

War on Hunger

A Report from The Agency for International Development



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COVER:

A public health worker sprays DDT on the walls of a house in a mosquito infested area. See Page 1. Photo by Carl Purcell.

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Dr. John A. Hannah, AID Administrator

Clinton F. Wheeler, Director, Office of Public Affairs



These Africans will have a better chance of improving their lives if malaria eradication succeeds. DDT is the major weapon.



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Dr. Borlaug and His Critics

Dr. Norman Borlaug, winner of the 1970 Nobel Peace Prize, recently came under criticism for his defense of the use of chemical fertilizers and insecticides, specifically DDT. The spark that ignited the debate was an address Dr. Borlaug delivered at the 16th Governing Conference of the UN Food and Agriculture Organization in Rome November 8, 1971.

In that address, and in subsequent statements, Dr. Borlaug, whose work in the development of high-yield cereal varieties helped bring about the Green Revolution, asserted that if farmers, especially those in the developing countries, are denied the use of chemical fertilizers and pesticides, the world would be doomed to starvation. He also stated that he is not yet convinced that DDT is threatening any species of animal, or causing "discernible injury to man."

Dr. Borlaug expressed a number of other important views in his address, but they became obscured in the outburst of criticism of his position on insecticides.

There was no obscurity, however, for his opinions on DDT. Here are some of the reactions that followed his remarks:

Dr. Sicco Mansholt, vice president of the European Common Market Commission—

"We cannot be indifferent. We don't know exactly what the result of all this poison will be. . . . Ten years' use of DDT means one kilo (about 2.2 pounds) per man in the world, and it stays in the world. It is in the soil, the plants, the seas, the plankton, the fish, the man."

The New York Times, in an editorial November 26—

"The plain fact is that for protecting food crops, DDT is now a greatly diminished factor—and is rapidly becoming so for protecting cotton as well.

"In fact, it is increasingly having the reverse effect. Because pesticides wipe out their victims' natural predators and be-

cause the pests themselves in time build up a resistance to pesticides, farmers find themselves on a treadmill, compelled to use more and more chemicals to get less in the way of results. Dr. Borlaug is apparently not even aware of this dilemma . . .

" . . . environmentalists do not say that DDT causes cancer, but rather that it constitutes a hazard in that respect, having produced cancer in experimental animals. DDT already present in the tissues of human beings around the world may well prove cancerous in the future, especially if it is allowed to go on building up. That it has done harm in other ways to the health of fish and wildlife and the propagation of birds should be beyond even Dr. Borlaug's capacity to doubt."

In an article in the Washington (D.C.) *Sunday Star* January 2, Dr. Charles Wurster, associate professor of environmental sciences, State University of New York, and Robert van den Bosch, University of California entomologist, wrote:

"Strong dependence on pesticides for insect control . . . is an ineffective, costly, and destructive method that is rapidly being replaced by modern, sophisticated, and effective integrated control techniques.

"DDT is incompatible with integrated control because it disrupts the beneficial balance of insect communities, often creates greater pest problems than it solves, is destructive to wildlife, and is a human health hazard. In short, most benefits Dr. Borlaug envisions are not attainable with DDT, but can be achieved by safer means."

The following article, an adaptation of Dr. Borlaug's FAO address, does not necessarily represent the views of the Agency for International Development. We are publishing it, along with the critical comments on this page, with the aim of providing the context in which the issues have been raised, and to broaden understanding of a world dilemma.

'EVOLVE OR PERISH' —

By Norman Borlaug

Criticism of the Green Revolution has become a popular pastime. Perhaps it reflects the feelings of some who had predicted famine and doom for the hungry nations and, consequently, cannot yet forgive the new strategy for being successful. Some critics have said that the Green Revolution has created more problems than it has solved. This I cannot accept, for I believe it is far better for mankind to be struggling with new problems caused by abundance rather than with the old problem of famine. Certainly, loyalty to the status quo in food production—when being pressured by population growth—cannot break the chains that have bound the peasant to poverty and hunger.

One must ask: Is it just to criticize the Green Revolution, with its recognized accomplishments, for failure to correct all the socio-economic ills of the world that have accumulated from the days of Adam and Eve up to the present?

Change we must, or we will perish as a species, just as did the dinosaurs in the late Cretaceous period.

The Green Revolution has won a temporary success in man's war against hunger and deprivation. It has given man a breathing spell. If fully implemented, it can provide sufficient food for sustenance during the next three decades. This could, hopefully, provide man time to bring population growth into balance with his capacity for providing a decent standard of living to all peoples of the world.



The continued success of the Green Revolution will hinge upon whether agriculture will be permitted to use the inputs necessary to cope with hunger. If agriculture is denied the use of chemical fertilizers and pesticides for example, the world will be doomed, not by chemical poisoning, but from starvation.

I am in complete agreement that we should try to preserve all forms of wildlife as part of our heritage, as far as it is possible to do so. On the other hand, let us not become egotistical to the point of assuming supernatural powers. A glance at the book of rocks tells us of



Drawings by B. R. Phaneendranath.

the impotency of many species, including man, against the forces of nature. Dr. Donald Spencer estimates that 99 percent of all the species that have lived, since the candle of life was first lit on the planet earth about 3.2 billion years ago, have flunked the adaptation imperative: "evolve or perish", and consequently have now become extinct.

The implied command: "evolve or perish" has been an unwritten natural law from the beginning of time. It is equally evident in the physical and biological world. Long before there was life on earth there were countless physical changes in the earth's crust. Repeatedly, mountains were built through volcanic action or by physical shifts in the earth's crust, only to be eroded away and the debris deposited elsewhere. The oceans invaded and inundated what was once the land, only to recede again. Physical changes, of course, continue to reshape the planet earth to this day.

Climates have changed time and again in many parts of our world. Vast areas that once possessed tropical climates have subsequently been covered by continental ice sheets. Areas that once were blessed with heavy rainfall have become desert and vice versa. These changes in environments have, in turn, exerted strong selection pressure on the evolution of all forms of life.

There are undoubtedly many subtle changes being exerted on the environment of the planet today that are beyond the influence and control of man. The composite effect of the present day selection pressure of the environment, affected both by man and natural influences, will undoubtedly continue to take its toll of some species that are poorly adapted to the current world environment.

The Challenge of Change

One informed estimate is that there are at present approximately 1,100,000 species of animals, many of them very simple forms, and 350,000 species of plants that currently inhabit the planet earth. Of these, the United States Fish and Wildlife Service in 1966 listed 33 species of mammals, 49 species of birds and 9 species of reptiles and amphibians, and 38 species of fish in the United States, which were either rare or endangered. In discussing the causes for reduction in numbers and possible disappearance of these 129 species, the destruction of the habitat and disturbances resulting from man's activities were paramount. Pesticides were mentioned as possible contributing factors in only two cases. In the past three or four years there has been much propaganda, but little convincing scientific evidence, indicating that DDT has contributed to the decline of the Bald Eagle, Peregrine Falcon, American Osprey and California Condor. One does not need thin egg shell hypothesis due to DDT to explain the reduction in the population of these species. The truth of the matter is that many ornithologists had reported on the reduction in populations of these large birds of prey as far back as the 1880s and 1890s, long before the time of DDT. It is almost a foregone conclusion that one or more of these species is about to flunk the imperative "evolve or perish". Its habitat is being destroyed by the encroachment of man. Protective legislation alone will not, in most cases, be adequate to save them. Dynamic research, propagation and good sound game management might do so, providing human population pressures on their habitat are not too great.

Although it is generally the long-time continuing effects of changes in the environment which exert effects on the evolution and survival or the extinction of a species, there are many other changes in the environment that affect the more short term "balance of nature", among the many species in a given habitat or ecosystem. These are the seasonal shifts we are concerned with in producing and protecting our crops or animals. The cliché "in balance with nature", which is in common usage today, is very misleading. It implies we would have a favorable "in balance with nature" to assure the protection of our crop species if the "balance of nature" were not upset by man. This, of course, is not true. Nor is there in existence a single in balance with nature ecosystem. Rather there is, within a given area, an infinite number of local and many merging more extensive ecosystems. None of them is in static equilibrium. They are in a constant state of dynamic change, responding to the changes in the environment.

At different times, the selection pressure provoking change is drought, floods, frosts, heat, insect or disease attacks, or invasion of the habitat by other species.

Early in my career as a forester working in a large wilderness area completely isolated from the influence of man, I learned of the fickleness of nature. I have seen 20 forest fires ignited by a single "dry thunder (electric) storm". Some of these fires started by lightning destroyed or damaged vast areas of several forest types of ecosystems. In the same area I have seen tens of thousands of acres of lodgepole pine killed by infestation.



Many times I have seen attempts made to grow cotton without the use of insecticides in the native home of the boll weevil in Mexico where all of the native predators of this insect were present. The results were disastrous. Similarly, I have observed cotton grown without insecticides in West Pakistan, the native home of the pink bollworm, with all of its natural predators and parasites present. In this case also the results were disastrous. In fact, in both of the cases it was difficult to tell from casual observation whether the cotton was being grown for the production of fiber or for the production of feed for a native insect. Nevertheless, in both cases there should have been, according to environmentalist jargon, an "in balance with nature" equilibrium.

I must also point out that modern agriculture—with 3.7 billion people demanding food and fiber—has no choice but to devote extensive areas to a single crop in areas ecologically best suited to the culture of that crop. This was not true 5,000 years ago, when there was less population pressure, so that crops could be grown in small isolated fields.

It, therefore, becomes abundantly clear that we cannot rely on biological control alone to protect our food and fiber crops from the fickleness of nature. If left to Mother Nature's whims, we would harvest only one third or one half of the yield per unit of cultivated area that can be harvested using a modern balanced technological package of practices. Someday, it may be possible to use alternate non-chemical methods to control many of the insects responsible for the most severe crop and animal losses, but that day, if ever attainable, lies far in the future.

Today, conventional insecticides are needed to control 80 to 90 percent of the insect problems affecting agriculture and public health. Meanwhile, research to find new techniques and methods, must be strengthened. Present control programs must be designed to take advantage of the best materials and techniques available so as to reduce losses to an acceptable level.

The control methods that are now being studied or used on different insects include: 1) the use of natural predators, parasites and pathogens, 2) the breeding of resistant varieties—which may provide long term protection against some species, but may be ephemeral against other species which have great genetic variability combined with many generations per year, 3) the genetic male sterile technique which has proven highly effective in controlling the screwworm, and shows promise now on a number of other species, 4) the use of attractants, both sex and food, 5) use of traps i.e. light and sound, 6) development of hormones to interfere with life cycles, 7) improvement of cultural practices, which have been long used effectively in reducing losses from species, and 8) the development of better biodegradable insecticides, that will effectively combat the target species without doing damage to beneficial insects, to wildlife or to man.



What does this have to do with the controversy over the use of DDT?

