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GO TO GRASS

LOOKING through the first volume of *Walden,* to find a passage worthy of quoting, one is smitten by feelings of virtue—it is virtuous, is it not, to read Thoreau?—and then, too, it is a pleasant sort of loafing to be led from page to page, free of the guilt-feelings that mere reading is likely to inspire. One may actually get through the whole volume without making a decision on what to reproduce.

Why, one wonders, did he write this book? A certain wryness animates the text, from beginning to end, and a kind of pushy preaching which is always exaggerating to drive a point home. What he writes, you conclude, is always in parallel with what he thinks, yet never identical with it. In the chapter on "Sounds" he set down:

> Follow your genius closely enough, and it will not fail to show you a fresh prospect every hour. Housework was a pleasant pastime. When my floor was dirty, I rose early, and, setting all my furniture out of doors on the grass, bed and bedstead making but one budget, dashed water on the floor, and sprinkled white sand from the pond on it, and then with a broom scrubbed it white and clean, and by the time the villagers had broken their fast the morning sun had dried my house sufficiently to allow me to move in again, and my meditations were almost uninterrupted. It was pleasant to see my whole household effects out on the grass, making a little pile like a gypsy's pack, and my three-legged table, from which I did not remove the books and pen and ink, standing amid the pines and hickories. They seemed glad to get out for themselves, and as if unwilling to be brought in. I was sometimes tempted to stretch an awning over them and take my seat there. It was worth the while to see the sun shine on these things, and hear the free wind blow on them; so much more interesting most familiar objects look out of doors than in the house.
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> A bird sits on the next bough, life-everlasting grows under the table, and blackberry vines run around its legs; pine cones, chestnut burrs, and strawberry leaves are strewn about. It looked as if this was the way these forms came to be transferred to our furniture, to tables, chairs, and bedsteads—because they once stood in their midst.

We skip a little and go on quoting:

> As I sit at my window this summer afternoon, hawks are circling about my clearing; the tantivy of wild pigeons, flying by twos and threes athwart my view, or perching restless on the white-pine boughs behind my house, gives a voice to the air; a fishhawk dimples the glassy surface of the pond and brings up a fish; a mink steals out of the marsh before my door and seizes a frog by the shore; the sedge is bending under the weight of the reed-birds flitting hither and thither; and for the last half hour I have heard the rattle of railroad cars, now dying away and then reviving like the beat of a partridge, conveying travellers from Boston to the country. . . .
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> I kept neither dog, cat, cow, pig, nor hens so that you would have to say there was a deficiency of domestic sounds; neither the churn, nor the spinning-wheel, nor even the singing of the kettle, nor the hissing of the urn, nor children crying to comfort one. . . . No cockerels to crow nor hens to cackle in the yard. No yard! but unfenced Nature reaching up to your very sills. . . . Instead of a scuttle or blind blown off in the gale,—a pine tree snapped off or torn up by the roots behind your house for fuel. Instead of no path to the front-yard gate in the Great Snow,—no gate—no front-yard,—and no path to the civilized world.

These are the things that Thoreau cared about, that therefore made his prose. There have been others—men and women—worth reading since his time, but no more Thoreaus. And where, indeed, would you look for a modern Thoreau—a man with no wife to burden or delight him, a man with a fine education but who preferred to be an inspector of snow storms to any respectable calling, yet a naturalist so schooled and competent he could write the *Natural History of Massachusetts* (in 1842) on appointment of the Commissioners on the Zoological and Botanical Survey of the State. He could have been almost anything he wanted—he took over his father's

pencil manufacturing business, improved the product so that it was acclaimed as good a pencil ever made, then gave it up as no longer of interest to him.

He ended *his Natural History* by saying:

> We do not learn by inference and deduction, and the application of mathematics to philosophy, but by direct intercourse and sympathy. It is with science as with ethics,—we cannot know truth by contrivance and method; and the Baconian is as false as any other, and with all the helps of machinery and the arts, the most scientific will still be the healthiest and friendliest man, and possess a more perfect Indian wisdom.

Yet the search for a modern Thoreau is by no means a lonely calling. The journalists who write feature stories for the better newspapers keep trying to locate one, having, as writers, themselves read Thoreau and admired him, wondering what made him tick. With astonishing regularity they locate farmers with at least some of Thoreau's affections and do stories about them. An example is Miles Corwin's report in the *Los Angeles Times* for last March 27, in which he begins:

> In the spare, dry hills of eastern San Luis Obispo County where the horizon is unbroken by trees or shrubs, rancher Eben McMillan's home, a lush deep green preserve overlooking a small valley, stands out like an oasis. More than 20 types of trees that he planted surround his house, and thick sage and salt bush provide cover for wildlife. Dozens of species of birds roost in the trees, cottontails hop around the yard and hundreds of quail dot the property.
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> McMillan, 80, who has lived on ranches in the area all his life, and his wife are virtually self-sufficient. A windmill pumps their water, and a solar panel heats it. Their garden provides vegetables, their chickens provide eggs and their cattle provide meat.

