tifies three major areas of investigation:

1) The acquisition and use of scientific and technical information in decision-making. "Actual EPA decisions will be studied . . . [but] this retrospective analysis will not have as its purpose the evaluation of the performance of the agency."

2) Analyses and critical reviews of substantive environmental problems, such as "environmental regulations and the energy crisis" and the benefits and hazards of pesticides.

3) Several general topics applicable to most EPA functions, such as the statistical treatment of environmental data and the development of a system of environmental quality indicators.

The staff of the Muskie subcommittee learned of the EPA-NAS study contract less than 10 days before it was signed, and immediately became alarmed. Sharpening the sense of alarm was the fact that, whereas the Whitten subcommittee and the Office of Management and Budget were consulted in the preparation of the study contract, the Muskie subcommittee was not. It was apparently only the subcommittee's last-min intervention that led the EPA to have the contract explicitly state that study plans must be mutually acceptable to the EPA and the NAS.

Officials at the NAS are acutely sensitive about the EPA study. On 4 July, the *New York Times* reported that Leon Billings, staff director of the Muskie subcommittee, had suggested that, if the reports from the 3-year study call EPA regulations into question, they could lead to legal challenges by polluters which might seriously delay the pollution-control effort. New information about pollution hazards can be cited by environmentalists in challenges aimed at strengthening pollution-control regulations, but Billings obviously did not think such information would be forthcoming from the academy studies.

Yet, according to David Jackson, a White House Fellow who has been the EPA contract officer for the study, Russell Train believes that the study can contribute substantially to improving his agency's procedures and decision-making. An early report to be aimed at improving the EPA office of research and development, which is currently without a top administrator, is awaited with particular interest.

Also, Jackson says that he has been much impressed by the caliber of the ad hoc group set up under the NAS Commission on Natural Resources to serve as the senior working committee in charge of the study. This committee is chaired by Robert M. Solow, an MIT economist.*

Although the outcome of the study should not be prejudged, one can fairly say that the path through the political underbrush in which the NAS now finds itself is narrow indeed. In trying to avoid the "adversary role" of which Handler warned, the academy may fall into a blandness that will not give the Hon. Mr. Whitten what he wants for his money.—LUTHER J. CARTER

* Other members of the committee are Daniel B. Botkin, an ecologist with the Yale School of Forestry; Lucius P. Gregg, Jr., president of the First Chicago University Finance Corporation and a specialist on manpower training and human resources; William L. Garrison, of the Institute of Transportation and Traffic Engineering, the University of California, Berkeley; Samuel Baxter, a Philadelphia consultant on sanitary and environmental engineering; Robert T. Holt, a behavioral scientist with the Center for Comparative Studies in Technological Development and Social Change, University of Minnesota; and John C. Frye, of the Illinois State Geological Survey.

Lester Brown: Tireless Sounder of the World Alert

Anyone perusing a magazine or newspaper article about the world food and population situation is likely as not to run across the name of Lester R. Brown who, it seems, is invariably resorted to as a source of ironclad expertise on the great supply/demand dilemma of all time: people versus everything required to sustain them—jobs, energy, the environment, natural resources, and, above all, food.

Who is Lester Brown, and why does he know so much? Is he making any difference in the world? Is he right?

Some call Brown a publicizer; others see him as a one-man early warning system for future global crises. Brown calls himself a synthesizer. "The world desperately needs synthesizers," he says. Brown is jack of many trades and master of some, with degrees in economics from the University of Maryland, public administration from Harvard, and considerable familiarity with various disciplines bearing on food production and world trade.

Raised on a farm in New Jersey, Brown is a country boy whose ambition and brains have lifted him into that special international orbit that experts in the concerns of the moment fly around in, held up by ready flows of money from private foundations, corporations, and governments.

