

omers and telescopes such as we have, to them our stellar system would appear as a spiral nebula, a scarcely visible point of light in the starry heavens.

Now Campbell would carry us one step further in our search for the true theory for the origin of the world. At a certain point within the great spiral, a subsidiary whirl was developed within which grew, by the infall of planetesimals, as suggested by Chamberlin, our solar system, including the infinitesimal speck of matter upon which we live our unquiet lives.

VI

I have now traced the growth of man's idea of the origin of the planet on which he lives from the crude cosmogony of primitive ages up to the scientific theories of the twentieth century. Notwithstanding periods of intellectual stagnation and even of retrogression, this represents a continuous broadening of his grasp upon the realities of his physical environment. But we have not yet attained finality. The great mysteries of knowledge are as yet unfathomed.

But one thing we have learned.

The spirit of eternal change,
Which is the soul of nature

is all pervading. What we see is but an evanescent phase in an endless series of changes. There was a time when they did not exist; there will come a day when the thousands of fiery suns which we see in the heavens to-night will, each one, have cooled down to darkness and death. To our finite minds the life of a sun, measured as it must be by hundreds of millions of years, seems inconceivably long, but to "the spectator of all time and all existence" to borrow Plato's noble expression, it is but as a momentary flash. Now although it is believed that there are a great many dark bodies in the heavens, most of the stars are

still alight. Together they came into being, together their fires will disappear.

They shall all grow old as doth a garment, and as a vesture shalt Thou fold them up.

WILLIAM HARVEY MCNAIRN

WORK OF THE DEPARTMENT OF AGRICULTURE

REVIEWING the progress of the campaigns for increased production to meet war demands and conditions, David F. Houston, Secretary of Agriculture, in his annual report states that the farmers of the nation, patriotically responding to the appeals of agricultural and other agencies, have produced more than 5½ billion bushels of cereal food crops—exceeding by 1,000,000,000 bushels the five-year average for cereals—record crops of Irish potatoes and sweet potatoes, large crops of beans and sugar beets, and an unusually large crop of perishables. Authentic figures for meat, poultry, dairy products, and vegetable oils are not available for 1917, but rough estimates indicate that the quantity for the year is slightly greater than for either 1916 or 1915 and exceeds the five-year average by two or three billion pounds.

It must be borne in mind, however, the secretary says, that the 1917 cereal crops are 199 million bushels below the yield of 1915; that the carry-over of cereals from last year was much below the normal; that the percentage of soft corn of the 1917 crop—which can not be used for food—is unusually high; and that, with the destruction of live stock in Europe and the great demands from there for meats and fats, with consequent greatly increased exports from the country, the supply of meats and fats will not be adequate to meet the domestic needs and those of the nations with which we are cooperating.

"That the farmers of the nation have generously responded to the appeals for increased production, and that much has already been done to insure a large supply of foods and feedstuffs, justifies no let-down in their activities or in those of all agricultural agencies," the secretary says. "On the contrary, even greater efforts must be put forth in the coming

months if we are to meet satisfactorily the domestic demands and the needs of the nations with which we are associated in this struggle. There must be no breakdown on the farms, no failure of foods, feedstuffs, or clothing. I can not emphasize too strongly the urgent necessity of doing everything possible to bring about a still further increase in the production of all essential commodities, particularly of the staple crops and live stock.

The yields in 1917 of the major food crops are as follows, the secretary reports, according to unrevised estimates: 3,191,000,000 bushels of corn, 659,797,000 of wheat, 1,580,000,000 of oats, 201,659,000 of barley, 56,000,000 of rye, 16,813,000 of buckwheat, 33,256,000 of rice, 73,380,000 of kafir, 439,686,000 of Irish potatoes, 84,727,000 of sweet potatoes, 15,957,000 of commercial beans, 42,606,000 of peaches, 11,419,000 of pears, 177,733,000 of apples, and 7,621,000 tons of sugar beets.