His brother, Ian, who is 83, farms a neighboring ranch. Both brothers are environmentalist ranchers. Corwin says of them:

> Both are nationally recognized naturalists, mentors to a generation of young conservationists. They dropped out of school in the ninth grade but have such an extensive knowledge of plant and wildlife in the area that they are often consulted by professors and field biologists conducting research.
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> Ian McMillan is the writer. He is the author of the well-received book, *Man and the California Condor*. He has published dozens of articles for wildlife and environmental journals on subjects ranging from agricultural accountability to the whooping crane and the California quail. And he writes hundreds of letters a year to local and state agencies regarding environmental issues.
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> "There were a lot of important issues I wanted to fight for, and to fight for them properly I had to learn to write," Ian McMillan said. "I started with letters, to get my point of view on the record, and it went from there."

Eben McMillan, Corwin says, is the philosopher.

> He has created his own Walden Pond on his ranch, his own secluded Utopia for contemplation. He has an encyclopedic knowledge of the birds and vegetation of the area and he has made six wildlife documentary films for the Audubon Society that have been shown throughout the country. And he frequently takes visiting Audubon groups and school classes on field trips, interspersing his lectures with rambling discourses on the deterioration of the ecosystem and the havoc technology has inflicted on the land.
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> "The way we have mismanaged our environment is a tragedy," Eben McMillan said. "Greed is the motivating factor today. We're planting more crops than the land can support, grazing more cattle than the land can provide. We're going into environmental debt, and the capacity of the land to support people is lessening all the time. Technology is only compounding the problems."

Neither of the brothers uses any chemicals on their land, yet both produce as much as their neighbors. "I'd rather eat an apple with a worm in it than have to spray my trees with pesticides," Eben said. "Worms aren't nearly as bad for you as what people use to try to prevent them."

> Both call their theory of ranching "sustainable yield." They are interested in long-range production and only take from the land what it will yield without depleting it. Both raise only as much cattle as the land will support. But most ranchers, they said, have larger herds and "overgraze" the land, which eventually diminishes the yield of the pastures.

Ian McMillan divides his ranch of 1,360 acres into three sections—cattle grazing, barley farming, and fallowing. He rotates them to produce a crop every three years. Most of his neighbors, he says, fallow every other year, douse the land with chemical fertilizers and harvest a bumper crop the next year.

> "Most farmers ignore the future," Ian McMillan said. "The land eventually is depleted of its organic content, becomes less productive and is exposed to erosion. Then it requires more and more chemical fertilizer to get a decent yield. This is what is happening all over the world. We're denuding the earth and selling out our future."

While the brothers have been environmental activists for many years, they are probably best known for their work in behalf of the California condor. Half a century ago, when Eben acquired his 640-acre wheat and cattle ranch, he and his family would sometimes see an enormous shadow crossing the lawn. They would then "watch the majestic image of a condor in flight: a jet-black, prehistoric-looking bird with an enormous wingspan—up to nine feet—soaring effortlessly, barely moving its wings, flooting above the hills like an enormous butterfly."

> Up until the 1950s, Eben McMillan said he could spot a condor every other day. Today only 27 are left—all in captivity During the last five years all remaining wild condors have been captured and transported to the San Diego and Los Angeles zoos for breeding. The McMillans oppose the zoos' program partly because the emphasis, they said, should not be on condor breeding but on the larger issue of what is precipitating the bird's demise. . . .
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> The demise of the condor is only a symbol, like a miner's canary or the red temperature gauge in an automobile, Eben McMillan said. It is a warning that there is a serious problem "We'd better stop and pay attention to that warning," Ian McMillan said. "We can't just work on saving the condor We have to work on what's causing the condor's extinction—and that's the deterioration of the environment. If we don't do anything about that, other species—including man—will be in line to suffer a similar fate."

In 1963 the National Audubon Society asked the McMillans to do the field research on the decline of the condors. Then forty remained of the species.

> They concluded, after 18 months of research, that the condor's two main causes of death were from shooting and from poison planted by ranchers to kill coyotes, ground squirrels and rodents.
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> The McMillans recommended that one type of poison that had killed numerous condors be banned and other poisoning programs coordinated to avoid condor feeding cycles. And they asked for stricter enforcement of shooting laws and recommended that the shooting of a condor be declared a felony.
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> None of their recommendations were implemented, Eben McMillan said. . . .
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> Most ranchers refuse to "sacrifice economics for preservation," Ian McMillan said. And he is pessimistic about the impact of his environmental activism. "If I'd spent all my time fishing or working with my bird dogs, I'd have been just as effective," he said with a tired smile.
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> When asked why he continued to fight for the environment, he nodded as if waiting for the question, and then raised a forefinger. "It's not our prerogative to determine whether or not we're going to become involved; it's our commitment. We have to do it. We have to see that the legacy of life is passed on as full of life and survival as when we've come into it."

