SCIENCE NEWS

THE BOYCE THOMPSON INSTITUTE FOR PLANT RESEARCH

Science Service

WHEN the population of the United States reaches 200,000,000, as some authorities claim it will in less than one hundred years, the problem of obtaining sufficient food is going to be severe. Far-sighted scientists are endeavoring to anticipate this, and to answer the question before it becomes acute. The Boyce Thompson Institute for Plant Research, Yonkers, N. Y., formally opened on September 24, is an embodiment of this effort.

Human beings, in a savage state, are opportunists. They get their food as chance offers and do without when they must, but civilized man of the twentieth century is beginning to realize that the serious problem of food for the coming generations must be solved in advance and by more scientific methods. The cheap, rich, easily accessible lands of the last century are pretty well occupied now, and the bread for our doubled population of to-morrow will have to come from crops that have been taught to be doubly productive.

Realization of the seriousness of the basic food problem, and appreciation of the steps necessary for its solution, underlie the establishment of the Boyce Thompson Institute. It is the materialization of a dream of an engineer-scientist, and it may become the cradle of a technology as yet unborn.

During the last century great research foundations were established for inquiry into the basic facts of chemistry, electricity, hydraulics and other non-biological sciences, and in them were bred astonishing advances in material civilization of the past half-century. They made the atmosphere, colored the light, in which Colonel William Boyce Thompson, mining engineer, the founder of the institute, was reared. His nickname, "Colonel Facts Thompson," indicates the trend of the past few decades which have changed engineering from a largely empiric art to an exact science, founded on things known and not guessed at.

It was not remarkable then that when Colonel Thompson looked at the looming problem of food for the future, he should think in terms of basic research for facts on which a technology could later be established. The remarkable development of the past few decades in agriculture, forestry and other applied branches of botanical science has been founded on surprisingly little exactly known fact. Present achievement in applied biology shines only by comparison with the dense darkness that preceded it; it is nothing compared with the progress that may be made possible by the acquisition of new basic facts about plants, and the further refinement of basic facts already partly known.

The attack on plant problems in the Boyce Thompson Institute will be fundamentally the same as that on the problems of inorganic matter in the earlier researches. Chemists and physicists get at the basic facts about iron and clay and electricity by studying their behavior under exactly controlled conditions. Botanists and physiologists will get at the basic facts about plants by controlling their environmental conditions. The elaborate machinery for controlling the circumstances of the lives of plants at the institute reflects at once the analytical mind of the botanist and the ingenuity of the engineer.

Plants respond to changes in temperature; therefore automatic devices control the temperature in the rooms and greenhouses within one degree. Plants behave differently under different intensities and colors of light, and with differing lengths of day; therefore color screens and great batteries of thousand-watt lamps enable experimenters to supplement, modify and even replace the light of the sun. Plants must have carbon dioxide from the air; therefore generators make it possible to supply this gas in any concentration desired, or to withhold it altogether.

So it is with other environmental factors. Every influence in plant life has its set of controls. The plants at the institute will live in a little universe regulated by science instead of nature.

The Boyce Thompson Institute itself is the result of an interaction of several minds. The chief advisers to Colonel Thompson are Professor John M. Coulter, head of the botany department at the University of Chicago; Professor L. R. Jones, head of the department of plant pathology at the University of Wisconsin, and Dr. Raymond F. Bacon, formerly director of the Mellon Institute of Industrial Research. The active head of the institute and director of research is Dr. William Crocker, formerly in charge of plant physiology at the University of Chicago.

THE INTERNATIONAL CONGRESS OF AMERICANISTS

Science Service

SOME one else beat Columbus twenty years in the discovery of the American mainland. Tobacco was not a native product of the American Indians, but had come to them from Africa. These are only two of the startling theories that were advanced and defended at the twenty-first world congress of Americanists, which has just been held in Gothenburg, Sweden. An "Americanist" is an expert on any phase of the ancient and primitive civilization in the western hemisphere. There were one hundred and fifty of them assembled from all parts of the world at Gothenburg, and eighty papers in all were presented at the sessions.

Dr. Sophus Larsen, of Copenhagen, was the one who offered evidence that a Portuguese admiral, Joao Vaz Corte-Real, commanded by his king to discover new lands, had in 1474 reached the shores near the mouth of the St. Lawrence River. This region was afterwards called "Stockfishland," and, according to a history of the Azores, Joao Vaz was made viceroy over part of these islands in 1474 as a reward for his discovery. Charts

published as early as 1534, says Dr. Larsen, show the names Joao Vaz Bay and Joao Vaz Land in the Labrador region.