Today in the United States, conventional insecticides are still required to control 80 to 90 percent of the insect problems affecting agriculture and public health. The use of DDT in the United States has gone down greatly in the past five years, since other more effective controls have become available. It is still, however,

used extensively in the south and southeastern part of the country on cotton insects, especially on the boll-weevil.

Some environmentalists would now like to have a legislative ban placed on DDT so as to prohibit it for use in the United States. Almost certainly as soon as this is achieved, the campaign will begin to have it banned everywhere in the world. This must not be permitted to happen, until an even more effective and safer insecticide is available, for no chemical has ever done as much as DDT to protect the health, economic and social benefits to the people of the developing nations.



The World Health Organization (WHO) with the assistance of the Pan American Health Organization and the United Nations Children's Fund (UNICEF) in 1955 launched a worldwide campaign against malaria, based on spraying the interior of all houses with DDT, so as to kill the Anopheline mosquito vector and break the cycle. Of the 124 countries and territories in the tropics where malaria has existed, the disease has been eradicated from 19. There are 48 other countries in which eradication programs are in progress and an additional 37 where extensive control programs are underway. There remain only 20 nations in malarial areas where no programs have yet been initiated.

There is also dramatic evidence from Ceylon of what can happen if a program is stopped before eradication is accomplished. When the campaign was initiated in the mid 1950's there were more than two million cases of malaria in Ceylon. By 1962 it had dropped to 31 cases and by 1963 to 17, at which point the spray program was discontinued for budgetary reasons. By 1967 the number of cases had jumped to 3,000 and by 1968 to more than 16,000. Before the programs could be re-established, in late 1969, two million cases had reappeared.

In summarizing the progress in this World-Wide Malaria Campaign on February 2, 1971 officials of WHO made the following statement:

"More than 1,000 million people have been freed from the risk of malaria in the past 25 years, mostly thanks to DDT. This is an achievement unparalleled in the annals of public health. But even today 329 million people are being protected from malaria through DDT spraying operations for malaria control or total eradication.

(Continued on p. 17)

AID TRAINING: A Two-Way Street

By Allan Deutsch

The even-temperated air under the splattered glass of the greenhouse was still as Eduardo Locatelli intently scrutinized the 6-inch-high forest of green flax shoots. He meticulously noted shoot size and seedling vigor, pot by pot, row by row.

After 16 months of preparation and study at Oregon State University, Eduardo Locatelli's goal was in sight. These spindly flax shoots, represented the culmination of a long-held dream: a master's degree in agronomy.

Locatelli, a Uruguayan agronomist, realized his dream through his selection for training under the Agency for International Development's Participant Training Program. The AID program assists outstanding, highly-qualified individuals from less developed countries earn degrees at U.S. universities. When these men and women return to their own countries, they spearhead progress in key development areas, including education, agriculture, and population planning.

A broad range of U.S. educational institutions participate in the AID program, particularly those which specialize in technically related disciplines. Agriculture is but one of a number of important fields encompassed by the program and Oregon State is just one of many land grant universities involved in both AID-supported study programs and AID-sponsored overseas technical research and assistance.

Eduardo Locatelli, his wife and three daughters all adapted well to the AID program, to OSU and to the community in Corvallis, Oregon. In addition to establishing close friendships with other graduate students

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Eduardo Locatelli, an economist from Uruguay, points to flax seedlings he's studying at Oregon State University.

and Latin American participants, the Locatelli family also enjoyed, and contributed to, a number of community activities. Locatelli's daughter attended public schools and joined the Girl Scouts. Their English now contains more than a smattering of colloquialisms.

Social life, however, was second in importance to Locatelli's academic program. His research with flax was no make-work exercise. Previous deep involvement with the weed control research program at La Estanzuela, a prominent Uruguayan agricultural research station, had stimulated his awareness of the problems asso-

ciated with reduced crop yields due to weeds and other pests. The master's degree program at OSU afforded an opportunity, Locatelli observed, to learn more theory and achieve a broader outlook.

Not only did he gain increased exposure to new developments in his field through course work, but his investigative research can be directly applied to the Uruguayan flax crop. Preliminary results of Locatelli's research indicated that use of certain selective herbicides appears to increase the oil and protein content of Uruguayan flax seeds. As flax is used in livestock feed, the results could have significance for a country which must still overcome dietary protein deficiency.

Practicality also has been a characteristic of AID-sponsored study and research for Barakat Abu-Irmaileh, a participant from Jordan. Abu-Irmaileh was first identified as a promising candidate by OSU staff members assigned to an AID wheat improvement program in Jordan. Dr. Norman Goetze, an OSU extension agronomic crops specialist who met and worked with Abu-Irmaileh in Jordan, later became his academic adviser. The entire program for Abu-Irmaileh at OSU was built around research on techniques for controlling wild oats in wheat, a critical problem for a major Jordanian crop.

Another AID participant, Carlos Romero of Colombia, worked closely with members of an AID/OSU weed control research project which recently completed its fourth year of activity in Colombia. Romero functioned as a staff counterpart and co-authored a number of related studies published through ICA, the Colombian agricultural research organization. U.S. agricultural researchers working in Colombia identified Romero as a potential AID student, helped develop a program for him, and recommended him for an advanced degree program at OSU.

Both Locatelli and Romero retained staff positions with their home research organizations while in the United States, as have other professionals. Both men returned home to help provide leadership for critically important weed control research activities. Abu-Irmaileh earlier returned to Jordan to assume responsibility for a coordinated national weed control research program.

For these three men and thousands of other participants, selection for AID sponsorship and the right to study for a degree in the United States is tough and highly competitive. Promising candidates are identified in their home countries by a national AID project leader or other recognized authority, and then brought to the attention of the AID mission in the country. AID representatives thoroughly evaluate candidates' achievements, specialties, and their potential for upgrading a critical facet of the country's development.

With the assistance of AID's Office of International Training, candidates are placed in an appropriate U.S. educational institution, one which offers degree work in a field relevant to the Development Training Specialist's goals. The next hurdle is to meet the institu-

tion's academic requirements and gain acceptance. An acceptance must be in hand before a candidate leaves for AID-sponsored study in the United States. There are, in addition, some AID-sponsored short term, non-degree programs aimed mainly at familiarizing participants with particular technical projects.

Once a degree program has been tailored to fit a student's needs, extensions of stay in the United States are rarely granted for additional degree work. Recipients agree to return to their own countries upon completion of their program and work for a stipulated period of time.

Carlos Romero of Colombia (left) and Eduardo Locatelli (center) discuss the wheat seeds identified by Barakat Abu-Irmaileh of Jordan. All three were selected for advanced study in the United States under AID's participant program.



The flow of benefits is far from one way. The three international students cited have many other counterparts at OSU and hundreds more across the United States, all of whom make significant contributions to the educational experience of domestic students. Professor Robert K. Kiekel, chairman of the International Education Committee at OSU, notes, "It can be truly said that diversity is the best environment for learning about the modern world and the international students make contributions to this environment far out of proportion to their numbers."

Abu-Irmaileh, Locatelli and Romero have all conducted seminars at OSU on agricultural achievements, problems and research in their respective countries providing first-hand information of interest and value to domestic students. AID-sponsored students have also participated in field tours to U.S. research stations and sites. This, too, has yielded a fruitful two-way exchange of information.

The relationship does not terminate after graduation. The international student is no longer merely a name in a distant country, but a colleague and very possibly a source of valuable technical information.

The value of the AID program is realized when participants return home to apply their increased expertise to the tasks of development. The mutual increase in understanding and beneficial exchange of technical information fostered by the program in the environment noted by Professor Kiekel is another positive link in the communication of mankind.

An Eye on Developing Nations

By Robert S. McNamara

It is becoming increasingly apparent that future plans of the World Bank Group, as well as of other bilateral and multilateral development finance agencies and, most importantly, of the developing countries themselves, must give far greater attention to the basic problems affecting the lives of the developing peoples. These problems—which stem largely from the unanticipated growth of population—include severe malnutrition, rising unemployment, and the growing inequality in the distribution of income.

... Population planning must have high priority in most of the developing countries—even in those countries where the symptoms of over population are not yet fully evident. The reason is clear: much more time is required than is generally imagined in order to translate population-planning programs into reductions in the birth rate sufficiently large to result in reasonable rates of growth.

The latest demographic studies, completed within this past year, indicate that if a net reproduction rate of one (an average of two children per couple) is reached in the developing countries by the year 2040—a possible but by no means certain achievement—their present population of 2.6 billion will increase more than fivefold to nearly 14 billion. If the net reproduction rate of one could be reached two decades sooner, the ultimate size of the population of the developing countries alone would be reduced by over 4 billion, a figure substantially in excess of the planet's total population today.

Two important conclusions can be drawn from these projections:

- Each decade of delay in addressing the population problem in developing countries will lead to an ultimate population in those nations approximately 20 percent larger than would otherwise be the case.
- Even on very favorable assumptions, the populations of the developing countries will continue to grow rapidly for several decades, expanding perhaps fourfold from present levels and reaching a total of nearly 10 billion.

This article is excerpted from a statement by Mr. McNamara, President of the World Bank, before the Board of Governors in Washington, D. C. on September 27, 1971.



Mr. McNamara was recently re-elected to a second five-year term as President of the World Bank.

The implications of these facts for all of us engaged in development are clear:

- We must intensify our efforts in population planning, seeking to shorten the time required to reduce the rate of growth.
- We must reshape development programs for the next decade or two to take account of what is certain to be a continuing rapid growth of total population.

Much of the most significant knowledge dealing with nutritional deficiencies—and most particularly the implications for development—has been discovered only recently. Even now the full extent of these deficiencies in the less-advantaged countries and the degree to which they seriously limit economic and social progress is only beginning to become apparent. And we have hardly ever begun to develop plans to deal with the problem.

And yet, despite the evidence that with a relatively small per capita expenditure of resources major gains

can be achieved, there is scarcely a country in the developing world where a concerted attack on the problem is underway.

Clearly, the first result of widespread malnutrition is high child mortality. But not all malnourished children die. Hundreds of millions of those who live—and the Food and Agricultural Organization and the World Health Organization estimate that as many as two-thirds of all surviving children in the less-developed countries have been malnourished—suffer serious deprivation of the opportunity to realize their full potential.

While it is difficult to distinguish the effects of protein deficiency on child development from other aspects of poverty in the child's environment, there can be no serious doubt that there is a relationship between severe malnutrition in infancy and mental retardation—mental retardation, which more and more scientists are concluding is irreversible.

Prolonged into adulthood, the poor mental and physical growth characteristics of the early years can greatly impair the range of human capacities. Add to that the current low standards of nutrition for grown adults in much of the developing world, and it is clear why there are adverse effects on the ability to work. Dexterity, alertness, initiative: these are the qualities that malnutrition attacks and diminishes.

As in the case of the population problem, the nutrition problem represents less a need for new and immense amounts of development capital, than a need for realistic understanding of the situation. What we already know suggests that to meet basic nutritional deficiencies of hundreds of millions of the developing peoples will not entail unacceptable costs. It has been estimated, for example, that at a cost of \$8 per child per year one could make up the deficiencies of a diet that now deprives him of one-fourth of his protein need and one-third of his caloric need.