We have such men among us, leaving their mark even though they hardly see it, and yet we sometimes talk as though men were animals. Who ever encountered a committed animal, a principled dog or horse? So, to add to the variety of what we do meet we return to Thoreau, who cannot be classified except as Thoreau. Indeed, this is an appropriate designation for real human beings, that they cannot be classified.

In his essay on "Walking," toward the end, Thoreau wrote:

> We are accustomed to say in New England that fewer and fewer pigeons visit us every year. Our forests furnish no mast for them. So, it would seem, few and fewer thoughts visit each growing man from year to year, for the grove in our minds is laid waste,—sold to feed unnecessary fires of ambition, or sent to mill, and there is scarcely a twig left for them to perch on. They no longer build nor breed with us.

In some more genial season, perchance, a faint shadow flits across the landscape of the mind, cast by the *wings* of some thought in its vernal or autumnal migration, but, looking up, we are unable to detect the substance of the thought itself Our winged thoughts are turned to poultry. They no longer soar, and they attain only to a Shanghai and Cochin-China grandeur. Those *gra-a-ate* thoughts, those *gra-a-ate* men you hear of!

We hug the earth,—how rarely we mount! Methinks we might elevate ourselves a little more. We might climb a tree, at least. I found my account in climbing a tree once. It was a tall white pine, on the top of a hill; and though I got well pitched, I was well paid for it, for I discovered new mountains in the horizon which I had never seen before,—so much more of the earth and the heavens. I might have walked about the foot of the tree for three-score years and ten; and yet I certainly should never have seen them. . . .

Above all, we cannot afford not to live in the present. He is blessed over all mortals who loses no moment of the passing life in remembering the past. Unless our philosophy hears the cock crow in every barn-yard within our horizon, it is belated. That sound commonly reminds us that we are growing rusty and antique in our employments and habits of thought. His philosophy comes down to a more recent time than ours. There is something suggested by it that is a newer testament,—the gospel according to this moment. . . . The merit of this bird's strain is in its freedom from all plaintiveness. The singer can easily move us to tears or to laughter, but where is he who can excite in us a pure morning joy?

Thoreau is always Thoreauvian—a delighted but somehow complaining man, yet with tongue pleasantly in cheek. It is in this essay that we find hi's celebration of *wildness,* often quoted but not always understood. Here is the passage:

The West of which I speak is but another name for the Wild, and what I have been preparing to say is, that in Wildness is the preservation of the World. Every tree sends its fibres forth in search of the Wild. The cities import it at any price. Men plough and sail for it. From the forest and wilderness come the tonics and barks which brace mankind. Our ancestors were savages. The story of Romulus and Remus being suckled by a wolf is not a meaningless fable. The founders of every State which has risen to eminence have drawn their nourishment and vigor from a similar wild source. It was because the children of the Empire were not suckled by the wolf that they were conquered and displaced by the children of the Northern forests who were.

Wildness had for him many meanings.

There are other letters for the child to learn than those which Cadmus invented. The Spaniards have a good term to express this wild and dusky knowledge,—*Gramatica parda,* tawny grammar. . . .

We have heard of a Society for the Diffusion of Useful Knowledge. It is said that knowledge is power; and the like. Methinks there is equal need of a Society for the Diffusion of Useful Ignorance, what we will call Beautiful Knowledge, a knowledge useful in a higher sense: for what is most of our boasted so-called knowledge but a conceit that we know something, which robs us of the advantage of our actual ignorance? What we call knowledge is often our positive ignorance; ignorance our negative knowledge. By long years of patient industry and reading of the newspapers,—for what are the libraries of science but files of newspapers?—a man accumulates a myriad facts, lays them up in his memory, and then when in some spring of his life he saunters abroad into the great Fields of thought, he, as it were goes to grass like a horse, and leaves all his harness behind in the stable. I would say to the Society for the Diffusion of Useful Knowledge, sometimes,—Go to grass. You have eaten hay long enough.

REVIEW
INADEQUATE MEDICAL THEORY

ORDINARILY, we would not review *Who Gets Sick* by Blair Justice for the general reader. There are too many technical terms and the distinction between mind and brain seems left up in the air. Yet, on second thought, the criticism which this book makes of the germ theory of disease—a criticism begun long ago by Antoine Béchamp—gives the volume a particular value. As the author says:

> A new understanding of why some people get sick when exposed to germs while others remain healthy is radically revising the popular concept of what causes illness. How resistant we are to the microbes in our lives is a function of how well we are coping, which in turn depends largely on how we look at problems—our "cognitive appraisal"—and the chemical changes that our thoughts produce in our brains and bodies.

