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THE EIGHTH AMERICAN SCIENTIFIC CONGRESS

By AUSTIN H. CLARK

PRESS RELATIONS OFFICER

THE Eighth American Scientific Congress was held in Washington from May 10 to 18. The formal opening on the evening of May 10 was featured by a stirring and memorable address by President Roosevelt, in which he said:

All the men and women of this Pan American Scientific Congress have come here to-night with heavy hearts. During the past few years we have seen event follow event, each and every one of them a shock to our hopes for the peaceful development of modern civilization. This very day three more independent nations have been cruelly invaded by force of arms.

In some human affairs the mind of man grows accustomed to unusual actions if they are oft repeated. That is not so in the world happenings of to-day—and I am proud that it is not so. I am glad that we are shocked and angered by the tragic news from Belgium and The Netherlands and Luxembourg.

The overwhelmingly greater part of the population of the world abhors conquest and war and bloodshed—prays that the hand of neighbor shall not be lifted against neighbor. The whole has seen attack follow threat on so many occasions and in so many places during these later years. We have come, therefore, to the reluctant conclusion that a continuance of these processes of arms presents a definite challenge to the continuation of the type of civilization to which all of us in the three Americas have been accustomed.

In his address President Roosevelt acknowledged with appreciation the great achievements of science in the extension and development of modern civilization. He said that the objectives toward which science is

striving are closer and more peaceful relations between all nations through the spirit of cooperation and the interchange of knowledge. He deprecated the idea that science is responsible for the present "attacks on civilization which are in progress elsewhere," remarking that "The great achievements of science and even of art can be used to destroy as well as to create; they are only instruments by which men try to do the things they most want to do."

President Roosevelt's words made it very clear that although the participants in the congress were the twenty-one American Republics only, the people of these American Republics no longer can regard themselves as independent of, and insulated from, affairs in other portions of the world. Neither can science longer be regarded as distinct and apart from other forms of human activity.

With the past few generations science in its development has become more and more closely integrated with all phases of human social life. Furthermore, the numerous branches into which science is divided are now becoming recognized as merely convenient segments of a subject too vast to be thoroughly appreciated in its entirety.

Man as he used to be, as he is to-day, as he is to be in the future, his social organizations, welfare and activities of every kind, and especially man in his relation to America and to other Americans—this was the broad subject that occupied the attention of the Eighth American Scientific Congress.

Of most immediate interest to every one are the sciences grouped under Public Health and Medicine. These in recent years have attracted much attention throughout the Americas. In this section 119 papers were presented. Most of these were of broad general interest from the view-point of public health, though some gave details of the latest work on important and wide-spread ailments, or on obscure or little known tropical diseases.

In order to keep track of health and other conditions affecting populations it is necessary to have at hand accurate and up-to-date statistics. The accumulation of adequate statistical information regarding the population is recognized throughout the Americas as a matter of vital importance. In the section on statistics there were 71 papers, covering nearly all phases of the subject, read by statistical experts from all the twenty-one American Republics. An examination of these contributions shows how closely the conditions among the people are being checked throughout the Western Hemisphere.

Although public health attracted the most attention at the congress, the interrelations of the people, as individuals and collectively, and their relations to local and general conditions—included under sociology and economics—were discussed in numerous papers. These subjects were treated both from the point of view of the several national units, and from the point of view of a closer unification of the American Republics.

A closer unification of the American Republics envisions a greater uniformity in legal systems and in legal procedure than exists at present. There were 78 papers dealing with various aspects of international law, public law and jurisprudence. Many eminent jurists took part in this discussion, including Señor Dr. Don Hector David Castro, Minister of El Salvador in Washington; Señor Dr. Don Julián R. Cáceres, Minister of Honduras in Washington; Señor Ramón Beteta, Under Secretary for Foreign Affairs, México; Senator Juan A. Buero, of Uruguay; Señor Gustavo Gutiérrez-Sánchez, member of the Cuban House of Representatives; and three members of the Faculty of Law in the University of San Marcos at Lima, Peru, the oldest university in the Americas, founded in 1551.

Education plays a large part in fitting individuals to take their proper place in the affairs of the communities in which they live. Education therefore occupied a prominent place in the proceedings of the congress. There were 61 contributions to this subject. Problems in higher education were discussed by Señor Enrique Molina, Rector of the University of Concepción, Chile; Señor Octavio Mendez Pereira, Rector of the University of Panamá; President Edward C. Elliott, of Purdue University; President Henry M. Wriston, of Brown University; Señor Enrique Galván, director of the Gimnasio Peruano; Dean Henry Wyman Holmes, of the Graduate School of Education, Harvard University; and Professor I. C. Kandel, of Teachers College, Columbia University.