There are, in fact, many promising possibilities for increasing the nutritional value of food through low-cost agricultural and industrial solutions:

- 1) Crop shifts—through appropriate pricing policies—from low-protein cereals to high-protein pulses.
- 2) The introduction of higher nutritive strains of conventional cereals, such as the new high-lysine corn which doubles protein value.
- 3) The fortification of existing basic foods to improve their nutritional value, such as the protein fortification of cereals, and the vitamin and iron fortification of wheat flour.
- 4) The development and distribution of wholly new low-cost processed foods, particularly for the feeding of young children, using available oilseed protein.

The Unemployment Problem

Available statistics and concepts of employment and unemployment are both inadequate and ambiguous in less-developed countries. However, there is ample evi-

dence that although growth rates of national product have increased substantially over the past decade, very few developing economies have expanded fast enough to absorb the growth in their labor force.

It can be misleading to speak of the employment problem. There are in fact two distinct employment problems: one urban, and one rural. Of the two, the urban problem is usually the more dramatic. Estimates of total open unemployment in most developing countries are in the range of 5 to 10 percent of the total labor force. But as this unemployment is very heavily concentrated in cities, the proportion of the urban labor force that is unemployed is much greater.

Worse in Rural Areas

As bad as the urban situation is, almost everywhere the rural underemployment problem is numerically worse; and since it involves the poorest people of a developing society, it is even more tragic. Typically it results from large families sharing the little work provided by tiny farms, or landless laborers who can find jobs only at peak seasons of the year. Rural underemployment is a major cause of the large and often widening gap between urban and rural incomes. In most developing countries average incomes in the urban areas are far higher than in the rural areas. In metropolitan Manila, for example, the average income is almost four times that of rural areas in the Philippines.

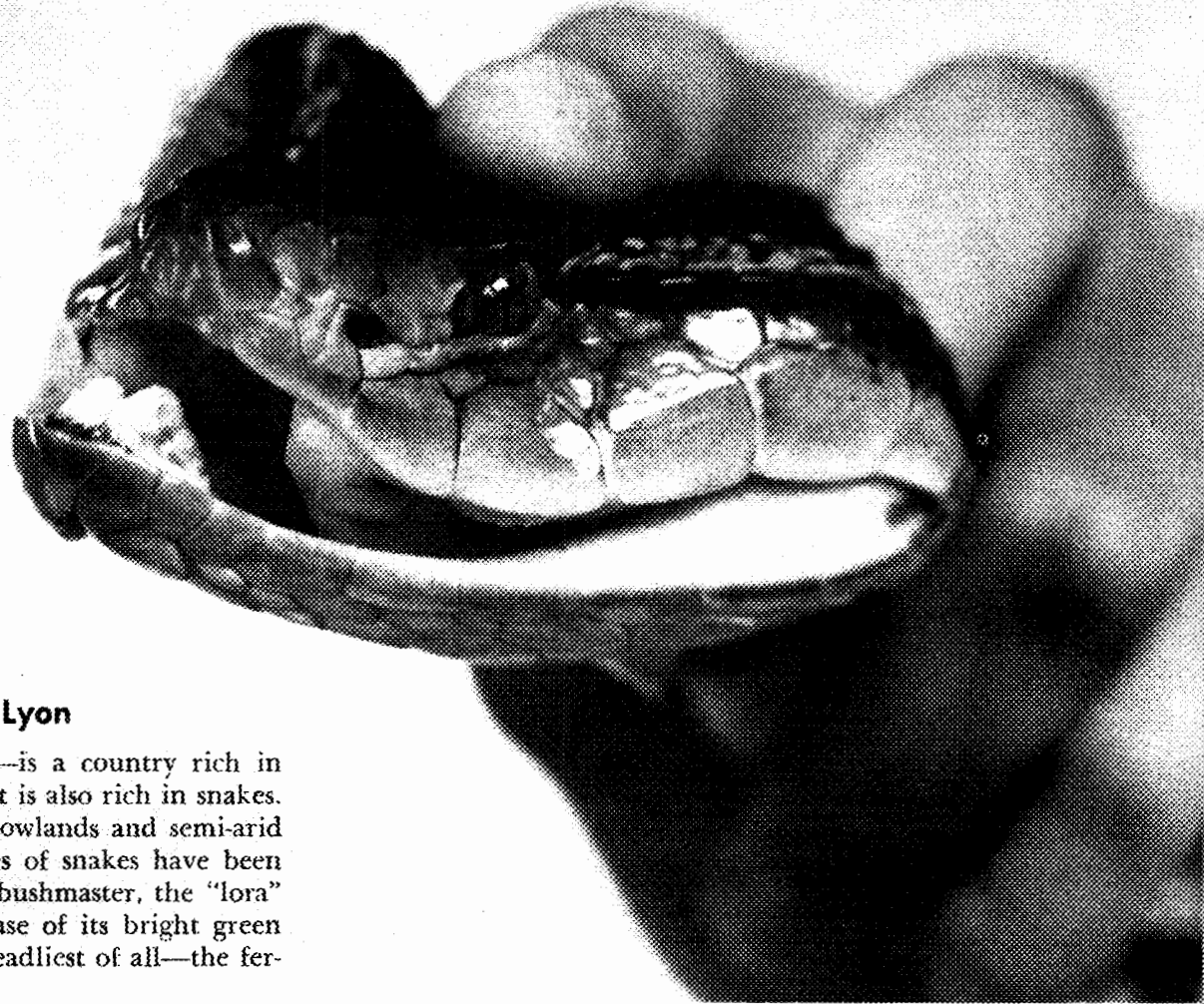
Rural and urban unemployment are clearly related: that in urban areas results from the growing inequality between the incomes of those fortunate enough to obtain urban employment, and the mass of the rural poor. To many in the countryside it appears more attractive to migrate to the cities and wait there—even without work—in the hope of eventual employment, rather than to endure the poverty of underemployment in agriculture.

Although there is a good deal that can and must be done to increase the rate of growth in productive jobs in the urban areas . . . so long as rural underemployment exists, the income gap will exist, and migration to cities will tend to exceed the number of new jobs there. So, solving the urban problem depends on solving the rural problem. And the solution to the rural problem must be found mainly in the rural areas.

. . . Development policies must explicitly aim at greater employment and greater equality of income distribution. The lesson of the last decade has been that we cannot simply depend on economic growth alone to solve the problems of employment and income distribution.

But it is equally true that to frame the issue as a mutually exclusive choice between economic growth and employment is to oversimplify a very complex matter. What is required is a realistic search for measures which will provide satisfactory rates of both job creation and economic growth. We believe that such measures are within reach.

Snakes also Serve



By Vernon F. Lyon

Costa Rica—"the rich coast"—is a country rich in soil, in scenery and in promise. It is also rich in snakes.

In Costa Rica's lush tropical lowlands and semi-arid highlands, more than 600 species of snakes have been found, including the venomous bushmaster, the "lora" or parrot snake, so named because of its bright green color, the coral snake, and the deadliest of all—the fer-de-lance.

Until recently these and other poisonous varieties were killing three or four persons a month and crippling many more. This is a high rate in a country no bigger than West Virginia and having less than two million people. Now, because of a program made possible by the U.S. Agency for International Development, the U.S. Army and the Costa Rican government, the snakebite death rate is approaching zero. Farmers can go into their fields with less fear.

Dr. Roger Bolanos, Director of the Microbiology Division of the University of Costa Rica, heads the organization which has brought down the toll of deaths. He is carrying on in the tradition of an earlier immunologist and student of serpents, Dr. Clodomiro Picado, whose book, "Serpientes Venenosas de Costa Rica", published in 1931, was one of the first definitive works on snakes and snakebite treatment produced on the American continent.

Costa Rica has always known it had snakes, and that the fatal fangs were a threat to development, but it was not until 1965 that the country began to build a capacity to produce the serums necessary for effective counter-action.

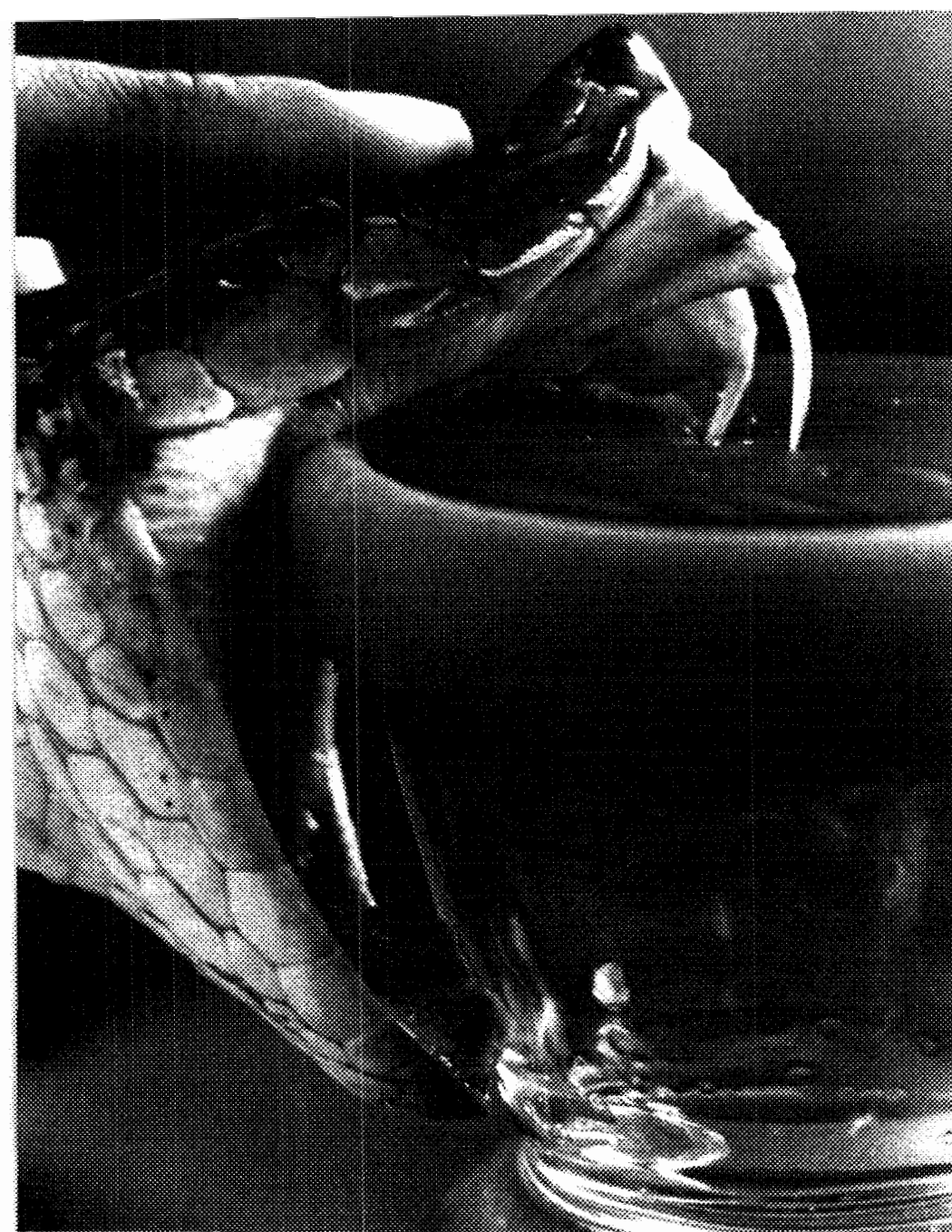
Mr. Lyon is on the staff of Office of Public Affairs, AID.