"The actual increase in the acreage of crops sown this fall can not be accurately determined at this time," the secretary says. "There is every indication, however, that the farmers in the sections where fall grains can be profitably raised have patriotically responded to the nation's call for more breadstuffs. Reports made to the Bureau of Crop Estimates in August, before the campaign for increased acreages was well under way, indicated an intention on the part of farmers to increase their sowing of winter wheat by about 10 per cent., and of rye by about 3 per cent. If these intentions are realized, it will result in the planting of 44,100,000 acres of wheat and about 4,340,000 acres of rye. Reports received since August are to the effect that the fall-sown acreage of these two crops has been increased in nearly every state, although the drought in the Southwestern States and in portions of Washington has made it impracticable fully to carry out the planting program. The official estimate of the acreage of winter wheat and rye will be issued on December 19 after the planting of winter grains is completed in the South. Similarly, it is too early to determine the percentage of germination of seed actually sown, and therefore any prophecy at this time as to

the actual harvest of winter wheat to be expected in 1918 would be merely a guess."

The report outlines the efforts of the department of agriculture to increase the meat supply and sums up the live-stock situation as follows:

"The number of milch cows and other cattle has shown an increase during the last four or five years, the estimate for the former for the present year being 23,906,000, as against 22,768,000 a year ago and 20,497,000 in 1913, before the European war began, while that for the cattle is 43,291,000, as against 40,849,000 a year ago and 36,030,000 in 1913. Unfortunately, the number of sheep continues to decline; the estimate for 1917 is only 46,059,000, as against 48,483,000 a year ago and 51,482,000 in 1913. It is estimated that the number of hogs, which during recent years has shown an upward tendency, decreased over 4,000,000, or from 67,453,000 to 62,747,000. However, it is greater than it was at the beginning of the European war. The number of hogs varies from year to year more widely than that of the larger meat animals. . . . The mere statement that the population has steadily increased in this country—the gain in the 10 years from 1908 to 1917 being 13,000,000—with an absolute decrease in the live stock for the same period, would sufficiently emphasize the seriousness of the situation if conditions were normal and the demands for meats and fats were not so urgent." There is a close relationship, the report says, between the production of live stock and the supply of feedstuffs, and the large production of these necessities during the present season should conduce to more satisfactory conditions for the producers of live stock.

Nation-wide campaigns to increase the meat supply are in progress, the report shows. As hogs and poultry yield the quickest returns, urgent efforts are being made to increase their production. Funds have been set aside from the appropriation made by the food production act to employ a force of 32 additional specialists to give their time to the task of increasing the number of hogs, 39 to encourage poultry raising, and 6 to assist producers of cattle.

By the end of October field agents of the department had assisted in the transfer of 100,000 cattle from localities where there is a shortage of feed to areas where feedstuffs are relatively abundant. This work has resulted in the saving to the nation of large numbers of animals.

Every effort has been and is being made to protect crops and live stock from diseases and pests. The force of experts dealing with these matters has been greatly increased and they are maintaining constant vigil and assisting in combating outbreaks in their early stages. Forty additional expert entomologists will be placed in the field to cooperate with the extension forces, and specialists familiar with seed treatment for the prevention of smuts of wheat, barley, oats, and rye, which alone cause losses of from 50 to 60 million dollars a year, have been assigned to prevention work in Oregon, Ohio, New York, Tennessee, Indiana, Illinois, Oklahoma, Texas, Washington, and California.

Under the food production act, the facilities of the Bureau of Animal Industry for dealing with live-stock diseases have been further extended. Forty-six workers have been added to the force combating cattle ticks in the South. Fifty-one per cent. of the original infested territory has now been cleared of the tick. Hog cholera losses decreased 30 per cent. during the last year, and 65 additional veterinarians have been assigned to the work of controlling the disease. In 12 states an inspector has been detailed to assist in combating tuberculosis of cattle and swine and of abortion of cattle, and it is proposed to increase the number to 19. Other specialists are engaged in the work of controlling blackleg of cattle and anthrax of domestic animals.

Calling attention to the fact that the nation was facing an unsatisfactory situation with respect to its supply of foodstuffs and feedstuffs when the existence of a state of war was declared, the secretary outlines some of the efforts of the department and its cooperating agencies to increase the production of these commodities even before the entrance of the United States into the conflict. He then de-

scribes the steps taken to bring about more effective organization and closer coordination of the agricultural agencies of the nation, beginning with the conference with the official agricultural representatives of the various states, which was held at St. Louis, Mo., on April 9 and 10. States east of the Rocky Mountains were represented at the meeting and a similar conference for the states west of the Rockies was held at Berkeley, Cal., on April 13.