Blair Justice quotes a Harvard reseacher and doctor who says:

> . . . this point must be stressed: external, material objects are never causes of disease, merely agents waiting to cause specific symptoms in susceptible hosts. . . . Rather than warring on disease agents with the hope (vain, I suspect) of eliminating them, we ought to worry more about strengthening resistance to them and learning to live in balance with them more of the time. . . .

Dr. Justice, who is a professor of psychology who teaches courses on stress and illness at the University of Texas Science Center in the Houston School of Public Health continues:

> Our mind and behavior, our environment and our genetic predispositions are the common contributors to disease. The relative importance of each of these three spheres varies with the disease in question. A few diseases, like cystic fibrosis, are almost entirely genetic and require very little "push" from psychological or environmental influences to develop. On the other hand, the most prevalent diseases today are significantly affected by our coping styles (including our thinking) and our environment. Carcinogens in the environment or our diets may produce cancerous change in our cells but the evidence suggests that malignance will not occur unless other risk factors are present and our immune systems are depressed. . . .
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> Fund-raising campaigns urge the public to "fight disease" with dollars so that "the cause" and "cure" can be found for everything from cancer to chronic ileitis. Internist Caroline Thomas of Johns Hopkins observes that medicine's "notable success in eradicating specific infectious diseases by means of specific agents has led to the general belief that chronic disease can be similarly abolished when the single 'cause' for each disorder is found." But she notes:
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> "Thirty years of intensive research . . . have so far failed to discover the single 'cause' of cancer, heart attack, or mental illness. The time has now come to consider another concept of disease etiology."

The evidence in behalf of what Dr. Justice says is close to overwhelming. Most of his book is made up of citations of scientific observation and experiments. He writes:

> Scientific recognition that germs cannot explain disease has grown as researchers began to pay attention to the uneven distribution of illness in groups of people exposed to the same conditions or environments. Lawrence Hinkle and his colleagues at Cornell Medical College in New York studied the illness patterns of more than 3,500 people over a 20-year period. Included were five groups of workers and students who shared the same work environments or living conditions. Those in each group had approximately the same exposure to potential pathogenic microbes and other external agents identified with disease. But the amount of illness experienced by individuals in each group was far from equal. About one-fourth of the individuals experienced more than half of all the illness and over two-thirds of the total days of disability.
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> For instance, one group was made up of 1,297 telephone operators, some of whom were frequently ill and others seldom sick. When women with a high absentee rate were compared with those who had a low rate, the researchers found that the frequently sick operators experienced illness "clusters" when they saw themselves as having great difficulty in coping with situations at work or home. Those who were more dissatisfied and discontented in general had more numerous illnesses. . . .
>
> If we get sick, then, chances are we did not suddenly "catch a bug" that caused our illness, but we probably did something to lower our immunity.

> Although the relationship is not simple between our thinking and behavior and our immune defenses, a connection does exist and psycho-social factors can pave the way for disease to occur.
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> Peaceful coexistence between microorganisms—such as streptococci, for example—and their human hosts is "the rule, while disease is the exception." The question is, What determines which of us will develop an illness and which will not?

It develops that the causes, while complex, are roughly definable. In a later chapter the author comments:

> The fact that no illness, infectious or otherwise, can be explained strictly on the basis of a germ or some other single agent has left medicine without an adequate theory of disease. Without such a theory, few truly comprehensive treatment and prevention programs can be developed. Drug therapy must necessarily be relied upon as the response by most physicians to health problems. Herbert Weiner, a widely published clinical researcher now at UCLA School of Medicine, has observed that medicine's one existing theory or model "derives from infectious disease and is generally acknowledged to be unsatisfactory because it is linear, restrictive and oversimplified."
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> In addition to limiting severely the approaches to prevention and treatment, this deficient model also leaves medicine without answers to such questions as: Why do some people get sick and others do not when they are exposed to the same infectious agents or noxious conditions? What decides whether a person is at risk of acquiring a particular disease? Under what circumstances will a predisposed person develop a disease. . . .
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> One of the reasons that medicine has been described as being in a crisis is that its prevailing theory of disease, which largely ignores psychological influences, cannot answer so many important questions or account for individual outcomes. Although modern medicine has outgrown the idea that every disorder is caused by its own specific agent, the theory in infectious disease—which once seemed to explain so much and lead to so many advances—remains the guiding light to many practitioners and lay people.