The Fer-de-Lance is one of the deadliest of all poisonous snakes, but the Colodomire Picado Institute in Costa Rica which AID helped to establish now produces a snakebite serum that is effective against the Fer-de-Lance venom.

In that year, Major Herschel Flowers of the U.S. Army came to Costa Rica with an interest in snakes and a small grant to help establish an immunization program. Until then the country had been dependent on antivenins imported from Brazil and Germany, and none of these was fully effective against the potent poisons of the home-grown vipers.

Flowers gathered a collection of snakes from all over Costa Rica, housed them in his rumpus room at home, and bought a few horses. By "milking" the snakes of their poison and injecting it into the horses, in due course he built up an immunity in the horses' blood. When drawn and subjected to chemical processes, the blood could become the basis for snakebite serum.

This modest operation was still in a stage of experimental testing when the small grant ran out and Major Flowers was transferred to another post. Enough general public interest and specific interest on the part of Costa Rica's Ministry of Health had been generated by this time to make continuance of the work feasible.

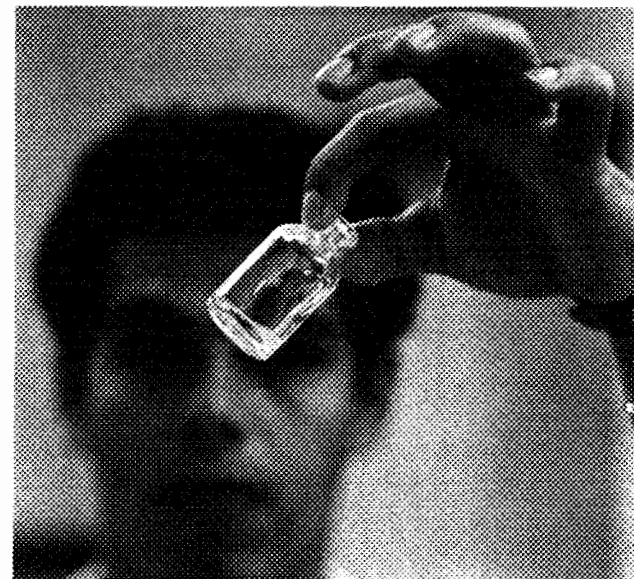


A Fer-de-Lance is milked of its venom at the Institute laboratory. Great care must be used in handling.

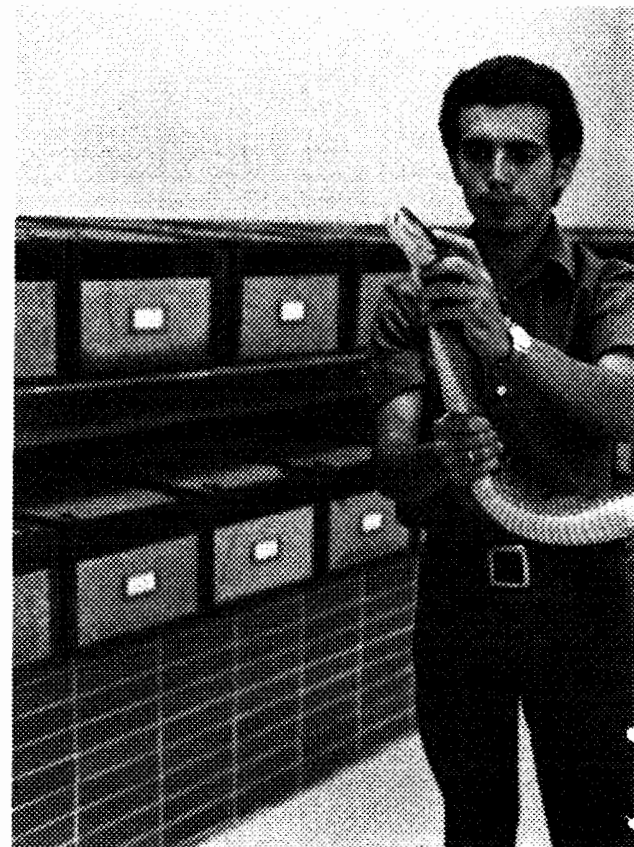
At this juncture AID agreed to provide \$27,000 for needed supplies, laboratory expenses, repairs and upkeep. A smaller pledge of funds was also made by the Ministry of Health.

Direction of the work started by Dr. Picado, given additional impetus by Major Flowers, and saved by AID, was not taken over by Dr. Bolanos. He patiently and persistently continued assembling necessary equipment and training personnel.

The first sample of antivenin was produced in 1966. It was a polyvalent serum, effective against the bite of all snakes except the coral snake. By 1967, nearly a thousand ampules of polyvalent antivenin had been produced and distributed to hospitals throughout Costa Rica for clinical use and evaluation. Laboratory testing at the University of Costa Rica and in the United States proved that the product was effective against all species of poisonous snakes found in Central America, except the coral. Work toward producing an antivenin spe-



A minute quantity of venom, but it is more than enough to prove fatal to a human.



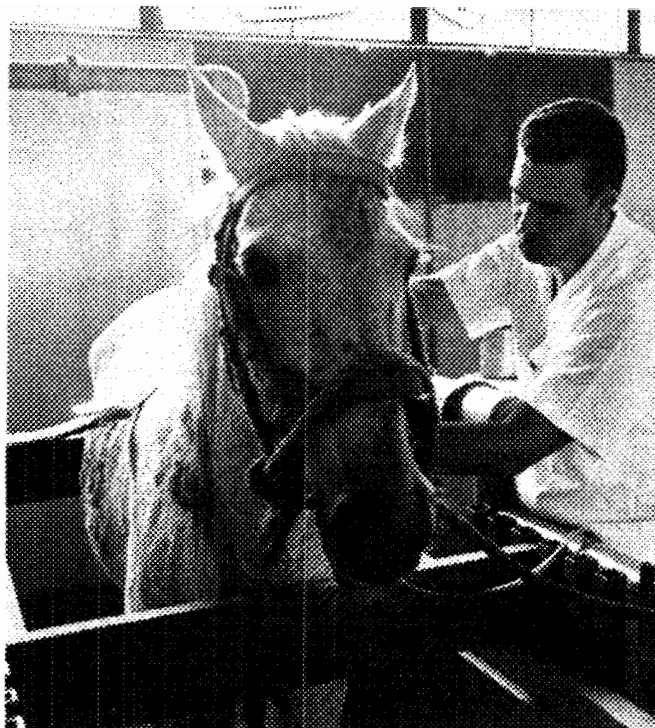
Laboratory assistants hold a seven-foot Bushmaster snake.

Photos by
Carl Purcell

cifically against the coral snake was underway, however, and Costa Rica later in the same year became the second country in the world to produce coral antivenin.

Production of antivenin is conceptually simple but operationally complex, made so in part because it is necessary first to capture snakes.

Costa Rican farmers, some motivated by a desire to serve the public interest, others by a small bounty, keep the serpentarium cages filled. About 100 snakes are continually "in residence".



to Supervisor Richard Taylor draws blood from a horse, which has been injected with small doses of snake venom.



Dried anti-coral snakebite serum awaits packaging in emergency kits. Costa Rica was the second country to produce an effective coral snake serum.



Strict procedures have prevented snakebite incidents at the Institute.

Venom is extracted weekly from all the snakes by making them bite through a membrane covering a funnel. In order to preserve the venom, it is dried and then dissolved when needed.

The venom is injected into horses, initially in very small and harmless amounts. Quantities are gradually increased until the horse has acquired immunity to the venom.

When the horse is immune, 24 liters of blood are extracted from it every two months. The antivenin is pre-

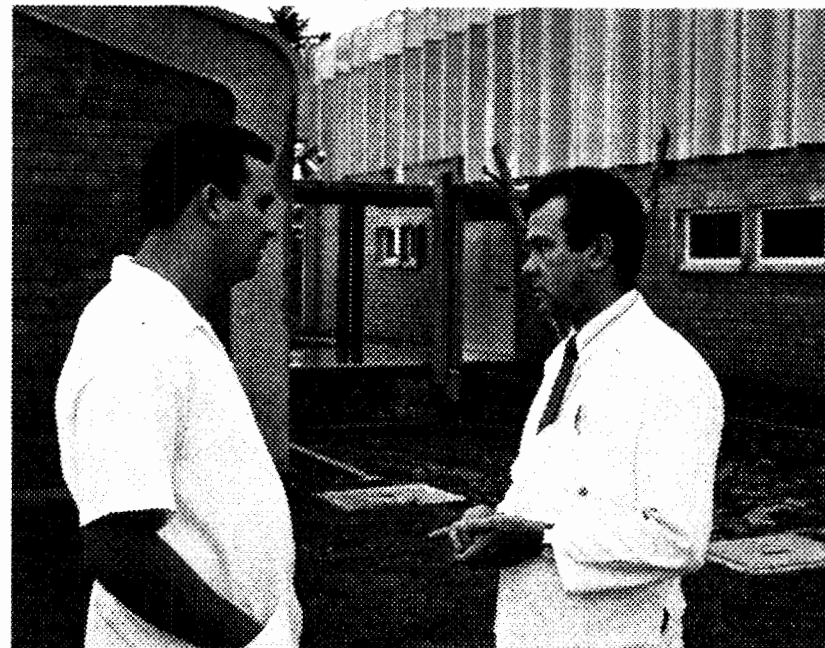
pared from the plasma of this blood by chemical and physical fractionating procedures.

Once purified, the serum is sterilized and antibacterial preservatives are added. It is tested and packed and then ready for distribution. The serum is available at all police stations, pharmacies, schools, hospitals and from rural agents. Emergency kits consist of six doses of polyvalent serum, two of anticoral serum, a disposable syringe and needle and cotton impregnated with disinfectant. Easy-to-follow instructions for treatment are included.