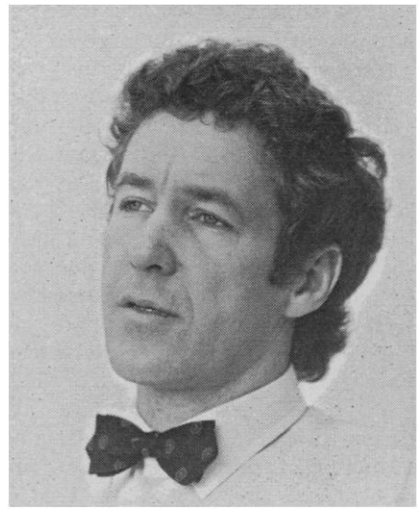
Lester Brown is much in demand these days, so much so that one wonders when he has the chance to retreat and replenish himself. No doubt his regular participation in Saturday afternoon football games helps furnish the energy for his breakneck pace. Here, for example, in his schedule for the next 6 months: this month he is off to Salzburg, Austria, for a 2-week faculty appointment in American studies, during which time he will shuttle back and forth to the United Nations–sponsored World Population Conference in Bucharest, where he is scheduled to deliver two talks. In September he will be in Stockholm, addressing the Nobel conference. In October there is a meeting of the Club of Rome in Berlin; from thence he will proceed to the World Food Conference in Rome in November. Then there is the Central American nutrition conference in Guatemala in December, and finally a business executives' round table sponsored by Business International (which is headed by his old boss Orville Freeman), in Acapulco in January. And lord knows how many other things in between. "I got five speaking requests this morning," Brown announced over a dinner of broiled chicken ("I've moved down the food chain a bit") at the Cosmos Club, Washington's distinguished hangout for the scientist set.

Brown doesn't know exactly what he'll be saying at his next speech, but it will undoubtedly contain parts of the messages relayed in the four books and

innumerable reports, articles, and speeches he has written to date. His basic message: the last quarter of this century is not going to be merely a continuation of the trends that have marked the first three-quarters. The world is facing a series of "major discontinuities." The market in food and raw materials has changed from a buyers' to a sellers' market. Countries that were a decade ago exporting wheat are now buying it. The balance of political power is shifting toward underdeveloped countries that have control over raw materials. The days of cheap energy are over. The population growth rate is going to slow down; the economic growth curve will flatten out. Accompanying this basic message is a welter of dismaying facts: global weather patterns are changing for the worse; the world's fisheries have just about reached their limit of exploitability; mankind faces water shortages, fertilizer shortages, and land shortages, all of which jeopardize further gains for the Green Revolution, for which crops require intensive irrigation and fertilization. Brown hasn't spelled out any definitive solutions but says, "If we see the red light ahead we can plan to stop for it."

Brown, at 40, has found an ideal forum for his activities in the Overseas Development Council (ODC), a privately funded think tank which he joined at its inception in 1969. There he can write his own ticket, free from bureaucratic, political, and apparently, financial constraints. He is totally committed to his work. He puts in 7-day weeks and 12- to 14-hour days, a habit of discipline he acquired from his boyhood. Blue-eyed, bow-tied, soft-spoken and diffident in manner, there is a hard core of self-assurance under the modest surface, and a long history of ambition. At 14, he decided to become the biggest tomato grower in New Jersey. He launched a commercial tomato business with his younger brother, and tomatoes paid for most of his education. By the time he reached his early 20's, he had revised his goal to that of becoming the biggest tomato producer in the world. By 1958, the last year the business was in operation, the brothers marketed 1.5 million pounds of tomatoes. This, he says with quiet pride, at least put them in the upper 5 percent.

What got Lester Brown away from tomatoes was 6 months spent in villages in India on a fellowship from the National 4-H Club Foundation. It was



Lester Brown

then that he "became restless" and rechanneled his energies into the cause of international agriculture. In 1959 he took a GS-7 (lower rung) job with the Department of Agriculture (USDA) under Orville Freeman. Seven years later, at the age of 32, Brown had worked his way up to the position of administrator of the International Development Service, the technical assistance arm of USDA. He worked closely as an adviser to Freeman, who probably comes as close as anyone, except ODC director James Grant, to being his mentor. He attributes his steady rise in part to Freeman's interest in giving opportunities to talented youth in the department, which meant there were no external constraints to advancement. Brown calls himself an "economic policy architect" of the Green Revolution. This involved providing technical assistance to underdeveloped nations and encouraging them to do the necessary things, like building fertilizer plants, to make use of the new high-yield wheat and rice strains. Brown, in what may have been his most successful prophetic achievement, takes credit for being one of the few who recognized the devastating impacts the monsoon failures in 1965 and 1966 would have on Indian agriculture—in time for the United States to launch emergency wheat shipments.