Nonetheless, the author says, "the training of physicians and the practice of medicine still largely neglect mind and behavior in explanations of why we get sick or what can be done about our health problems," which may account for the fact that skeptical, self-reliant and intuitive people seem to be the healthiest of all. (This book is published by Jeremy Tarcher and retails at $17.95.)

Another book that we wouldn't ordinarily review—because it generates a cultic atmosphere—is *How Nature Works* by Michael J. Cohen, published by Stillpoint in paperback at $10.95. The author conducts "classroom in the field" camping trips as a founder and director of the National Audubon Society Expedition Institute. His point in this book is that we are out of key and out of touch with the planet that is our home. We were converted to the value of his work by the way in which, right at the beginning, he found a way to illustrate our distorted relationship with the world of nature.

Back in 1959 he was rebuilding an old Vermont farmhouse. He did the rough work and hired a local carpenter for the more precise construction such as putting in new windows. Coming back from the lumber yard with supplies he saw that a new window was cocked, neither vertical nor horizontal. He asked the carpenter what had happened, and the craftsman was flabbergasted by what he saw.

> Upstairs we went and soon found the problem. Joe had used a level arid installed the window true to the level's readings. But the level also showed that the house and the foundation were on an angle. Against the forest and field background, you would hardly notice their slant. Only if you placed a marble on the floor would its rolling indicate the building's bent. You could ignore the marble's message while inside the house, but outside, in contrast to Joe's beautifully level window, the house became the leaning eyesore of Vermont.
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> We never corrected the house's bias. Joe came back the following day and re-installed the window crooked by making it parallel to the warped angle of the roof and cellar line. The house looked stately once again.

His point:

> Level-headedness discloses that some of modern society's foundations are faulty, such as how we deal with our hurtful stress, peace and environmental problems. But rather than correct our fundamentally disjointed contacts with Planet Earth's nature, we hide them under language and relationships as crooked as my farmhouse window. That is modern society's angle. . . .
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> Our separation from Nature pervades all aspects of modern life. It weakens us. Our battles with Nature ignite the wars between and within ourselves.

One value of this book is its collection of insights by both scientists and poets. Michael Cohen comments:

> We may feel these sensations unconsciously in beautiful wild places, as did people like John Burroughs, John Muir and Aldo Leopold. Perhaps these sensations led Emerson to write, "The Earth laughs in flowers," and Thoreau to note, "Wilderness is a civilization other than our own."

COMMENTARY
PATIENTS AND DOCTORS

IN this week's Review, Blair Justice, author of *Who Gets Sick,* points out that modern medicine is now without an adequate theory of disease. People get sick, and doctors find germs in their bodies, but a lot of other people have the same germs but don't get sick. The people who don't get sick apparently are able to live with the germs but remain healthy. So, with ample justification, Dr. Justice quotes Caroline Thomas of Johns Hopkins:

> Thirty years of intensive research . . . have so far failed to discover the single "cause" of cancer, heart attack, or mental illness. The time has now come to consider another concept of disease etiology.

Illness is not a matter of "catching a bug" but of lowered immunity. The old idea, "Get rid of the bug and you'll be well" no longer has authority. But as Dr. Justice puts it:

> Although modern medicine has outgrown the idea that every disorder is caused by its own specific agent, the theory in infectious disease—which once seemed to explain so much and lead to so many advances—remains the guiding light to many practitioners and lay people.

The question is why, when research has developed so many arguments against it. The answer, no doubt, is habit. If your car won't run you take it to a mechanic, who locates the trouble and fixes it. He is the expert and he knows how. So, if your body has something wrong with it, or if your feelings act up in a way that makes you miserable, you go to another kind of expert, and expect him to fix you—with a pill or a shot. But a lot of the time, perhaps most of the time, this doesn't work, so you look around for another kind of expert. Today there are at least a dozen schools of healing besides allopathic medicine, each with a large number of enthusiasts, patients who say they have been helped. And some of them have.

There are osteopaths, homeopaths, chiropractors, naturopaths, and various other kinds of healers, and lately practitioners of Western forms of medicine such as acupuncture and acupressure. And now and then one finds a conventional physician who has adopted some of these approaches and techniques.

For an informed discussion of this subject we suggest a reading of the book by Richard Grossman, *The Other Medicines,* published by Doubleday in 1986. For those with back issues of MANAS, we reviewed this book in the April 30, 1986 issue.

> I believe [he writes in an opening note] we are entitled to the most comprehensive vision of health and medicine of which the human mind is capable, and in my work in medical education and clinical practice, I have seen the marvelous ways in which systems as disparate as acupuncture and chemotherapy, herbal medicines and complex surgery, Yogic meditation and physiotherapy, breathing exercises and psychiatry can work together in a complementary way to provide greater benefits to ailing persons than any one of those treatments might provide alone.