Another lecturer, Professor Leo Wiener, of Harvard University, presented a theory at Gothenburg which conflicts with the history we learned in our school days. He declared that tobacco was well known in Europe before the discovery of America, and that America herself had got it from Africa. His theory is based on language researches in which he had been able to trace back the use of the word "tobacco," in various spellings, and in many countries, to times long before the voyages of Columbus.

Professor Franz Boas, of Columbia University, declared that ancient civilization in America, dating back some 10,000 years, had developed independently of other countries. He believed that the people themselves had originated in the old world and migrated to the Western Hemisphere but that their civilization was peculiar to America. Thus their agriculture was based on the growing of maize (Indian corn) which was native in Mexico. The making of pottery also developed without influence from abroad. The use of bronze for weapons, tools, etc., came at a very late period in America, and in the earliest stages copper in natural state was hammered out into the various shapes needed. Here again, Professor Boas saw no influence from abroad. He pointed out further that vehicles with wheels were unknown in America, and that neither horses nor cattle were used to assist man in tilling the soil. The professor concluded from these, and many other evidences, that ancient American culture was of spontaneous development.

Several experts on the Maya civilization, which flourished in Central America hundreds of years before Columbus reached the West Indies, presented papers of unusual interest, in many cases illustrated with stereopticon views. Thus Professor Sylvanus G. Morley, of the Carnegie Institution, came to Gothenburg fresh from his excavations of the ancient Maya city Chichen Itza in Yucatan. He told of having found remarkable ruins in this, the sacred city of the Mayas, temples with hundreds of stately columns, beautiful graven images of gods, bas-relief sculpture and pictorial designs which prove a high artistic development. Professor Morley drew a smile from his fellow-citizens by announcing that he had also uncovered a well-preserved ball field for public games.

Dr. Joseph Spinden, of Harvard University, reported on the surprisingly accurate astronomical calculations of the Maya scientists, and declared that it was possible to date back some of their "stone calendars" to the year 3373 B. C. William Gates, president of the American Maya Society, who has classified about 2,000 hieroglyphic characters, and has spent a quarter of a century in trying to discover their meaning, expressed his belief that the key to these Maya writings will soon be found, and that future research would reveal a civilization in Central America fully as fascinating as that of ancient Egypt.

THE APPLICATIONS OF ELECTRICITY

Science Service

ELECTRICITY from Franklin's kite to modern radio—the long list of far-reaching discoveries, prophecies overleaped, and revolutionary applications in the promotion of human welfare were discussed in rapid review by Dr. E. W. Rice, Jr., honorary chairman of the board of directors of the General Electric Company, before the centenary celebration of the Franklin Institute at Philadelphia.

Dr. Rice reminded his hearers that in its very infancy electrical research was recognized and rewarded, when the Royal Society elected Benjamin Franklin to membership. Franklin was the first American ever to be thus honored.

The foundations of modern electrical industry, Dr. Rice stated, were laid many years ago in two discoveries, that of the electric arc by Davy and the phenomenon of electro-magnetic induction by Faraday. From these beginnings the development of the applications of electricity has gone on at such a speed as to keep research workers always on a keen edge to meet the demands of the industry.

As an example, the speaker cited a prophecy made in 1900 that carbon would always be used for the electrode in the arc lamp, for the filament in the incandescent lamp and for a brush in direct current dynamos. In less than ten years it was displaced, wholly in the incandescent lamp and partly in the other two uses.

The progress in electro-chemistry, according to Dr. Rice, has been one of the most outstanding achievements in the electrical field. The early achievements in the making of aluminum, carborundum and calcium carbide have been followed by a host of new discoveries. In electro-physics results have been equally noteworthy, the discovery of X-rays and Becquerel rays leading to the researches that gave radium to the world. Research in electricity fathered modern communication, beginning with the telephone and continuing to the radio.

Dr. Rice listed a number of fields that give promise of further fruit when explored by researchers in electricity; among them are vacuum tubes, X-ray tubes, kenetrons, X-ray spectrum analysis, and many others, some of which have hardly even been touched as yet.

THE NEW COMET

Science Service

A COMET, which may never have been observed before, has been discovered at the Bonn, Germany, Observatory, by Professor Finsler. It is brighter than any comet that has appeared for several years, and the reports received by the Harvard College Observatory, Cambridge, Mass., from the International Astronomical Bureau at Copenhagen, state that it is visible through strong field glasses, binoculars and small telescopes. Its astronomical magnitude is eight. This visitor to the solar system is sufficiently well developed to show a faint tail, and is moving southeast at considerable speed in the western sky shortly after sunset.

The discovery was made on September 15, when a doubtful observation gave a right ascension of thirteen hours and thirteen minutes and a declination of plus nineteen degrees. A second position was secured at the Bonn Observatory two days later and the results were then sent to the observatory at Kiel, which transmitted them to the International Bureau, which distributes to

observatories information about new astronomical discoveries. Professor Prager, of Babelsberg Observatory, about nine miles outside of Hamburg, then reported that he also had located the new heavenly object.