When Freeman left the Agriculture Department at the end of the Johnson Administration, Brown jumped over to the ODC. The council was formed by a group of people worried about the falloff of American concern over developing countries that occurred in the late 1960's, which coincided with public disillusionment over the war in Vietnam. The ODC has over 40 sources of support among foundations and corporations, chief among them being the Ford and Rockefeller foundations. It has only a half-dozen senior staff members (plus 20 professional and support personnel), but despite its size it appears to have accumulated significant authority as the only body outside USDA (according to Brown) engaged in studies about world agriculture. Brown, whose personal staff consists of a young assistant, Eric Eckholm, and a secretary, has churned out four books since 1970. The first, *Seeds of Change*, is an upbeat account of the development of the Green Revolution. *World Without Borders*, which he calls his most "ambitious" work, appeared in 1972. This one roams all over ecology, the environment, world trade, economics, population, education, energy, employment, and food. Interspersed with depressing observations about the decaying world situation are bright visions of ways in which nations can launch international cooperative ventures to fix everything up. *In the Human Interest*, prepared in time to be used as a source for delegates to the World Population Conference, hashes over the population problem, and *By Bread Alone*, scheduled for publication in September, relays some disturbing information relating to oncoming shortages of land, water, fertilizer, and energy, which undermines some of Brown's previous optimism about the Green Revolution.

While anyone who reads the total corpus of Brown's work may find the repetition somewhat exasperating, one of the main criticisms of Brown is that he changes his mind. Former USDA colleagues point out that in the early 1960's he was talking about mass starvation around the corner. Then he jumped on the Green Revolution bandwagon and went so far as to compare it to the advent of the steam engine. "For the first time in history, it is realistic to consider the eradication of hunger for the overwhelming majority of mankind," he wrote. Now he is more cautious, and points out that we have some "difficult, complex, sticky, second-generation problems to face."

A sampling of opinion from some of Brown's colleagues and friends indicate that people have varying degrees of appreciation of the value of his work. Everyone agrees that he is dead serious, works terribly hard, and is remarkably effective at communicating the world

situation as he sees it, both to the general public and to the various official and unofficial groups who seek his counsel. Very high on Lester Brown is Alan Berg, deputy director for nutrition at the World Bank and author of *The Nutrition Factor*, who believes that Brown is unique. "More than any institution he deserves credit for waking up policy-makers and the country at large to the current situation." Others point out that he is a rare bird in his willingness to take risks. Most people are afraid to stick their necks out because they have a horror of being proved wrong. Brown, by making speculations others don't dare to make, broadens the scope of public discussion. Brown is not a crass publicity-seeker, but his status as an expert is certainly partly attributable to his accessibility. "He gets invited to all the [congressional] hearings even though he keeps on saying the same thing," observes one friend.

Brown's strongest critics may be people at the USDA. His basic thesis—that the rest of this century is going to be a "whole new ball game foodwise," as one puts it, runs against the view of traditional agriculturalists, which is that agricultural production can be expanded adequately in the foreseeable future with the continuing application of new technologies. "Brown is to the world food situation what Jeremiah was to the Israelites," says Donald Paarlberg, USDA director of agricultural economics. He acknowledges Brown's role in highlighting the importance of the world food situation, but calls him a "weathervane" with a knack for sensing the current mood on food, "whatever that may be," and for telling people what they want to hear.