We said at that time:

> The family doctor who actually made calls and treated everyone from babies to oldsters has almost disappeared, being replaced as Grossman says, "by a battery of specialists who have divided human health into such refined and isolated segments that one criticism of modern medical practice is that doctors know 'more and more about less and less'."

In our experience, the healthiest people are the most self-reliant, not the people who are most careful in picking doctors, and the best doctors we have come across are the ones who candidly admit that they can't be of much help to people who just want to be "fixed," but fully realize that health is something they have to achieve for themselves, and not by relying on "specialists." This fits well with what Richard Grossman says

> Modern medicine's religious reliance on technological forms of diagnosis and treatment; its air of depersonalization that leads to objectifying patients to mere vehicles for disease; its quick and often arrogant invasion of the human body with surgery or intervention with chemotherapy; its startling costs that have contributed so hugely to the broken back of

the world economy, and excluded so many impoverished people from its technical miracles . . . all these charges continue to be leveled at the practitioners of contemporary scientific medicine. . . .

Were we able to see all medical knowledge without the parochial vanity of modernism, we could also see the other medicines as potentially complementary and supplementary to other treatments in dealing with distressful symptoms. We need not be confined to *either* scientific medicine *or* the unconventional therapies, but are blessed with the opportunity to use *both* the relevant treatments of the ancients and the modern, *both* the East and West, *both* the rationalist *and* the empiricist, both the sophisticated *and* the primitive. . . .

CHILDREN
. . . and Ourselves
WHERE WORK NEEDS DOING

IN Worldwatch Paper No. 81, which came out early this year, Cynthia Pollock Shea begins by saying:

> When faced with a severe wood shortage due to overcutting, the ancient Greeks began to design their homes and cities so as to take advantage of the sun's ability to warm buildings in winter and cool them in summer. Through the ages many civilizations have learned to tap the multiple processes set in motion by the sun to garner useful energy. Uneven heating of the earth's surface produce wind, yesterday's winds are today's waves, and a season's worth of solar energy is trapped in plants whose residues can be burned as fuel.

Her subject is "Renewable Energy: Today's Contribution, Tomorrow's Promise." Why, one wonders, couldn't this excellent pamphlet be made part of the curriculum of the nation's high schools? By the time a boy or girl reaches high school, it is natural for them to wonder what sort of work they might undertake, how to spend their lives, and reading "Renewable Energy" would be a good way to begin thinking about future possibilities. The next two paragraphs make this clear:

> Almost 15 years after the first major oil price rise wreaked havoc on the world's economies, efforts to tap the planet's myriad resources of renewable energy have met with mixed success. The 1986 oil price collapse further set back many renewables programs, particularly in the United States. Renewables offer a timely alternative to dwindling oil supplies and to environmentally damaging coal combustion, but policy support and financial backing need to be strengthened if their contribution is to increase significantly in the years ahead.
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> Expanded use of renewables and a greater commitment to energy efficiency are the most cost-effective and environmentally sound approaches to mitigating many seemingly intractable problems. In the United States, fossil fuel pollutants may cause as many of 50,000 premature deaths annually. Across the Atlantic, the air pollution caused by burning these fuels is implicated in damaging 31 million hectares of trees in central and northern Europe. Each year fossil fuel combustion emits some 5.4 billion tons of carbon per year. Atmospheric carbon dioxide concentrations have increased 9 per cent since 1960 and 30 per cent since 1860, contributing to the greenhouse effect that is predicted to change the earth's climate.

Parents who remember reading Paul Goodman's *Growing Up Absurd* might well consider the area Cynthi'a Shea writes about as an appealing alternative to the conventional careers that Goodman described. A young man or woman who decides to work in some form of renewable energy production will probably always be able to find a job and to feel like a useful citizen. There will be both satisfactions and problems. As Cynthia Shea says:

> An intensified global commitment to renewable energy sources will put the world economy on more stable footing. Building resilience into energy policies via efficiency measures and diversified, smaller scale supply options will help provide the flexibility needed to adapt to an unpredictable future. Unfortunately, many energy policy-makers, complacent after the oil price plunge of the mid-eighties, are not looking ahead.

Meanwhile the opportunities in the Third World will be great.

> Much of the Third World can take special advantage of new renewables technologies, however, because most are small in scale, have zero or minimal fuel costs, and can often be assembled with local labor. Small-scale technologies with short construction times provide greater adaptability in responding to unpredictable growth in power demand. Economies that depend on renewable fuels are not as vulnerable to supply disruptions or price volatility, nor are they forced to spend their foreign exchange on fuel imports. Half of all developing countries rely on imported oil for over 75 per cent of their commercial energy needs. Yet sunshine, wind, water, and biomass are all available locally.

