Grandfather." Mr. Brown explains:

*Wakan-Tanka* as Grandfather is the Great Spirit independent of manifestation, unqualified, unlimited, identical to the Christian Godhead, or to the Hindu *Brahma-Nirguna*. *Wakan-Tanka* as Father is the Great Spirit considered in relation to his manifestation, either as Creator, Preserver, or Destroyer, identical to the Christian God, or to *Brahma-Sagana*.

These linkages with the philosophical traditions of other lands are an important means of deepening our understanding of Indian thought, illustrating once more, the universal presence of philosophical religion. It is toward this heritage that the hungering impulses of so many may now be directed, and there could hardly be a better use for scholarship than such demonstrations of the common philosophical roots in American Indian and other beliefs.

What of the practical questions which the young are so far from solving? Perhaps it is a matter of first things first, for them. The "practical people," after all, haven't been able to accomplish much in the way of the changes which the young are actually trying to carry out, even though they hardly know how. We might remember that the first rule that Aldo Leopold laid down was: You have to love the land. It isn't enough to value it prudentially.

## *FRONTIERS* No Simple Answers

WE first came across the name of Norman Borlaug a year ago in the February 1979 issue of the *Newsletter* of the Society for Social Responsibility in Science, where Ruth Harmer, author of *Unfit for Human Consumption*, warned her readers that the National Agricultural Chemicals Association had a big new "educational" program on the importance of pesticides, and that the "chief weapon" of persuasion in this campaign for use with children of all grade levels was "a film entitled *Norman Borlaug: Revolutionary*."

We have since acquired more information about Dr. Borlaug, in a report by Vance Bourjaily in the *Atlantic* for February. This article is so balanced and richly informing that it deserves a wide circulation among all those who are concerned about the use of the land. There is far too little writing of this sort. Mr. Bourjaily bows to no man in his distaste for chemical abuse of the land—he admits to having advocated public flogging for chemical manufacturers—but he is able to give Dr. Borlaug a fair hearing and to write a moving appreciation of his life-work for the cause of increased food production. His article is called "One of the Green Revolution Boys," of whom Norman Borlaug may be the most eminent, having recently received the Nobel Peace Prize for his achievements in plant breeding.

The interesting part of Borlaug's story began some twenty years ago when Henry Wallace, another agricultural scientist who was then Vice President, arranged for Borlaug to go to Mexico to help our Mexican allies in the war with "the tortuous genetic problems of Mexican wheat, which, though there was land and water available, was so weak and susceptible to rust that thousands of tons had to be imported." When Borlaug got there the Mexican farmers would hardly shake hands with him. "They thought agricultural scientists were parasites on their

taxes." But Borlaug took off his coat and went out into the fields.

Twenty years later, the farmers who wouldn't shake hands named a street after him in Ciudad Obregon, in Sonora; Mexico's production of basic foods (wheat, corn, and beans) was up 300 per cent.

One of the administrators of the program which he'd joined in Mexico recalled: "Norman came storming in saying, 'All I want is land, sunshine, and water.' So we let him have it. He took his sleeping bag and camping equipment into Sonora, and started breeding wheat."

Now he trains young men from agricultural schools all over the world. After two weeks of seminars they go out into the fields and breed food grains. He selects future plant scientists and breeders the way he picks out strains of wheat—for stamina and production. Bourjaily asked him if he could be called a "county agent to the world." Borlaug liked the phrase but explained: "We move governments." They put on demonstrations. His life's most persistent enemy is bureaucracy. "The goal for Norman Borlaug is always a 100 per cent increase in national wheat production the first year."

The Green Revolution is largely an achievement of men who work under the sponsorship of an international center for the improvement of corn and wheat, called CIMMYT—an acronym of its Spanish name; and the help of the Rockefeller and Ford foundations has also been important. Hundreds of plant specialists are involved in the Green Revolution. Borlaug named several:

Robert Chandler in rice, at the International Rice Institute in the Philippines. Ernest Sprague and Ed Welhausen in corn. John Niederhauser in potatoes. Frank Zillinsky in triticale, the first man-made grain—one produced, that is, by geneticists manipulating genes instead of by evolution. There are manmade forages, the sudan grass-sorghum cross for example, but the parents were genetically close. Triticale, Dr. Borlaug told me, a wheat-rye cross, is something like breeding a dog to a cat. It was first produced fifty years ago, but what has finally been done is to overcome the problem of sterility in triticale—its high protein and productivity will make

it miraculously useful as a cereal grain and for feeding stock, a rival to high-lysine corn, which designates the breakthrough in that plant family.

In reply to critics of the Green Revolution, Borlaug came out like an old war horse, steaming with indignation. "So what is to be done? Are we to sit idly by and watch the world starve?" He ended a letter on the subject by declaring, "*we have also generated hope where there was despair.*" Mr. Bourjaily comments musingly:

If the agricultural techniques of the Green Revolution were much more widely admired now because of the Nobel Prize, there was also more publicity for its critics, who continued to take alarm, particularly at the world-wide spread of pesticides, on which much of the new productivity depends.

He responded to the criticisms in his younger character; he reverted to being a fighter, with scores to settle. In a controversial speech in Rome, he called environmentalists "myopic and hysterical" and their policies "disastrous." He had had a chance, been in a position, to have great impact on people in this country. There were not, after all, very many Nobel Peace Prize winners around who were first rate speakers, inspiring men, crack scientists, and experienced at moving governments. He'd lost his chance. And I'd become too much his advocate in our few meetings not to care.

I think he was too much out of touch with valid and important currents of American concern about the environment and did not know the quality of its leadership, only that of its cranks; and I think he simply didn't take time (or maybe have time) to think through the relationship of his work to those concerns in a way that would permit him to offer us fresh wisdom from a man of demonstrated judgment and integrity, a scientist and humanitarian established beyond criticism in his field.

Bourjaily goes on with a perceptive consideration of the issues involved: how Borlaug probably thinks America could do better than most other countries, learning to rely less on pesticides and demonstrate the value of good management and restraint; although in other parts of the world it seemed to him that without DDT certain areas—the tropics for example—would become uninhabitable. He felt that the

environmentalists were attacking the farmers who were his people, and he wouldn't stand for it.

Mr. Bourjaily seems to be saying, finally, that the aggressive polemics of some of the conservationists fail to recognize the dimensions of the threat of hunger to poor countries with growing populations, and that shrill attacks on men who have devoted their lives to increasing the food supply of the world are far from being the best way to generate solutions for problems which have become so complex that there can be *no* wholly ideal corrective program during the first stages of reform and change.