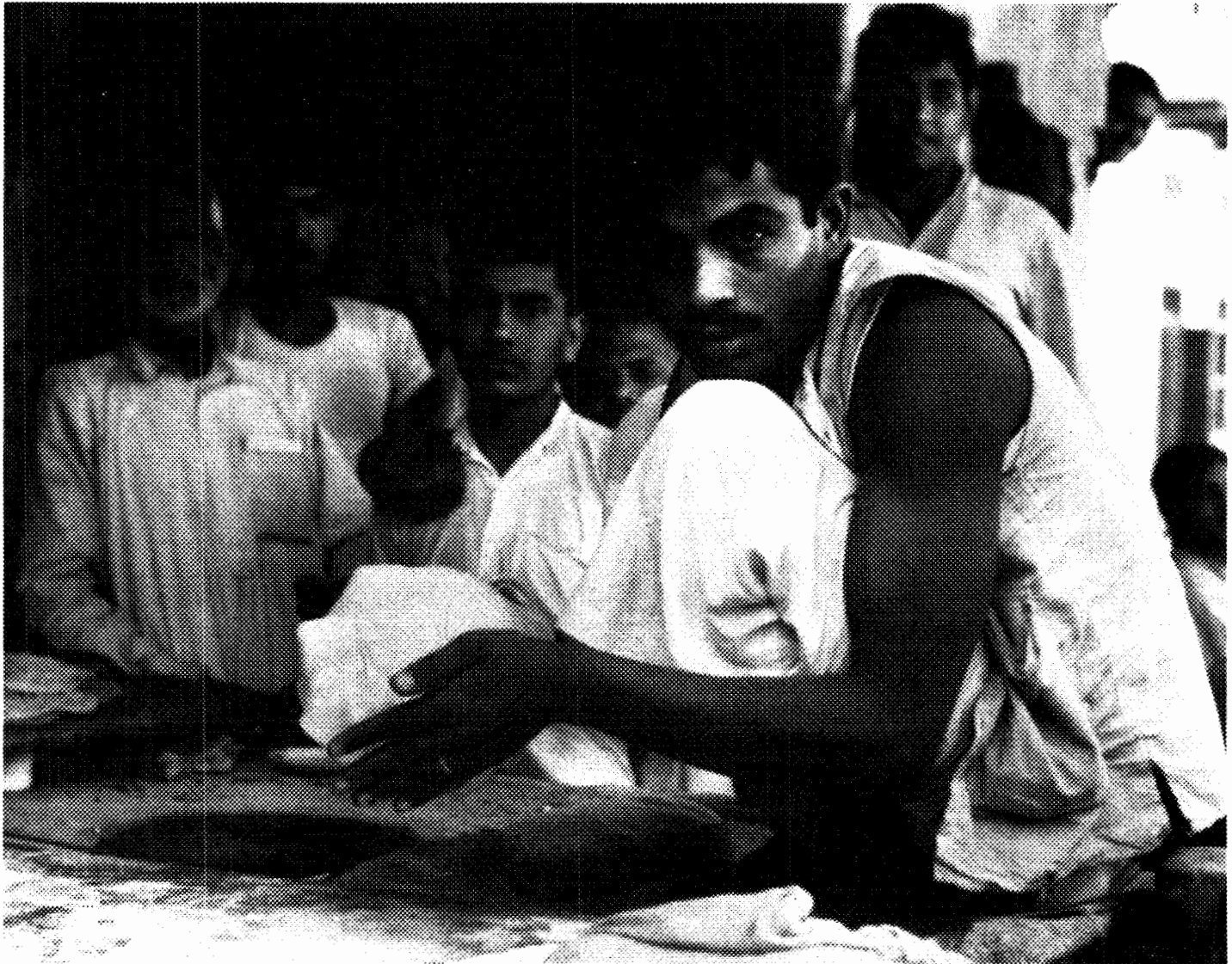
Today the program is financed entirely by the government of Costa Rica through a subsidy that covers the cost of the serum that is distributed free in rural areas and the cost of an intensive public education and training program. Some funds are derived from sale of the serum. Recent customers have included zoos in Chicago and Columbus, Ohio, and the University of Iowa.

The Colodomiro Picado Institute is tangible evidence of a small but effective effort to surmount obstacles to development.

Richard Taylor talks with Dr. Roger Bolanos, head of the Microbiology Division at the University of Costa Rica.



THE TECHNICAL FRONT



Improving the nutritional qualities of Arab bread could significantly improve the diets of the children of North Africa.

Progress in Fortifying Foods

by Irwin Hornstein

Among the most compelling statistics of life in the less developed countries today are those which point to widespread malnutrition, a dark shadow that falls over as much as 60 percent of the populations in these countries.

Particularly vulnerable to the malignant effects of inadequate nutrition are children who are at the critical weaning and pre-school age. This is in part because children in many areas of the developing world are weaned directly to an adult diet where they must compete with other members of the family for available food. Since their share may be minimal, improving the nutritive value of staple foods can be of major importance to children at this age.

Researchers at the Food and Feed Grain Institute of Kansas State University are tackling

Dr. Hornstein is Research Officer in AID's Office of Nutrition.

this crucial problem. Under the sponsorship of the Agency for International Development, they are seeking means of improving the nutritional value of staple cereal based foods by supplementation or process modification. A project imperative is that this must be done without decreasing the acceptability of products to the populations in the developing world and, ideally, without increasing the cost of those foods.

To provide a practical end point to the project as well as to demonstrate the value of a systematic approach to fortifying cereal based foods, the Arab bread and cous-cous products of North Africa and the chapati products of Pakistan and India were selected as staple foods for fortification with the high-protein materials evaluated in the project.

The Survey Phase

An initial survey phase involved a team visit to Morocco and Pakistan. The team gathered first-hand knowledge of dietary patterns, food consumption data on the populations, and material on the nutritional status of population segments. Information was acquired on the composition, preparation, consumption and commercial processing of cous-cous, chapatis and Moroccan bread.

Contacts were also established with research groups in each country to provide for future assistance in carrying out cooperative in-country testing and development of fortified foods.

The second, experimental phase of the project has included a complete analysis of the nutrient composition of grain and grain products, local crops that may serve as potential nutrient sources, supplements derived from local crops and protein concentrates from all sources whether currently available commercially or under development in research laboratories. A series of milling and processing studies to develop grain products with maximum nutrition and to develop process products from wheat, high lysine corn and grain sorghum as nutritional supplements is presently underway. A series of tests to detail the physical functional properties contributed to finished foods by known protein supplements such as soy flour, cottonseed flour, fish protein concentrate, peanut flour and high lysine corn flour, as well as by supplements under development in the project such as wheat protein concentrate, broad bean flour and chick pea flour are nearly completed.

A series of nutritional tests involving animal feeding studies are also being conducted to evaluate the nutrient content and nutrient availa-

bility of subject foods in order to establish a nutrient standard for products developed in the project. The tests will also serve to evaluate the nutritional contribution of protein supplements, including the effect of processing conditions and product form. Organoleptic (flavor, odor, appearance) panel evaluations serve as a final screening device for selection of formulations and products.

The criteria of having maximum nutrition and acceptability at minimum cost for staple foods fortified with protein concentrates is not easily met. Much of the experimental work has involved defining the parameters and limitations of usage of high protein materials. Many of these materials can be used only at limited levels. This points to the concerted effort needed for developing modifications of high protein materials with consistent quality and better functional properties.

The experimental phase of the project has been in progress for about 3 years and the researchers can now predict reasonably well which protein concentrate materials are most suitable for the products with which they are working. The field testing phase of the project is now being planned and will include acceptability and marketing studies both in Morocco and Pakistan.

Work in Progress

Some selected examples of the work in progress can be given to indicate the type of activity that has been underway.

In a series of experiments concerned with improving the nutritive value of chapatis, rats were fed ground whole wheat, attas (crude flour of 80 percent and 95 percent extraction) and chapatis made from them with and without supplementation by lysine, the essential amino acid that is low in wheat but required for maximum utilization of its protein. Growth rates and protein efficiency ratios (PER), a measure of the degree of protein utilization, were evaluated weekly over eight-week periods. PERs were higher for the fortified chapatis than for the non-fortified chapatis. Supplementation of the wheats with lysine resulted in an increase in PER during the first four weeks of the eight week feeding trial. During the second four week period there was an adverse effect on PER. However, supplementation with the same amount of lysine minerals and vitamins increased PER throughout the eight week trials. The results indicated that fortification of cereal products with lysine or protein concentrates should include concurrent fortification with vitamins and minerals, partic-

ularly when the food staples being fortified may contribute up to 80 percent of the daily caloric intake as is often true in developing countries.

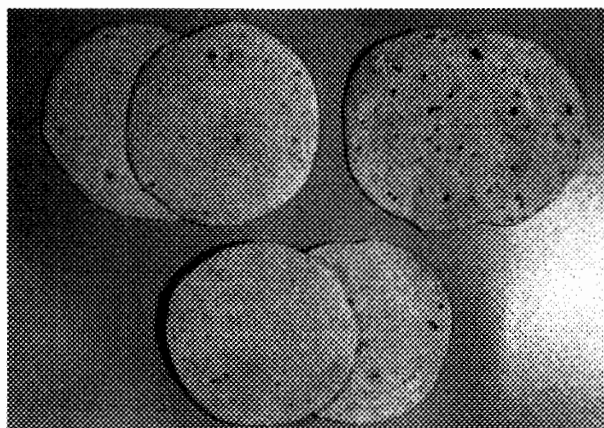
Atta, to make chapatis, was supplemented in another series of tests with 5 percent, 10 percent or 15 percent cottonseed flour. Cottonseed flour aroma and flavor seemed to limit its use as a chapati supplement at the 10 percent level. At the 10 percent level, it was barely discernible. However, at the 5 percent level of supplementation the chapatis were sweeter and fuller in flavor and aroma than other supplemented samples or control products. But difficulty was encountered in the use of cottonseed flour as it produced flatulence and other indications of indigestibility.

Organoleptic evaluations of cous-cous supplemented with 5 percent increments up to 15 percent of broad bean (horse bean) flour has been completed. All uncooked samples of cous-cous semolina containing broad beans were different in color from the unsupplemented semolina and were characterized as being green, bitter and beany in flavor. Broad bean flour aromatics were noted in both the aroma and flavor of the cooked 10 percent and 15 percent supplemented cous-cous and possibly in the flavor of the 5 percent supplemented cous-cous. Nutritional studies performed on both chapatis and cous-cous with added broad bean flour showed that the broad bean flour improved the weight gains of rats fed with these supplemented chapatis or cous-cous.

Promising Breakthroughs

It has been, until very recently, axiomatic that the addition of any non-wheat materials to yeast leavened baked breadstuffs caused a serious lowering of the physical qualities of the bread such as crumb texture and loaf volume. In 1969, Pomeranz, Shogren and Finney of Kansas State University and the U. S. Department of Agriculture Hard Winter Wheat Quality Laboratory found that the addition of natural wheat glycolipids or synthetically produced sucroesters to bread formulations permitted the addition of significant levels of non-wheat protein concentrates without serious effect on the physical qualities of bread.