For useful exploitation of some renewable sources, particular intelligence is required. This is especially the case where large dams are involved.

> To operate well for many decades, hydro projects require sound management, not just of equipment, but of entire watersheds. Fragmented institutional structures impede enlightened management because each function of a watershed

> belongs to a different agency. As Brandeis University Professor Donald Worster writes in *Wilderness* magazine, "Everybody wants a piece of (rivers), wants to siphon them off, dump wastes in them, drink from them, or move barges along them, but no one has ever been given overall charge of protecting their renewability." Hydroelectric power will not be truly renewable until the functions of flood control, irrigation, transportation, power production, tree planting, fisheries management, and sanitation are coordinated with the overall goal of maintaining healthy and productive rivers.

In other areas, renewables are becoming important almost without our being aware of it. "In Brazil, sugarcane grown specifically for fuel was converted into 10.5 billion liters of ethanol in 1986, providing about half the country's automotive fuel. Most autos burn a gasoline-ethanol mixture that is 20 per cent alcohol, but 29 per cent of the nation's 10.6 million cars run on pure ethanol."

> The United States, in contrast, relied on surplus corn and other grains for 90 per cent of the 3 billion liters of ethanol it produced in 1987. More than 7 per cent of the "gasoline" sold in the country was actually gasohol, a 1-to-9 blend. In the past, ethanol markets have been bolstered by generous tax advantages at the state and national levels and by regulations mandating the reduction of lead in gasoline. Ethanol can replace lead as an octane enhancer.
>
> Alcohol fuels are now gaining support as an air pollution control measure. More than 60 U.S. cities did not meet federal carbon monoxide and ozone standards by the end of 1987, Colorado is the first state to require motorists in its major cities to use gasohol during the winter when pollution is worst. Officials expect carbon monoxide emissions to be cut by 12 per cent. Federal legislation has been introduced that would require gasohol use nationally by 1992.

The photovoltaic effect, discovered by Edmund Becquerel in 1839, is now a major category of solar technology:

> This phenomenon causes electricity to be produced when light strikes certain materials. No heat, water, or moving parts are required, just a photon to jar an electron from its orbit, causing an electric current to flow. A 10 per cent efficient photovoltaic (PV) cell about 100 square centimeters in size can produce 1 watt of electricity at noon on a clear day. First used to power spacecraft, the terrestrial market now dominates and has grown at an average annual rate of 44 per cent from 1980 to 1985. . . .
>
> Until the eighties, virtually all PV modules were made using some form of single crystal silicon. Although this is the second most abundant element in the earth's crust, the meticulous processing and high degree of purity required—from one part per billion up to less than one part per million of impurities are tolerable—meant that reducing PV costs posed formidable problems.
>
> The major new approach was to develop "thin-film" cells in which the photovoltaic materials are less than one one-hundredth as thick (one micron) as their crystalline counterparts.

This development led to a considerable drop in price of photovoltaics. While the thin-film silicon is not as efficient as crystalline silicon, the advantage of lower price has multiplied sales. Cynthia Shea says:

> Commercial PV modules range in efficiency from 7 per cent for those made of amorphous silicon to 13 per cent for those made of crystalline silicon. By stacking amorphous silicon cells on top of one another, researchers have succeeded in converting 14 per cent of the sun's rays into useful power in small solar cells. Theoretically, this level can be doubled. Using concentrated sunlight and crystalline silicon, laboratory cells have achieved efficiencies approaching 28 per cent. The major barrier to wider use of photovoltaics is their cost.

Cynthia Shea concludes her pamphlet:

> A sustainable energy path that relies on renewables and energy efficiency will provide policy-makers the flexibility to cope with an uncertain global future. Those ready to make the change need to improve pricing signals, open up the energy supply and energy savings business, and reinvigorate research and development programs. . . . Nations that accept the challenge will be rewarded with increased energy security, more stable economies and a healthier global environment.

FRONTIERS

The Cost of Hamburgers

A RECENT issue of the *Ecologist*, Vol. 17, No. 4/5, is entirely devoted to the deforestation of the planet and to the few efforts to restore the forest cover. One article in this issue is "Rainforests and the Hamburger Society," in which the writers, James D. Nations and Daniel K. Komer, report that much of the forest land of Central America has been cleared to enable ranchers to supply the United States and other western countries with cheap beef for hamburgers. These writers say at the beginning

> Few consumers associate fast food hamburgers or TV dinners with the eradication of Central America's tropical rainforests. But for more than 30 years, the United States' appetite for cheap, imported beef has been a critical factor in the future of those forests. Tropical rainforests throughout Central America (including southeastern Mexico and Panama) are being replaced by pasturelands to produce beef, much of which is consumed by U.S. citizens. . . .
>
> The destruction of rainforests in other areas of the world is sometimes even more dramatic than in Central America—as in the Amazon Basin where bulldozing, burning, and chemical defoliation destroy immense tracts of forest each year But nowhere is the loss of biological diversity more severe and nowhere is the United States' unwitting role in deforestation more apparent, than in the case of Central America.

