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AGRICULTURAL PRODUCTION AND THE POPULATION OF THE UNITED STATES

If the people of the United States are willing to endure a slightly changed standard of living, they need have no fear of over-population in the immediate future. But the next century will probably see a decrease in our comforts and luxuries, and our agricultural system before the close of the period will be hard put to keep pace with our growing population.

Dr. O. E. Baker, of the Bureau of Economics, U. S. Department of Agriculture, has made a study of the physical limits to agricultural production and population saturation under different systems of agriculture. His conclusion is "that after our arable land has increased about 100,000,000 acres, which appears likely to happen during the next 75 years, and if our acre yields of the crops attain those in northwestern Europe, and our diet reaches the pre-war German standard, our nation will be able to support about 300,000,000 people." But that these conditions will be fulfilled is very uncertain.

By 2000 A. D., it is estimated, our population will be between 190 and 200 million. How to feed, clothe, house and provide with the amenities of modern life these 80 additional millions of people is a very practical problem which faces the American people, and especially the Department of Agriculture, which is endeavoring to anticipate agricultural conditions during the next few decades.

Of course, farmers now are more concerned with the present surplus of their commodities than with the prospective shortage of agricultural products. But the fact remains that our population is increasing about 1,500,000 every year despite the diminution of immigration; that despite this rapid increase in population, no net extension of the crop area has taken place during the past few years, and that the yields per acre of crops, averaged together, show little or no increase during the past 15 years. The number of farmers and the farm population is decreasing, and there seems to be a slackened demand for land.

It has been possible, however, to have a steady increase for several years in our production of food without any increase in the area of agricultural land or in the yields per acre because a larger proportion of the land has been devoted to crops and less to pasture. More corn and potatoes and wheat and sugar and vegetables have been produced, crops which yield much more food per acre than pasture used for livestock. This movement is expected to continue, and it holds out hope for us. A changed diet, less meat and more vegetable products will enable our farmers to keep pace with the growing population, for several decades at least.

Through extension of the crop area by a third, through increasing the acre-yields of the crops another third, and through this change in diet, which would permit population to increase a third, the United States can provide food supply sufficient for double the present population, which is the population it is likely to have about a century hence. Beyond this point it is probable that both individual welfare and national strength would begin to diminish. But if population then continued to increase until the ratio of cultivated land to population attained that in Japan, our resources could support a population of a billion. However, as Dr. Baker concludes, "Let us hope that this condition of poverty may never be reached. It would weaken rather than strengthen the nation, for strength is measured more by per capita wealth and welfare than by numbers of people."

HOOF AND MOUTH DISEASE IN DENMARK

Hoof and mouth disease of cattle, which caused serious trouble in the Southwest last year and was suppressed only by the most rigorous destruction of the infected herds, is being treated in Denmark, the most important dairy country for its size in the world, by means of a serum prepared from immune animals. Dr. Erwin F. Smith, pathologist of the Bureau of Plant Industry, who recently returned from Europe, tells of the efforts of the little kingdom to rid itself of the disease by veterinary treatment, inasmuch as the destruction of infected herds is out of the question because of the wide prevalence of the malady in Europe.

"I spent some time in Dr. C. O. Jensen's laboratory in Copenhagen, which is the veterinary serum laboratory of the Danish Agricultural College," said Dr. Smith. "I went to see him primarily because in time past he has done important work on the tumors of animals. I found him head over ears in preparing serum for foot and mouth disease, now prevalent in Denmark. We have had several serious outbreaks of this disease in the United States suppressed at great expense by the general government through quarantine and slaughter of the animals. The disease attacks cattle, sheep and hogs, and sometimes men contract the disease from milk or from tending sick animals.

"The mortality of the disease varies, I believe, in different epidemics and in different localities. Dr. Jensen told me that the mortality in Denmark in untreated animals was about 25 per cent. He said that the disease had come into Denmark recently from Germany where, since the war, they have become lax in caring for outbreaks. He told me that they had had 22,000 outbreaks in Denmark and 80,000 in Holland. The disease also occurs in quite a good many places in England and in the Scandinavian Peninsula. He said that the form of the disease in Sweden was so light that it was difficult to get farmers waked up to deal with it.

"I found him preparing serum for this disease on a large scale—a regular United States of America scale. This serum is obtained from animals which have recovered from the disease. They take several gallons of blood from each animal, about one quarter of the blood of the animal, with no serious result, so he said, beyond reduction of

milk supply for some time. To this blood is added chinol, an antiseptic, and allowed to stand over night. It is then centrifuged, drawn off into large sterile glass containers, and afterwards bottled in sterile bottles to send to the farmers.

INSECTS IN STORED GRAIN

FREEZING, electricity and X-rays may all be called upon to protect from the ravages of insect pests the thousands of wagonloads of corn that are being turned out of the Mississippi cornfields at this time of the year and the loads of wheat that are dotting the roads from Canada to Texas. Professor Royal N. Chapman has been attacking the grain pest problem in his laboratory at the University of Minnesota.