Dr. Tsen and Dr. Hoover of Kansas State University later found that three commercially available dough conditioners, which have received clearance as food additives by the U.S. Food and Drug Administration, would perform a similar function in the making of protein fortified breadstuffs. As part of this AID project, a concerted effort to improve the quality of breads using these additives in conjunction



AID-financed research at the Kansas State University includes experimental fortification of chapatis.

with protein concentrates has been carried out. For example, a high-protein bread containing 12 percent soy flour that is practically indistinguishable from non-supplemented white bread in texture, color, loaf volume and overall acceptability has been developed by using 0.5 percent of sodium stearoyl-2-lactylate as a "dough conditioner." In tests, this bread has resulted in the growth rate of rats, after four weeks feeding, being over seven times that of rats on a control diet of non-supplemented bread, and shown a protein utilization value of nearly three times that of the control bread.

As a result of these developments, a proposal is currently under consideration to make available through the Food for Peace Program a protein fortified flour containing about 11 percent toasted defatted soy flour plus 0.4 percent of the dough conditioner and vitamins and minerals. The Office of Nutrition is also prepared to assist AID missions interested in evaluating the feasibility of introducing high-protein breads and bread-like products that contain high protein flours derived from indigenous legumes or oil-seeds.

Worldwide Implications

The systematic investigation of high-protein materials with respect to their nutritive composition (protein, amino acids, minerals and vitamins), their physical functional properties, and their effect on the acceptability of everyday foods will be continued for the duration of the study. Such a cataloging of the properties and qualities of protein concentrate materials has worldwide implications and should assist food formulators in determining which of the protein concentrate materials would be most suitable for use in the foods with which they are working.

A WAY for Development

by Kathy Goldbeck

Sixteen young people from six countries met in Washington, D.C., in September last year for an important reason: to discuss a world approach to population planning. As delegates of the World Assembly of Youth (WAY), which represents some eight million members throughout the world, they came to brainstorm ideas, make plans and prepare to implement population planning programs in the world's less developed nations.

Sponsored by WAY and the Population Institute in Washington, the seminar was designed to share resources and information about family planning programs and to activate international cooperation among WAY members in participating nations. Represented at the seminar were Kenya, Ghana, Mauritius, Nigeria, India and the United States. Additional U.S. representatives from the Population Institute, Planned Parenthood, Zero Population Growth and the Population Reference Bureau also participated at the meetings.

Project on Ethics

The meetings were initiated by discussions of several projects being undertaken in the United States. Rodney Shaw, president of the Population Institute, described a few of these:

A project on ethics involves the bringing together of Catholic, Protestant and Jewish ethicists to discuss the meaning of the biblical phrase 'go out and multiply' in relation to the environment and to overpopulation in general. Ethical questions on the general concepts of population control are also on the agenda. Regional meetings are being held among the ethicists, and the findings from these meetings will be brought to a national conference to be held early in 1972.

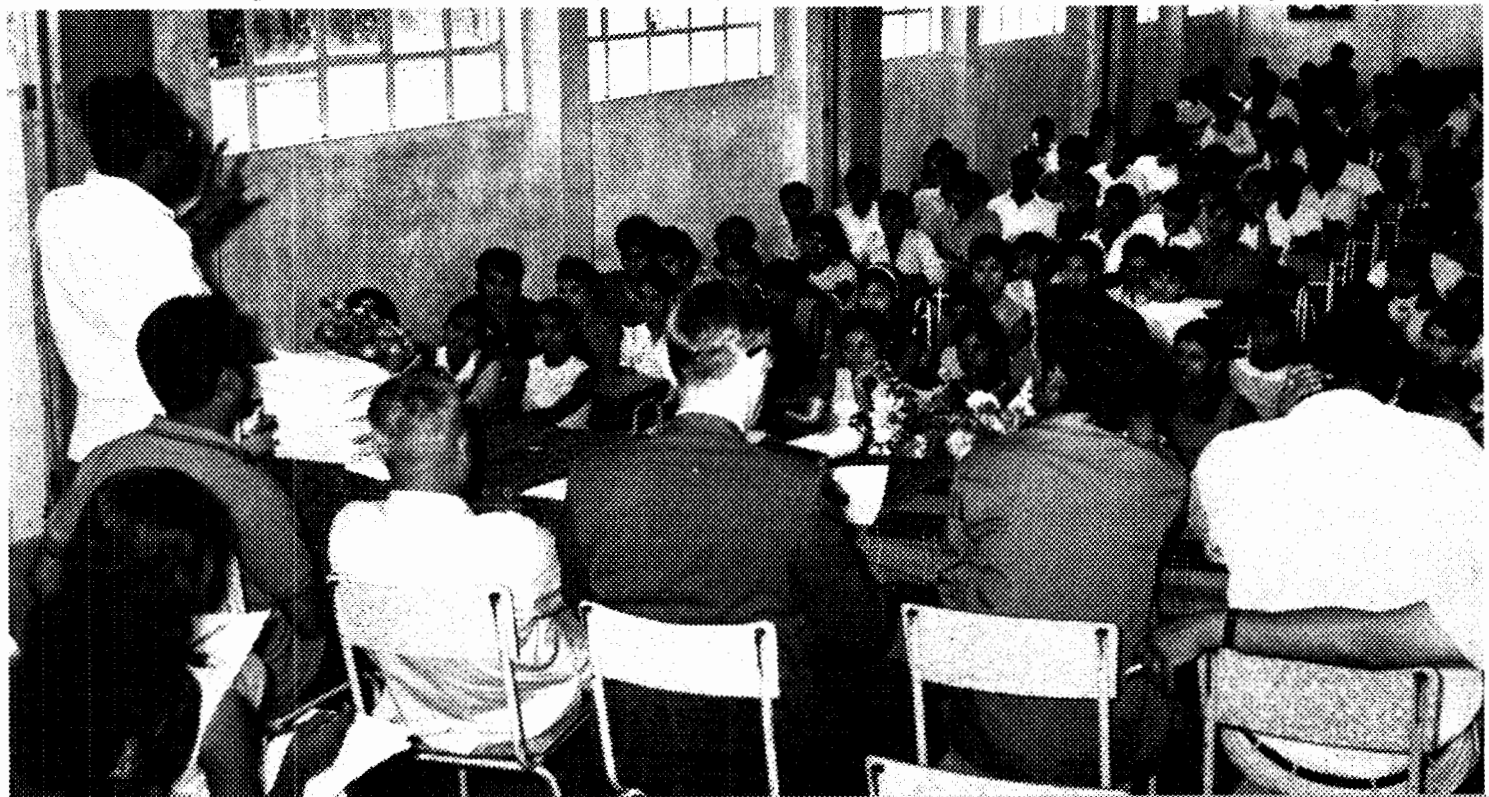
Another project involves a seminar for television producers, directors and writers. The first one-day seminar was held on November 17, 1971, in Los Angeles, California. It was designed to inform programmers about the issues involved in planning population growth. What we hope to do is help these decision makers understand the nature of the population catastrophe, to become excited about it, and to feed more population material into their programs.

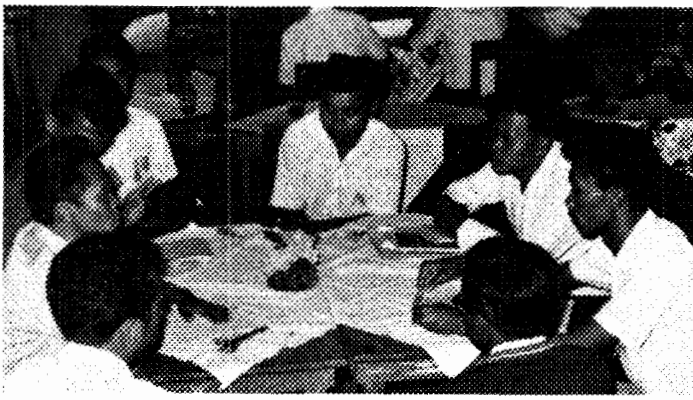
Miss Goldbeck served as a summer intern in the Technical Assistance Bureau of the Agency for International Development. She is currently attending the University of Maryland at College Park.



A girl at a WAY seminar in India speaks to other participants about constructive action they can take to improve their own communities.

In Mauritius, a government official addresses young people attending a WAY seminar on Youth and Family Planning.





WAY working groups, like the one above in Indonesia, discuss specific problems of their communities.

Discussion of these projects led to further exchange on the part of the participants about the programs in their respective countries. "One of the most important parts of the WAY family planning program is the follow-up campaign after every seminar," Sureshchandra Fakun of Mauritius stressed.

Rufus Issac of Nigeria noted, "In our country, the average couple measures its marital success by the number of children they have; often the father works odd jobs, is irregularly employed, and lends little support to the upbringing and welfare of the family. We try to reach these people in our local programs to show them that having one or two less children may help better their situation."

In each of the countries in which WAY is active, national and district seminars are held to discuss the specific problems of the local communities. WAY leaders attempt to motivate concern among young people about the socio-economic effects of overpopulation. Directing attention particularly to the unmarried, the recently married and one-child couples, WAY does not promote birth control as such. Rather its members encourage late marriages, delayed birth of the first child and a reasonable time allowance between children.

Population planning is not a new subject for WAY participants. Since 1964, WAY has realized the serious implications of rampant population growth, particularly in the lesser-developed countries.

WAY's work in these nations is important because large proportions of the populations are totally unfamiliar with family planning concepts. The typical target of WAY campaigns is under 20 years of age, lives in a rural area, and has had little or no opportunity for education. Since WAY's leaders feel that freedom of choice does not exist in a state of ignorance, their programs are designed to educate these people to the advantages of family planning.

Currently, WAY family planning programs are being conducted in India, Indonesia, Mauritius, Ghana, Kenya, the Philippines, Thailand, El Salvador and Trinidad-Tobago. These countries were chosen on the basis of their fast-growing populations and the existence of strong WAY national councils that are both willing and able to work on family planning projects.

Population is not WAY's only concern. Environment, consumer protection, human rights and education also

rank high on the list of priorities. In July this year, an environment seminar was held in Vienna, Austria, to encourage youth involvement in the environment policies of their respective communities and countries.

Encouraging international youth cooperation and participation in government, the World Assembly of Youth has sponsored many activities such as the population and environment seminars over the past 20 years. As a world-wide confederation of national councils, WAY's key aims are:

- fostering international understanding and cooperation
- increasing inter-racial respect;
- giving information about youth problems as well as methods and activities of youth organizations;
- furthering the exchange of ideas and assisting in the development of youth activities, of youth organizations, and of their national consultative groups;
- encouraging young people to take a full measure of responsibility in their own organizations, their societies, and their states, and developing good relations with voluntary and governmental organizations.

Today WAY represents over 1,000 youth organizations around the world with membership totalling over eight million young people in major political parties, cultural organizations, and student and educational groups. Sixty-four countries are now affiliated with WAY, and another 40 serve as associate members.

Funds are derived from various sources. The Secretariat noted that member committees and standing contributions constitute the basic support for the elected members of the secretariat and the minimum number of supporting persons necessary for WAY's functioning. Governmental and intergovernmental contracts relate to specific projects. Such support has been recently received from UNESCO, the Food and Agricultural Organization (FAO), the Agency for International Development and the governments of Belgium, Germany, and Japan.