If deforestation continues at the present rate, there will be virtually no rainforest left in Central America in 20 years, with only small remnants in national parks and preserves.

The first stage of destruction of rainforests is carried on by loggers who take out valuable hardwoods such as mahogany and tropical cedar. But since rainforests grow so luxuriantly in a tight tangle of vegetation, the felling of selected species damages the trees which are left behind, often amounting to between 30 and 50 per cent of the forest. The writers comment:

> But the damage wrought by commercial logging is not so much the result of what foresters remove from the local forests as what they]eave behind—namely, the roads they construct to enter and exploit the area. Road construction introduces the second stage of deforestation: colonisation. For down these roads, like leaf-cutter ants on a forest trail, come landless peasants from other areas of the country. Using agricultural traditions that are ill-suited to the tropical rainforest, they clear and burn the vegetation to plant subsistence crops—corn, beans, rice and manioc—and small-scale cash crops such as coffee, chilies, bananas, and cacao. This colonisation has a heavy impact on any indigenous people who live in the region. Indian groups who have survived the diseases and disruptions of timber exploitation may be overrun by colonising peasants who have little regard for the territory's aboriginal inhabitants and little ecological awareness of their new forest home.
>
> But to blame colonising peasants for uprooting tribal people and burning the rainforest is tantamount to blaming soldiers for causing wars. Peasant colonists carry out much of the work of deforestation in Central America, but they are mere pawns in a general's game. To understand the colonists' role in deforestation, one must ask why these families enter the rainforest in the first place. The answer is simple: because there is no land for them elsewhere.

According to the UN Food and Agriculture Organization (FAO), seven per cent of the landowners control 93 per cent of the arable land. For example, in Guatemala 2.2 per cent of the population owns 70 per cent of the agricultural land, most of it devoted to raising coffee and bananas.

> Until 1979, Anastasio Somoza and his family owned 23 per cent of Nigaragua's arable land. In sum, well over half of the rural families m Central America either own no land or own too little to support a family. Instead, they farm marginal plots and work as laborers on the land that belongs to others, all the while waiting for the day when they can own adequate farms.

Meanwhile, it should be pointed out that the soil which once supported the rainforests is infertile and good for only a few crops. Thus the first colonists are obliged to sell out to a second wave of settlers who will raise beef cattle on the land. As an expert geographer has said,

> . . . the crops planted by forest farmers serve as a transient stage between forest clearing and

> pastureland. Thus, the pioneer families receive a few years of crops in exchange for converting the rainforest to grassland for the benefit of someone else. . . . After seven to ten years of beef cattle yields, the effects of overgrazing and torrential rains turn the rainforests's nutrient-poor soils into eroded wastelands. When this happens, the rancher must find new cropland or rainforest to transform into pasture. In these various ways, beef cattle producers are expanding their operations throughout the rainforests of Central America, destroying forests, wildlife, and agricultural production with equal disregard.

One might suppose that the peoples of the Central American countries at least have more beef to eat, but the fact is, otherwise. These people cannot afford to pay for beef to eat. In Costa Rica, where beef production doubled between 1959 and 1972, per capita beef consumption fell from 30 pounds to less than 19.

> U.S. companies annually import more than 33 million pounds of Central American beef (including live calves), an amount which represents 25 per cent of the region's annual beef production and 90 per cent of its beef exports. Until the 1979 revolution, Nicaragua was the major source of Central American beef. The country sold U.S. companies an average of 42 million pounds each year. Somoza himself owned interest in six beef importing companies in Miami; the annually purchased beef worth $30 million, much of it produced on Somoza's own cattle ranches in Nicaragua.

What can be done to conserve the rainforests of Central America and in other parts of the world? The writers of this article say:

> One direct approach is for the U.S. Congress to pass legislation phasing out beef imports from the rainforest regions of Central America. While such laws would be resisted by Central America's cattle industry and by U.S. importers they would have a definite impact on the survival of Central America's tropical rainforests. Unfortunately, recent U.S. administrations have taken an opposite tack. Importing beef to compete with U.S. produced beef is said to have held down the price of hamburger meat by five cents per pound. In fact, some U.S. officials have claimed that beef imports have done more to hold down food price inflation than any other single government initiative. However, these calculations do not take into account the social and environmental costs of beef production in the exporting nations.

The writers conclude by saying that "Consumers must be made aware that when they bite into a fast-food hamburger or feed their dogs, they may also be consuming toucans, tapirs, and tropical rainforests."