As an indication of the assistance which the bureaus of the department of agriculture have rendered and are rendering to the War and Navy Departments and to other branches of the government in connection with war problems, the annual report of the secretary of agriculture cites the following:

The Bureau of Animal Industry is cooperating in the reinspection of meats and meat food products at 27 naval stations and at various army camps, cantonments, forts, and other places. The dairy specialists of the department have investigated local situations and made suggestions to insure sanitary milk supplies for the army cantonments and naval stations and also have inspected large quantities of butter for the navy. Supplies of vegetables purchased and loaded on the naval supply ships are being inspected by representatives of the Bureau of Markets. The Office of Home Economics has studied the rationing question for the army, navy, and coast guard service. The Bureau of Chemistry has prepared specifications for army and navy foods and has analyzed products offered for inspection. This bureau also has assisted in standardization of army and navy food supplies and is conducting research investigations on the antiseptic qualities of some important compounds.

The Bureau of Entomology has placed its experts, as well as all information on camp sanitation in its possession, at the disposal of the Medical Corps. The Bureau of Soils has cooperated with the War Department in investigations relating to fixed nitrogen and sulphuric acid. Experts of the Office of Public Roads and Rural Engineering have been de-

tailed to assist the War Department in road building at the 16 cantonments.

The Forest Service has given assistance to the War and Navy Departments and to other national agencies in locating new sources of wood and in seasoning the product, has assisted in the organization of a regiment of engineers for forestry work abroad, and is now cooperating with the War Department in the organization of a second regiment. The Weather Bureau, in addition to furnishing weather information to the army and navy, has assisted the War Department in the organization of its aerological observation work and of a regiment for gas and flame service.

SCIENTIFIC EVENTS

AMAZON EXHIBITS AT THE UNIVERSITY OF PENNSYLVANIA MUSEUM¹

THERE is now on public exhibition at the University of Pennsylvania Museum a large share of the collections which Dr. Wm. C. Farabee made during his three years' explorations of the Amazon, from which he returned last year. It has taken him a year to go over and catalogue his collections carefully, to label them and to install them in the galleries on the first floor of the museum.

During his three years in South America Dr. Farabee made his headquarters at Para, at the mouth of the Amazon, from which all of his various trips into the interior were made. The first journey was a thousand miles up the Amazon to Manaos, thence almost directly north into the highlands which divide Brazil from the Guianas, thence several hundred miles westward until it was no longer possible to travel by water, from which point he started eastward overland through the southern portion of British Guiana, spending many months among the Carib and Arowak, most of whom had never before seen a white man.

It was here that Dr. Farabee did some of his most important scientific work, since here were grouped a number of entirely distinct tribes of Indians, all of whom are rapidly diminishing in population and some of which are on the verge of extirpation. From

this point, having sent his collection down the Amazon, he made the terrible journey across the divide and down the Corentyne, during which he lost most of his equipment, all of his food and medicine, was obliged to live on monkeys and alligator meat, when even those were available, suffered terribly from fevers and finally reached the coast more dead than alive. Thence he went to the island of Barbados, where he met Colonel Roosevelt just returning from his trip through Brazil.

Dr. Farabee's second tour was up to the head waters of the Amazon River into the lower hills of the Andes in eastern Peru. Unfortunately, about the time he reached this section news of the great European war had come up the river and utterly dislocated all of his arrangements, making it impossible to get money or bring up supplies, so that he was obliged to return to Para, but not until after he had made some highly interesting and important researches and had secured a great number of the finest specimens of Conebo pottery in existence, which he managed to bring down with him and which are now on exhibition.

Subsequent trips were up some of the southern affluents of the Amazon, marching across from one great river to another, and investigating country never before trodden by a white man. Another series of explorations were to the north of the Amazon, not many hundred miles from the coast, where he also found hitherto unknown tribes and where he made collections, especially of large pottery animals used for burial urns. These were deep in the Amazon wood.

The results of all these journeyings are now on exhibition on the first floor of the museum. The room to the left is occupied with ancient and modern pottery and those whoever they were that made this pottery had a very much higher culture than any existing Indians in South America. It is doubtful if the Incas themselves at any time reached as fine a development in the making of pottery, but there is not the slightest clue as to who these people were, whence they came, when nor how they disappeared. None of the Indians who now occupy that portion of the country have even

¹ From *Old Penn.*