Private fund raising has included support from various projects such as the Canadian Miles for Millions Walks Committees, the American Freedom From Hunger Foundation, the Australian Freedom From Hunger Committee, and similar local organizations in Holland, Belgium, and the United Kingdom. Private support comes from individuals and corporations in several countries, including the United States.

Uniting youth in a search for international cooperation and understanding, WAY is dedicated to the ideals set down by the United Nation's Universal Declaration of Human Rights. By mobilizing today's young people to help themselves, their neighbors, and their countries, the World Assembly of Youth is contributing to world development and peaceful cooperation.



'Evolve or Perish', from p. 4

"The improvement in health resulting from malaria campaigns has broken the vicious circle of poverty and disease resulting in ample economic benefits: increased production of rice (and wheat) because the labor force is able to work; opening of vast areas for agricultural production: India, Nepal, Taiwan; and augmented land value where only subsistence agriculture was possible before.

"The safety record of DDT to man is truly remarkable. At the height of its production 400,000 tons a year were used for agriculture, forestry, public health, etc. Yet in spite of prolonged exposure by hundreds of millions of people, and the heavy occupational exposure of considerable numbers, the only confirmed cases of injury have been the result of massive accidental or suicidal swallowing of DDT. There is no evidence in man that DDT is causing cancer or genetic change."

Although more than 1,400 chemicals have been tested by WHO for use in malarial campaigns, only two have shown promise and both of these are far inferior to DDT.

As more and more scientific evidence accumulates, the charges against DDT become less and less convincing. There, of course, is evidence that man and most species of birds, fish and animals that have been examined have small quantities of DDT and/or other related compounds such as polychlorinated bi-phenyls in their fat. But there is very little convincing evidence available to date which indicates that it is threatening the existence of any species, nor is it causing any discernible injury to man.

Part of the past confusion concerning pesticides in the environment derives from the tremendous improvements that have been made in recent years in chemical analysis. Prior to the development of gas chromatography in 1956, the level of detection of many compounds with the paper chromatography was one part per million. With gas chromatography it became possible to detect one or two parts per billion, or even a few parts per trillion, both of which, of course, would have gone unnoticed 20 years ago. But such sensitive methods can also detect contaminants and in the hands of an inexperienced operator may lead to wrong conclusions. A recent article by Dr. Thomas H. Jukes, a reputable biochemist, emphasizes this dilemma:

"How reliable is the test? There is a delicate analytical procedure called gas liquid chromatography with electron capture. Sometimes I wonder whether this method in the hands of inexperienced people has done more harm than good. There has been a great hue and cry over alleged traces of DDT in the Antarctic penguins, amounts of the order of one or two parts per billion. I have not yet been convinced by the validity of these results. A few months ago at the University of Wisconsin, some soil samples that had been sealed since 1910 were tested for synthetic organochlorine pesticides by the latest, most delicate gas chromatographic procedure. Several pesticides were detected in 32 of the 34 samples.



The only flaw was that these pesticides not only were not used in 1910, they did not even exist until 1940."

Another complicating factor in identifying the origin of chlorinated hydrocarbons in human, animal, bird or fish tissue is that many thousands of tons of chemical wastes of all kinds have been and are still being dumped into the oceans. Do not some of these also get into the food chain?

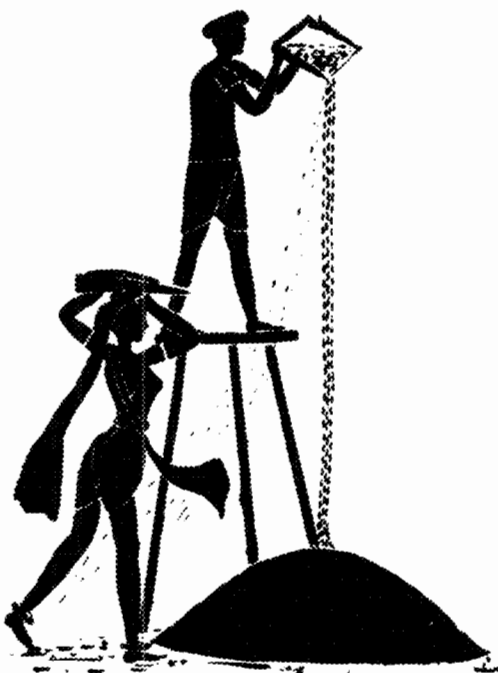
If the use of pesticides in the U.S.A. were to be completely banned, crop losses would probably soar to 50 percent, and food prices would increase four to five fold. Who then would provide for the food needs of the low income groups?

Soil infertility is the greatest curse of the densely populated developing nations of the world. Continuous cropping over centuries of time has depleted the soil of one or more of the essential plant nutrients. The result is that grain yields have reached equilibrium at a very low level, generally between 500 to 800 kilos per acre. Since the per capita area of land that is available for cultivation in these countries is very limited and cannot be appreciably expanded, most of the population lives in poverty at or near the starvation level. The only way that this vicious cycle can be broken is by the restoration of the limiting plant nutrients to a level which permits the production of high grain yields. This can be achieved by applying the proper kind and amount of fertilizer. Under most of these conditions the major elements limiting crop yields are nitrogen and phosphate, although in some soil types potassium is also limiting. Under certain situations, one or more of the minor elements must also be added in combination with the proper dosages of major elements, in order to restore high yields.

The breakthroughs in wheat, rice and maize production that are being achieved by the Green Revolution in a number of countries could not have been realized without the application of heavy doses of the right kind of fertilizers. Skilled use of chemical fertilizers will be

required in the developing nations in the next decade if these nations are to revolutionize their agriculture.

We have long had gardeners and farmers who believe that food crops produced by the use of organic fertilizer derived from decomposed plant residues and animal manures are different and superior in nutritive value from those grown from chemical fertilizer. They refuse to believe that the plant is unable to distinguish between nitrate, phosphate or potassium or any other essential element derived from the decomposition of organic materials from that applied from a sack of chemical fertilizer produced in a factory. They fail to understand the magnitude of the plant nutrient deficit, and that the use of these organic materials can do but little to solve the fertilizer needs of the world.



A recent study by Dr. Keith Barrons, a vegetable breeding and chemical weed control specialist, clearly indicates the increase in efficiency in food, feed, oil and fiber crop yield and production of 17 crops over the past 30 years. Using the average yield and production figure for each crop for the 1968-70 period as a base, calculations were made to determine the area that would have been required to provide the same total output using the 1938-40 yield figures. The results are startling. The area of 281 million acres cultivated to these crops in 1968-70 produced enough to meet the domestic needs of the U.S., with an additional amount of produce for export, valued at \$7 billion. The amount of *additional land* that would have been required to produce the *same quantities of these products using 1938-40 yields and technology would have been 292 million acres*, bringing the total to more than double the area under cultivation in 1970. Much of the increase in per acre yield and total production in 1970 compared to 1940, was due to the increased use of agricultural chemicals, especially fertilizers, insecticides and weed killers. Improved cultural practices and better seed undoubtedly also played a role.

Within the past decade, because of the improved technology and higher yields, it has been possible to remove 50 million acres from cultivation and still meet both the domestic and export needs for agricultural products. Were the country still relying on the 1940 technology, however, not only would the 50 million acres now held in reserve be back under the plow, but, moreover, an additional area of 242 million acres by necessity would have been opened to cultivation. In reality, it would require considerably more than 242 million acres of additional land since the quality of much of the land is poorer than that now in cultivation. Besides it would mean opening to cultivation lands that in large part are rolling, or semi-arid, and consequently vulnerable to erosion by water and wind, and also clearing the forests. Consider the additional havoc that this expansion of cultivated area would have caused to the wildlife habitat, and especially to rare and endangered species of animals and birds that are already on the brink of extinction.

Although Barrons' study was made in the United States, it behooves all mankind to increase the efficiency of agriculture throughout the world if we wish to alleviate human suffering, conserve wildlife and improve recreational opportunities. For instance, unless the food production of East Africa is expanded to meet the region's growing food needs, the large animals in the game reserves and national parks of East Africa will be poached out of existence within the next three decades. Similarly, the elephant, tiger, and peacock will perish from India because of population pressure.

I have been a great admirer of the splendid work that has been done by game management experts in the United States in re-establishing species such as the wild turkey that was nearly extinct. Under wise management and protection many other species of wildlife have made spectacular comebacks. The tremendous success of the introduction of the Chinese ring-neck pheasant and the Hungarian and Chukkar partridge are other tremendous accomplishments. The research that has brought under control the lamprey, that threatened the survival of the lake trout, is another tremendous achievement; so is the introduction of Coho salmon into Lake Michigan and Lake Superior.

These are examples of how mankind must use the brain and mind with which he is blessed. Unlike all other species, man can take stock of himself and project ahead to see the great difficulties that will be forthcoming—from hunger, exploding unemployment, inadequate housing, clothing and education, worsening difficulties with transportation and communications, lessening opportunities for recreation, a frightening rate of depletion of non-renewable resources, and a worsening situation with the environment as well as increasing problems with social, political and civil chaos.

Unless man abandons the folly of trying to compete reproductively with the highly fertile aphids, he will flunk the imperative: "evolve or perish," and leave behind only his imprint in the book of rocks.

Russian Aid Drops—China's Rises

Economic assistance to the less developed countries by Communist countries showed renewed strength in 1970, primarily because the People's Republic of China, emerging from the Cultural Revolution, resumed its bid for a greater role as an international power.

The U.S. State Department reported that in calendar year 1970 total Communist pledges of new economic assistance rose nearly one-quarter to \$1.1 billion, despite the smallest annual commitment by the Soviet Union since 1962 and a sharp decrease in East European aid over 1969.

The donor that made the difference was the People's Republic of China, which pledged over \$700 million, a sum nearly matching all aid previously given by that country since 1956. Over \$400 million of this aid went to two African countries, Tanzania and Zambia, for construction of the TanZam Railroad, the largest single project ever undertaken by a Communist country in the less developed world. Consequently, in 1970 Africa displaced the Near Eastern and South Asian

region as the top recipient of Communist economic aid.

While the 1970 Communist pledges brought the total aid extended to the developing countries since 1954 to over \$11 billion, less than half that amount has actually been delivered. Moreover, in the case of Soviet aid, unless deliveries are substantially increased in the next few years, the net aid flow will decline as repayment obligations continue to rise. For several countries net aid, in fact, could drop to zero and result in a backflow to the USSR as repayments exceed deliveries.

A breakdown of the figures shows that the USSR extended credits and grants amounting to \$204 million in 1970, compared to \$662 million in 1969. The Eastern European countries provided \$187 million in 1970, and \$230 million in 1969. No economic aid was provided in 1969 by China, compared to the \$709 million in 1970.

For a comparison in aid-giving, the 1971 year-end review of the Development Assistance Committee,

the group of 16 western nations engaged in providing economic assistance to the developing countries, reported a total \$8.1 billion in official development assistance commitments during calendar 1970, an increase of \$500 million over the previous year. The U.S. contribution to the total was \$3.4 billion in bilateral and multilateral economic assistance, Food for Peace, Peace Corps and other official government programs.