"Weevils in stored grain could all be killed without resorting to chemical insecticides," said Dr. Chapman, "if the grain were merely taken out of one bin on a very cold day and put into another. It is the heat that is maintained in the depth of the binned grain that keeps them alive." This method of eradicating grain pests in storage elevators is not only the simplest and cheapest yet discovered, but the most effective as well, Dr. Chapman believes.

Another method that is very novel but still in the experimental stage is the use of the electric current, which literally shocks the insects to death. Good results have been obtained by Dr. Chapman when packages of goods were passed along an endless belt conveyor which brought them into contact with a series of electrodes at varying levels until the entire area of the package from top to bottom had been treated.

The X-ray method has also been used to destroy insects in packages. Its use in destroying the cigarette worm in tobacco has been known for some time, although its application to the destruction of insect pests in grain is new. However, the method has been only a laboratory process and is still too expensive to apply commercially.

Although Dr. Chapman considers the temperature method the best, he believes that a great deal of research work is still necessary along that line, due to the fact that some insects that infest human food supplies may be frozen without being killed. Probably $200,000,000 worth of harvested grain and packed food products are destroyed annually in the United States by grubs and weevils, he estimates.

BOVINE TUBERCULOSIS

"ERADICATE bovine tuberculosis" is the appeal made by science and government to the farmers of America, according to Professor E. G. Hastings, of Wisconsin University. Tuberculosis in cattle, condemned by science for spreading human tuberculosis and for despoiling the farmer's bank account, has resulted in a nation-wide campaign by state and federal governments, which bids fair to be successful in eradicating bovine tuberculosis.

Professor Hastings, head of the bacteriological department, and Dr. B. A. Beach, of the veterinary department of the University of Wisconsin, conclude from field and laboratory work on the problem that the tuberculin test compares favorably with diagnostic tests for other diseases. Without it, they state, the struggle against bovine tuberculosis would be hopeless. This test, which singles out the diseased animals from the healthy, is based on the fact that injection of an extract of dead tubercle bacteria causes fever in tuberculous cattle. On the basis of this test, diseased cattle are removed from the herd so that they may not spread the disease.

Some farmers, not appreciating the advantages which tuberculosis eradication will bring, naturally oppose government slaughter of their cattle. These farmers should realize, Professor Hastings says, that the number of cattle to be removed will steadily decrease if farmers cooperate with the government agents.

A possibility that the test may need to be continued even after tuberculosis is practically eliminated is indicated by the discovery of an uncontrollable factor which causes the test to be misleading. Professor Hastings gives encouragement concerning this difficulty by suggesting that only three or four animals out of a thousand are likely to be affected by the misleading factor. This number, as he says, is negligible in consideration of the great benefits to be derived with the ultimate objective, eradication of bovine tuberculosis.

FOSSIL REMAINS IN INDIA, JAVA AND SOUTH AFRICA

ENDING a six-month survey of sites connected with man's origin and evolution in India, Ceylon, Java, Australia and South Africa, Dr. Aleš Hrdlička, curator of physical anthropology of the U. S. National Museum, returned to Washington with a remarkable collection of evidence which reveals three great regions as undeveloped "gold mines" for scientific research.

These regions which show such amazing richness in fossil remains and in which work is now practically at a standstill, Dr. Hrdlička declared, are the Siwalik Hills of India, the Solo River valley of Java and the Taungs-Broken Hill country in South Africa.

In the Siwalik Hills, which extend for hundreds of miles from Cashmir nearly to Burma, he found that five or six species of fossil big apes have been discovered, two or three of which have not yet been described by scientists. These ape remains are from different geological horizons in this single range of Himalayan foot-hills, and the surface has hardly been scratched.

In the valley of the Solo River, where the famous *Pithecanthropus erectus* or Java ape-man's remains were discovered in 1891, Dr. Hrdlička found another rich but neglected region. Old and well preserved fossils are still frequently washed out by the river, and natives sometimes find and sell these, but there is no scientist there to collect them. Pithecanthropus could not have existed alone. He must have had predeçessors and possibly progeny whose remains may be revealed by a systematic study of the region, Dr. Hrdlička claimed.

Another region offering immense possibilities in throwing light upon the origin of man is at Taungs and in the Broken Hill country of South Africa. Dr. Hrdlička found two skeletons of cave men in this section, where the remains of the mysterious Rhodesian man were originally discovered.

Besides inspecting these sites of major importance in connection with man's evolution, Dr. Hrdlička travelled extensively in India and Australia and made observations upon the people now living in those countries. In various parts of India he found definite traces of Negrito blood, and was able to trace the route followed by the ancestors of the Negritos of the Philippines in migrations from Africa by way of India.