American astronomers were notified of the German observations at once. At least two observatories have located the comet. Lick Observatory at Mount Hamilton, California, and the U. S. Naval Observatory at Washington, have both determined its position, and astronomers are now computing its orbit. On September 23, it was located 14 degrees south and 2 degrees east of the star Arcturus, and was found to be moving at the rate of a little over a degree a day both south and east.

There is a possibility that this comet will become visible to the naked eye and become an object which all may observe. Whether or not the comet will become brighter than at present will not be known definitely until it is determined just what path the visitor is traveling. Such information will have to await the computation of the comet's orbit and this is a matter of several days' work after at least three observations of greater precision than those obtained so far are reported.

COMETS, GREAT AND SMALL

Science Service

FOR more than twenty years astronomers have been anticipating the arrival of a great comet, worthy successor of the great comets of 1811, 1843, Donati's famous comet of 1858 and the great comets of 1880 and 1882, but so far they have looked in vain, for great comets, like great geniuses, are rare. Yet the present century has not been without its noteworthy and remarkable comets.

Chief among these were Halley's periodic comet, which returns every seventy-five years and which made its predicted return strictly on time in 1910, and the comet known as a1910 which was discovered in the southern hemisphere in the same year and which rivaled Halley's comet in brilliancy. Then there have been comets which were scarcely visible to the naked eye, but which were of great interest telescopically, such as Morehouse's comet of 1908 and Delavan's comet of 1913. Indeed the freakish and erratic beh vior of Morehouse's comet surpassed that of any other known comet, and its antics were observed with the keenest interest by the astronomical world because of the light that they might throw on the nature of comets in general.

Periodic comets, such as Encke's comet which has the shortest period of any known comet, three and a third years, and which was picked up this year at the Yerkes Observatory on July 31 by Professor G. Van Biesbroeck, and Faye's and Tempel's comets, due this fall, are continually returning to the vicinity of the sun. Scarcely a year passes that several such comets are not picked up. Most of these periodic comets, however, are small, inconspicuous telescopic objects, often tailless, mere fuzzy patches, which are members of Jupiter's family of comets. For the huge planet plays the part of the spider to many a luckless comet fly spreading out his gravitational web to catch any comet that chances to come within its reach. The captured comet subdued and harnessed is then forced to follow a path that extends little if any beyond the orbit of Jupiter. Frequent returns to the vicinity of the sun tend to disintegrate a comet and scatter its substance along its orbit in the form of clouds of meteoric particles.

The nucleus and head of a comet consists of a mass of meteoric particles of various sizes held together by their mutual attraction and surrounded by rare vapors and gaseous compounds; cyanogen, hydrogen and iron vapors frequently being present. As the comet draws near the sun light-pressure and electrical repulsion drive off from the head finely divided particles that go to form the tail. Such particles are permanently lost to the comet. They leave the head of the comet with accelerated motion and one tail is in turn discarded for another. So it is that the small periodic comets that have made many returns to the sun have little substance left to form the tails that are so characteristic of comets and look spent and faded compared to the great comets that frequently sport tails many million miles long and heads many thousand miles in diameter.

Comets great and small represent the fragments of the primitive mass from which the solar system was formed many million years ago. The great comets come fresh and unspent from the outlying regions of the solar system at intervals of thousands or even hundreds of thousands of years so it is little wonder that they shine at rare intervals with a splendor unknown to the small fry of the cometary world, Jupiter's captured family of periodic comets of which one or more members return to the sun practically every year.—*Isabel M. Lewis.*

ITEMS

Science Service

A WINDOW on the south side of a building will get in the course of a year 45 times the amount of sunlight that a window on the north side will get, according to experiments conducted by William Kunerth, associate professor of physics at Iowa State College. Mr. Kunerth's experiment does not include daylight, only sunlight. While the north window is getting one unit of sunshine to 45 for the south window, the east window gets 27 units and the southeast window gets 38 units. When the sunshine strikes a window glass at too sharp an angle the sunshine is reflected and hence does not penetrate into the room.

BEET seeds retain their germinating power for 17 years, according to experiments recently conducted by Professor K. Dorph-Petersen, of the Danish Seed Testing Station. A considerable amount of this stock was stored away seventeen years ago and some withdrawn for experiments every year. The tests showed 85 per cent. of germination the second year and 24 per cent. the seventeenth year of dormancy. Seeds of white clover germinated after twenty-five years. Only a few grass species tested showed much life after seven or eight years. Various environmental conditions may influence the length of time a seed may remain alive, Professor Dorph-Petersen believes.