Coincidentally, the U.S. Agency for International Development reported that its commitments for Fiscal 1971 totaled \$1.861 billion, slightly less than the \$1.877 billion provided in Fiscal 1970.

Eighty percent of AID's commitments to countries in Fiscal 1971 went to 10 recipients: Vietnam, \$388 million; India, \$206 million; Colombia, \$84 million; Brazil, \$79 million; Indonesia, \$79 million; Khmer Republic (Cambodia), \$70 million; Korea, \$61 million; Turkey, \$54 million; Laos, \$49 million, and Nigeria, \$33 million. The Nigeria sum included \$18.2 million for the International Relief Effort.



Thomas C. Niblock, Director of the U.S. AID Mission in the Philippines.

Progress and Justice

In a report to the Seventh Asian Regional Conference of the International Labor Organization in Tehran, ILO Director-General Wilfred Jenks emphasized that social progress and social justice "are not luxuries which must wait until satisfactory rates of economic growth have brought about higher levels of prosperity. They are, on the contrary, basic to the success of the development effort itself." Jenks observed that "if a handful of countries in the region have reached prosperity or are in sight of it, and if signs of progress can be seen almost everywhere, the essential condition of Asia is still poverty."

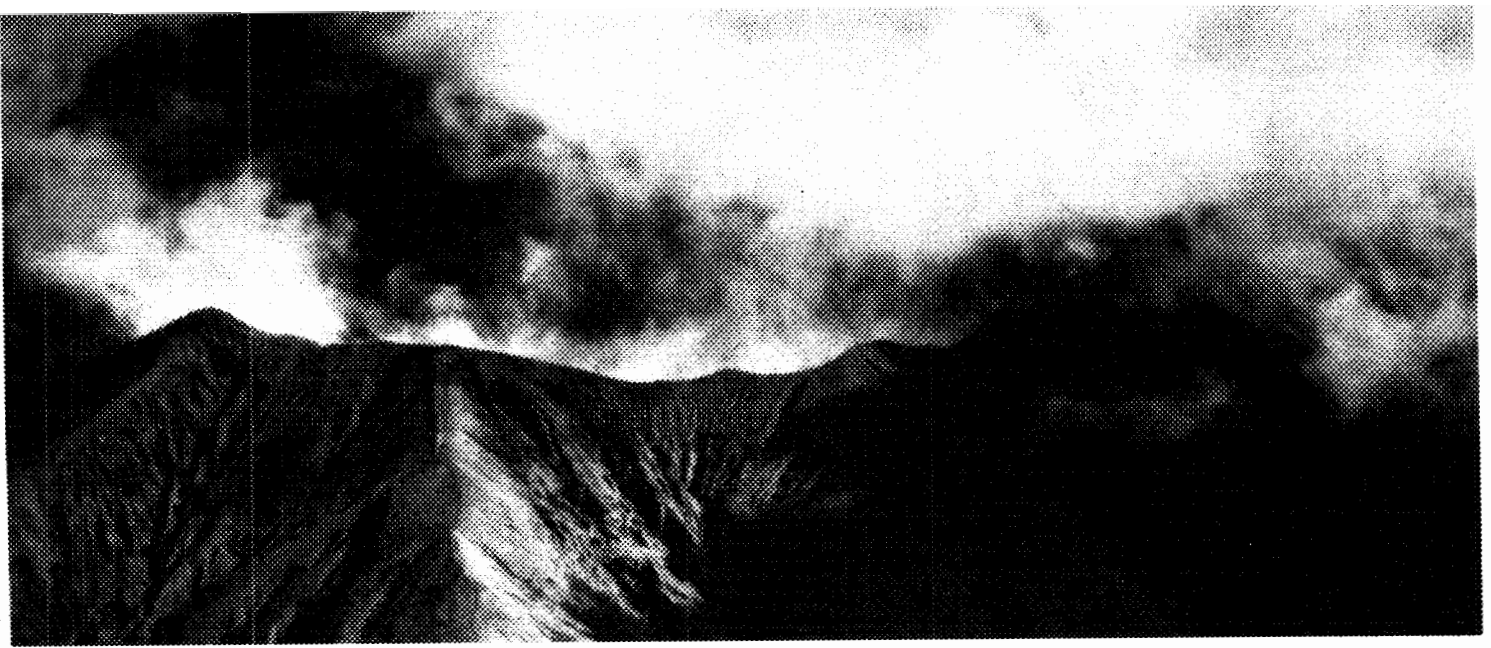
IN BRIEF

Power Plants for Philippines

There are approximately 30 million people living in the Philippines who do not have electricity available to them, according to a joint survey conducted by AID and the Philippine National Electrification Administration. To help reduce this figure, the U.S. government recently turned over to the Philippine government electrification equipment for four complete power plants to be established and operated by consumer-owned cooperatives in the provinces. The power plants for the four electric cooperatives are expected to be

put into operation in 1972 to bring much needed electric service to farms, homes, industry and remote barrios.

President Marcos and U.S. Ambassador Henry Byroade November 23 signed the transfer agreement covering the acquisition of excess property for the Philippine electrification program. The equipment from military installations in Okinawa was originally valued at over \$1 million. Under a bilateral agreement, a considerable amount of U.S. excess property will be acquired and utilized for the Philippine electrification program, according to



Watching a Caribbean Volcano

Scientists from the University of the West Indies have taken over the task of monitoring Mount Soufriere volcano on St. Vincent island in the Caribbean for signs of a possible eruption.

They were trained in the use of special surveillance equipment by volcano experts from a U.S. Geological Survey team who began

monitoring the 3,864-foot volcano November 28 under AID sponsorship.

The U.S. Geological Survey's volcano monitoring included the use of infra-red aerial photography, conventional photography, seismic measurements, temperature recordings and visual observation. To obtain this data, the Survey used two

U.S. Navy reconnaissance aircraft containing special equipment. The monitoring indicated the possibility of the eruption of Mt. Soufriere.

About 3,000 persons have been evacuated from the northern part of the island where the volcano lies. The island of St. Vincent, which is 18 miles long and 11 miles wide, is about 100 miles west of Barbados.

QUOTES

"The ugly fact is that in the runaway reproduction of East and West Bengal the milk of human kindness had dried up and shooting started, not to conquer human beings, but to shuck them off. . . . Where the proliferation of people far outruns the ability of resources to support them we will see, increasingly, a turning to the sword. If we can't get population under control by the end of the century the world will be full of Bangla Deshes."

*Jenkin Lloyd Jones
The Evening Star
Washington, D.C.*

"The President has proposed that technical assistance activities be turned over to a new International Development Institute. . . . What is needed now is a new kind of semi-autonomous public body with the capacity to bring together the best

of American science and technology and make them available to a peace-seeking world.

"The new institute should have the capacity for drawing on the scientific and technological resources of the whole American system, including contributions from federal and state governments, the private sector and the universities. It should have a capacity for continuing analysis of the changing development needs of the world and the capacity to respond to the most basic needs, including questions of population size, food supplies and the relationships between man and his environment.

"The institute should have a capacity to provide technical support and assistance on recognized problems, and it should have a very great capacity for problem-solving research and to assist the developing nations in the development of their own capacities for research and for the training of professional and scientific people.

*John Blackmore
University of Minnesota
St. Paul, Minnesota*

IN PRINT

Farmer Cooperatives in Developing Countries: Published by the Advisory Committee on Overseas Cooperative Development, 1430 K Street, N.W., Washington, D. C. 20005; 32 pp.; \$1.00.

The Advisory Committee on Overseas Development Cooperatives works with AID in planning and implementing programs involving cooperatives in the developing countries. As the foreword states:

"This report is written to help people who are involved or interested in development, but not expert in farmer cooperatives, to have a better understanding of cooperative development problems."

The report discusses the role farmer cooperatives have played and their potential. The record, the report admits, is not impressive, but this is related to the problems of development, rather than the institution itself.

Consortium Aids African University

The U.S. Agency for International Development has awarded a seven-year contract to a consortium of three universities to develop graduate agricultural programs at Makerere University in Kampala, Uganda.

The first year budget of \$421,000 provides up to eight staff members for the faculty of agriculture at Makerere University. West Virginia University, the prime participant, is providing four members; Ohio State University is furnishing three, and North Carolina A & T at Greensboro is assigning one person initially. Dr. Newton M. Baughman, director of international programs at West Virginia, is chairman of the steering committee that will develop policies and procedures for the project.



Photos by Carl Purcell

Dr. Richard Wurster (right), horticulturist member of the West Virginia University team, and Buxton Kiviri, head nurseryman, check pineapple on Makerere farm.

The new graduate program will help develop expertise in crop science and production, rural economy and extension. Makerere, the oldest university in East Africa, has the largest agriculture faculty and has tripled the enrollment of agriculture undergraduates to 236 since 1965.

Part of this growth has been credited to the advice and guidance

of a West Virginia University team that has been at Makerere since 1965 under an AID contract. Considerable emphasis has been placed on the teaching program, which has been revamped to eliminate overlaps and gaps, more in the tradition of U.S. land grant techniques.

The approach to research also has been changed, with the help of the West Virginia team.

"Under the old system," one of the team reported, "research was a strictly individual enterprise, mainly to satisfy the individual's curiosity. Now, a staff member seeking to do research must submit justification for the method and budget he intends to use. He must have approval by the department head and dean. A National Research Council has been set up and has adopted this procedure for research throughout Uganda."

In extension work, the West Virginia team helped launch an annual "field day" in the fall, providing a public view of the work being performed in livestock, poultry, cereals, bananas, pineapples, and other fruit and vegetables being tested at the university's experimental farm.

One of the projects being carried on under the guidance of Dr. Okra J. Abbott, animal physiologist, is the improvement of poultry, seeking to find hybrids that are of good laying and meat quality.

Particularly important are several projects concerning bananas. Dr. Paul Moe, soil microbiologist, points out that bananas are the staple food of 75 percent of the people of Uganda and improving both the quality and quantity, could have considerable impact on the health and economy of the Ugandans. The major projects are being conducted in nutrition, fertilizers, management practices, pest control and water utilization.

To assist the work, Dr. Moe di-



Dr. Okra J. Abbott (left), animal physiologist, and M. W. Okat, former AID participant, inspect an example of the poultry raised on the experimental farm.

rected the construction of what may be the largest lysimeter in the world. This is a scale to measure the percolation of water through the soil and how much water a plant uses.

Another research project with potential impact for Uganda's economy is in pineapples, which have been grown in Uganda only on a small scale. According to Dr. Richard Wurster, horticulturist, the project has had remarkable results, and the possibility exists that a pineapple industry for export can be developed.

Dr. Paul G. Moe, soil microbiologist with the West Virginia University team at Makerere, displays a variety of bananas used in Uganda for cooking.





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Street scenes in South Asia illustrate how chapatis are prepared and sold on the spot. Research on protein fortification of such staple foods is currently being sponsored by AID. (See Page 12)

