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ANSWERS TO QUESTIONS: PANEL DISCUSSION, FIFTY-SEVENTH ANNUAL MEETING.

Editor's note: President Elnore Stoldt asked four Past-Presidents of the Illinois Academy of Science to answer, at the 57th Annual Meeting, the questions posed in the presidential addresses that each gave at the end of their tenure in office.

THE IMPORTANCE OF BEING NOURISHED A REVIEW AFTER FIVE YEARS

HARLOW B. MILLS

Illinois Natural History Survey, Urbana

It was scarcely daylight when we arrived at the airport in Belém, Brazil. This is a relaxed area; the plane's crew didn't arrive until twenty minutes after departure time, but soon we were airborne and heading northwesterly across the south arm of the Amazon, across the tremendous estuarial island of Marajó, across the north arm, and in something over an hour we were descending toward the city of Macapá, the capital of the Territory of Amapá. Here we were whisked off to the interior of the Territory in the general direction of French Guiana. As we left Santana in a flango-wheel bus, we crossed the equator the third time that morning; once coming in the plane, once in the car taking us from Macapá to Santana, and once in the bus leaving Santana.

We were heading into the fetid tropical jungle, with all of its dangers and ills. But the jungle had to wait while we traversed 100 kilometers of tropical savanna to Porto Platon and the Amapari River. At this point we encountered the dense growth one associates with the tropics where rainfall is abundant and temperature high, and we were in it all the way to Serra do Navio, the other railhead, where the mine was located.

Cut right out of this jungle growth was a modern city of about 2,000 people. The ambitious forest pressed in on the clearing on all sides. We were settled in delightful guest quarters with screened windows, fans and even refrigerators stocked with cold drinks. Then we were taken on a tour of the city. We saw the recreation hall and its swimming pool, the theater where movies are shown, the school, the super market, the laundry, the bakery, and the ice plant. As we drove on to the hospital there were toucans yelping in the jungle on our right.

The hospital had been saved for the last, for it was their jewel, the showplace of the city. It was immaculate and comfortable. It had an out-patient clinic, doctors in numerous specialties, and 36 beds. It had an operating room and modern X-ray equipment, and all meals were planned by professional dietitians.

I talked to Dr. Paulo Antunes, the health adviser for the mining company. What were the greatest causes of hospitalization, I wondered. Did malaria give them much trouble? How about yellow fever, filariasis, schistosomiasis, Chagas disease?

Dr. Antunes smiled and said, "Our greatest cause for hospitaliza-

tion is childbirth. We have these other things licked."

I have been asked to enlarge on the presidential address I gave before the Academy in 1959, and to point out areas where we have made some progress. Unfortunately, I cannot do the latter, for we have made little discernible progress in this important matter of numbers of people. The world population is growing at the rate of 5,600 souls an hour, and even the *rate* increases a little with each hour that passes.

Much has been said about this paramount problem since the talk I gave in 1959. More people are interested. High level agencies have pontificated on the subject. Each one seems to be striving to say the same things in a different way, to impress a public that remains stolidly unimpressed. Man seems to be able to manage everything but himself.

To get to the matter of food, or the lack of it, appetite is an individual thing. We each have one. But there are more of them all of the time in this finite world. For the moment let us narrow our view to the United States alone.

Right now there are about 180,000,000 people in the country. There were at the last count about 1,124,000,000 acres of agricultural land. Simple arithmetic indicates that this gives each person 6.24 acres for his support. Demographers believe that the population will double in 40 years to an estimated 360,000,000 people. Agricultural statistics show that this agricultural land is being usurped for non-agricultural uses at the rate of over a million acres a year. If these figures are somewhere

near correct, and if the trends continue, about the year 2,000 we will have 360,000,000 people and 1,084,000,000 acres, and the average agricultural acreage for each person will have dropped from 6.24 to 3.0.

If this occurs, our food production from each acre of land must more than double; we will have to be 108% *more* efficient than now. When one considers that the introduction of hybrid corn increased our corn production by a third, and this over a period of 25 years according to Director James G. Horsfall of the Connecticut Agricultural Experiment Station, one can see what the magnitude of the task in the next 40 years is.

If we assume that the calculations are 50% in error we still have a job the magnitude of which is astounding. And we are the best fed country in the world. In less fortunate areas things do not get better. For example, in Brazil, where production increased in 1963 by 2.4% the population increased by 3.1%. We read that in Mexico the birth: death ratio is 4:1 and that in 20 years there will not be 36 million Mexicans, there will be 70 millions. Can these people be fed an adequate diet? In Ceylon the death rate has dropped from 21 to 12 per thousand, the population increased 30% from 1950 to 1960; the per capita income at \$129 in 1955, a bare subsistence level, dropped 10%. James A. Michener says that the population of Asia will increase from 1.5 billion to 3.5 billions during the lives of many now living. Further, he says that in countries like India a third of the people now exist on 20¢ a day. These people

are hungry people. The National Academy of Science says that it took the first 1,700 years after Christ to double the world's population, it doubled again in the next two centuries, again in less than 100 years, and the present rate of production will telescope the phenomenon of the first 1,700 years into 35 years.

This is not an even growth. Japan and most European countries will double in 50 to 100 years; the Soviet Union, the United States, Australia, New Zealand, Canada, and Argentina are a little faster, doubling in 30 to 40 years; the great underdeveloped, already hungry areas including most of Asia, the Philippines, Indonesia, Africa, Caribbean Islands, and most of Latin America will double in 20 to 40 years.

We hear much of the balance of nature these days. The balance of nature can be defined as a state where every species in the environment is at harmony with every other one, in that each makes no demand on the environment greater than its contribution. This is really an unattainable situation, and it can be approached only whereon one component does not set up standards which favor itself over the other components. Man has set up just such standards for himself and, what is more, has built in certain feed-back mechanisms which further enhance his position. There is woe-

fully little any more that comes close to a balance, but I shall leave to Dr. Evers (with my very strong endorsement) the task of enlarging on the subject of our needs for preservation of natural areas.

I am not really disturbed but that nature will take care of this human upstart in one way or another. Man never seems to have enough time, but time is what nature has the most of. What I am disturbed about is *how* this equalization will take place. As reasoning beings, we have a chance to fit ourselves into the environment—or we did have such a chance one time—and to continue in reasonable harmony, making our demands and contributions to this environment balance. But this we are not willing to do, and in the course of time nature will step in.

The President of the National Academy of Science has this to say, "The problem of uncontrolled population growth emerges as one of the most critical issues of our time since it influences the welfare and happiness of all the world's citizens. It commands the attention of every nation and society . . ." I must agree with President Sietz. I must also agree with Director Horsfall when he says, "We live indeed in the fat years. May the lean continue to be something we only read about in the Old Testament."