Among natives of Tibet, he also discovered remarkable American Indian types showing that they were remnants of the same people who populated America.

"I have some photographs of this latter people," said Dr. Hrdlička, " which I would swear were American Indians if I had not taken the pictures myself."

THE SEA'S RADIO BEACON

THE simplest and most constant sound in nature, the washing of the sea, serves as a radio beacon to warn whales, porpoises and many fishes to keep away from shore and below the surface in rough weather, according to Dr. Austin H. Clark, of the U. S. National Museum, and formerly naturalist on the scientific ship *Albatross*. In an interview he explained how modern wireless devices for transmitting danger signals to ships off shore in a fog are rivalled by nature's own method of protecting her creatures.

"Waves breaking on the shore and white caps on the open ocean," he said, "give forth a high-pitched, hissing sound consisting of an infinite number of separate sounds arising from the breaking bubbles which rapidly succeed each other."

Prolonged, uninterrupted sound is intensely disagreeable and soon becomes distressing. We have all noticed this, Dr. Clark pointed out, in the prolonged ringing of an electric bell, in the continuous rumbling of an idle motor engine and in other ways. Being high-pitched, the hissing sound of breaking waves has a marked directive quality; that is, it is easy to locate its point of origin. Being unceasing, it is distressing and repellent, and all the more sensitive sea creatures try to keep away from it. Whales, porpoises and dolphins and many fishes always keep well off shore, Dr. Clark stated, and they are apparently guided by these repellent sounds, while on a windy night various other types of life which normally would come up to the surface stay well beneath it.

"The simple breaking of the waves is of immense importance to sea creatures as an index to the dangers that they run," he concluded. "In times of storm the repellent sound increases and by this they are warned to keep farther from the shore and farther down beneath the surface.

ITEMS

MANY forms of sea food now considered of scant value have great possibilities, and in view of the depletion of supplies of shad, sturgeon, salmon, lobsters, crabs and other forms that are now used, the neglected ones may come into importance, according to Lewis Radcliffe, deputy commissioner of fisheries of the Department of Commerce. "An examination of our fishery statistics reveals the absence of some sea foods and a very small catch of others which reach a considerable magnitude in the fisheries of European countries," he says. "For example, the 1924 landings by fishing vessels in Great Britain include over 6,000,000 pounds of anglers or monk fish, valued at $230,000. Our Atlantic coast fishermen annually throw overboard about 10,000,000 pounds of this fish which has a higher nutritive value than the 'scarce' cod. There were also landed in Great Britain 20,000,000 pounds of cockles, valued at $200,000; nearly 23,000,000 pounds of mussels, valued at $130,000; 77,000,000 pounds of sharks, skates and rays, valued at $3,657,000, and 5,300,000 pounds of periwinkles and whelks valued at $100,000. The aggregate of the products listed exceeds 65,000 tons. Although in many of our waters, these products abound, the volume used for food is comparatively small and is consumed chiefly by those of foreign birth."

INTELLIGENCE tests recently conducted in San Francisco public schools show American children to be superior to Chinese children in the matter of intelligence, says Virginia T. Graham in her report of the tests to appear in *The Journal of Comparative Psychology*. The Chinese children used as subjects for the tests were all pupils of the Oriental School of San Francisco, a public school exclusively for Chinese. Only about one fifth of the children tested were born in China, but all were of Chinese parentage and came from Chinese-speaking homes. The majority were Cantonese. The subjects were all twelve years old and as practically all the twelve-year-old children in the school were tested, the group was reasonably representative. Several different types of standard mental tests were used and in so far as possible tests were selected which would not likely be affected by the difference in language. These same tests had been given previously to a group of American children and the results recorded.

A MUSICAL mouse is the astonishing animal described by Dr. Edwin B. Powers, of the University of Nebraska, in the forthcoming number of the *Journal of Mammalogy*. According to Dr. Powers' story, Dr. H. A. Morgan, a friend of his, was bothered for three or four nights last spring by a singing noise which for a while was attributed to a leaky radiator valve. Curiosity finally getting the better of Dr. Morgan, he began a search for the source of the noise and found that the noise was not coming from the radiator, but from a different part of the room. To his dismay, he found that the noise was coming from a waste paper basket. Upon shaking the basket, a mouse ran out and Dr. Morgan gave chase. The mouse ran into a small room from which there was no escape. As soon as the chase was stopped, the mouse would sit up on its haunches and sing, the singing approximating the noise made by the cricket but much more continuous. For ten or fifteen minutes before the mouse was captured it was in open space and under constant observation; and every time it came to rest this singing would take place, even under the excitement of the chase. The mouse was finally captured, but was fatally injured during the capture and died the next day in spite of efforts to keep it alive for further observation. It was turned over to a naturalist who identified it as the common variety of house mouse.