Brown, in turn, is hardly delighted with the current leadership at USDA. In contrast to Freeman, he says, who traveled all over the world trying to help poor countries develop their agricultural capacities, Secretary Earl L. Butz has only gone to Europe and Japan looking for commercial markets for the United States. "The world desperately needs leadership," says Brown, and has traditionally looked to the United States for it. Yet he says Butz appears to lack the capacity for leadership and "many doubt if he understands what's happening in the world." Butz, for example, opposes for now any government-held grain reserves on the grounds that they could depress domestic farm prices. He has urged Americans to consume more beef despite the fact that this is an inefficient use of protein. (As if to underline Brown's comment on Butz's powers of understanding, the secretary that very day came out with the observation that, "If some of those ill-informed, fuzzy thinking do-gooders who suggest that we eat one less hamburger per week to release more foodstuffs for the world are really serious . . . they could make the first onslaught on this noble goal by reducing our dog and cat population by 50 percent. . . .")

One obvious question to ask a man enveloped in the future of the world is, "Are you optimistic?" Brown says "I try to be," and points out quite rightly that if he weren't, there wouldn't be any point to what he is doing. While generally regarded as being in the gloom-and-doom camp these days, he sounded optimistic to *Science*. He believes, for example, that the world's number one priority—"putting the brakes on population growth" —will be achieved "much more quickly than most people realize."

ZPG by 2015?

Most optimists think world population can be stabilized at around 6.5 billion (current population is 4 billion); Brown, who says, "I follow the birthrate the way some people follow the stock market," thinks it can be halted at just under 6 billion. His timetable is as follows: by 1985 the developed nations of the world will have all reached zero growth (as has already occurred in several European countries), and the underdeveloped nations will have gotten their crude birth rate down to 25 per 1000. Then the latter have until 2015 to reach zero growth. How will this be achieved? Brown has no specific strategy, but he says "It all depends on how we see the population problem." Demographers have treated the issue too narrowly and have not been particularly successful in mapping trends, witness the fact that Malthus is still the best known demographer.

Brown accepts the conventional wisdom that people have to attain a certain degree of wealth and industrial sophistication before fertility goes down, and he believes the world has the resources to make such development possible—provided that affluent nations simplify their consumption patterns. That is the only way enough energy and other resources can be freed to enable the underdeveloped countries to build up their own production capacities. Americans are already moving in this direction, he points out—they're eating less animal protein, riding more bicycles, and having fewer babies. (Brown practices what he preaches—he has 2 children, bikes the 7 miles to work, and the Washington *Post* recently notified the nation that he has given up eggs and bacon for breakfast and cut his meat consumption by one-third.)

Obviously, altruism is not going to be the moving force, and this is where Brown's interdisciplinary vision of global cooperation moves in. As nations become increasingly interdependent, new kinds of economic and political pressures will come into play. How? Well, to take one of a thousand possible examples, says Brown, the Shah of Iran could hold a press conference. He could point out that America is a land of plenty, India is on the verge of famine, and if the United States doesn't do something about that Iran will cut off its exports of oil to the United States. What would the Shah's motive be for this move? The answer is that it would not be to Iran's advantage to have India in chaos because control over the Indian Ocean would revert entirely to the neighboring Arab nations, most of whose relationships with Iran are very shaky. But what if the United States says we can do without your oil, like we did in the winter of 1973?

Well, the questions go on and on. Brown is very adept at presenting the problems in all their complexity, but when it comes to answers he gets vague. Nonetheless, he believes that synthesizers such as himself have a better shot at answering them than those (such as economists—whose profession, he says, is "bankrupt") whose perceptions are limited by the particular orientations of their disciplines. Brown's mind can race through a thousand questions that he believes only synthesizers can begin to answer. Why, for example, did the leadership of all the major European governments change hands within a 6-month period (and could the Nixon resignation be related to this phenomenon)? What are the long-term effects of foreign capital investment in the Middle East? What will be the problems of social security financing as the average age of Americans rises? Yesterday, tomatoes; tomorrow, the world. There are those who think Brown did a good job waking people up on the food situation but that he is now getting in over his head. Be that as it may, Lester Brown intends to keep on swimming.—CONSTANCE HOLDEN