The history and geography of a region determine the background of the people, their social structure and how they are supported. There were 64 papers on these subjects, dealing mainly with Latin America.

People in order to support themselves must make use of natural resources of the regions in which they live. And, because people must eat, the development and the conservation of agricultural resources is of first importance. There were 42 contributions to these subjects, including an opening address by the Honorable Henry A. Wallace, Secretary of Agriculture, on "The Vital Role of Agriculture in Inter-American Relations," which was immediately followed by another by the Honorable Gifford Pinchot, formerly governor of Pennsylvania, on "Conservation as the Foundation of Permanent Peace." The papers as a whole covered a wide range of subjects. Soil erosion, the conservation of agricultural and forest resources, improved agricultural practices and range problems in both South and North America received special attention.

Agricultural resources are supplemented by mineral

resources, which were discussed in the section of geology. In this section there were presented 57 papers, covering practically all phases of the subject.

The proper utilization of the natural resources of any region is dependent upon the proper appliances and methods for the cultivation of the land, for the extraction of minerals from the earth, for transportation and communication, and for converting raw materials into finished products of all descriptions. Here physics and chemistry play their part. In this congress meteorology, radio transmission, gravity, electromagnetism, geomagnetic research, astronomy and crystallography were included under physics. There were 62 papers offered in this section.

In all branches of science it is necessary to look to the future—to outline general plans, or "laws," by means of which a multitude of apparently disconnected facts may be brought into correlation and thus take their proper place in a unified whole. And these "laws" must be constantly revised in the light of newly acquired information. This theoretical aspect of science has been especially developed in physics and in chemistry. Most significant and important of the papers under this heading was a dissertation by Professor Albert Einstein, of the Institute for Advanced Study, Princeton, N. J., entitled "Considerations concerning the Fundaments of Theoretical Physics."

The broad subject of agriculture and conservation—the study of plants and animals in relation to the changed conditions resulting from human occupation of the land—is really a section of applied biology. A proper understanding of this important subject is therefore dependent upon an understanding of biology as a whole. In the biological section of the congress there were listed 79 contributions on a very wide range of topics in both zoology and botany. There were many interesting papers on the extraordinarily rich fauna and flora of tropical America, as well as many on genetics, evolution, distribution and other topics.

In the section of anthropology there were listed 77 papers covering all aspects of general archeology, psychology, general ethnology, physical anthropology, linguistics, folklore and the original peopling of America.

The programs of the scientific sessions were well thought out, well balanced, well arranged and unusually interesting. The chairmen, vice-chairmen and secretaries of the eleven sections deserve great credit for the efficient way in which the exacting work of the sections was handled.

The scientific program was supplemented by an extensive social program. The formal inaugural session on May 10, featured by President Roosevelt's address and the attractive ceremony of the presentation of the flags of the twenty-one American Republics, was followed on Saturday evening by a formal reception by the Secretary of State and Mrs. Hull in the Pan American Building.

On Saturday afternoon the delegates visited Mount Vernon, and on Sunday there was a trip to the famous Luray caverns of Virginia, where luncheon was served, the return trip being by way of the Skyline Drive.

On Monday morning the Secretary of State delivered an address of welcome to the delegates, to which the heads of the several delegations responded. This was followed by an address by the Honorable L. S. Rowe, director general of the Pan American Union, which this year is celebrating the fiftieth anniversary of its foundation. Later the delegates were guests at an official luncheon at the Mayflower Hotel.

Through the courtesy of the Radio Corporation of America and the National Broadcasting Company there was on Tuesday evening a special concert by the NBC Orchestra, with Arturo Toscanini conducting.

On Wednesday Assistant Secretary of State Adolf A. Berle, Jr., and Mrs. Berle were hosts at a garden party, and on Thursday the delegates were guests of the Honorable Robert Woods Bliss, formerly Ambassador to Argentina, and Mrs. Bliss, at their estate, Dumbarton Oaks. The official banquet took place on Thursday evening at the Mayflower Hotel.

On Friday the final plenary session was held in the Pan American Building, and the report of the resolutions committee was received. This was followed by the farewell address of the president of the congress, the Honorable Sumner Welles. In the evening the delegates left by river steamer for Old Point Comfort, Virginia. Saturday was spent visiting Yorktown and inspecting the restoration of Colonial Williamsburg.

On Monday the delegates visited Philadelphia as guests of the American Philosophical Society, the oldest of American scientific societies, founded by Benjamin Franklin, leaving in the evening for New York, where Tuesday had been set aside as Eighth American Scientific Congress Day at the New York World's Fair, of which they were the guests throughout the entire day.

In the preparation and carrying out of this extensive social and scientific program many individuals participated. The Secretary of State was honorary chairman of the advisory committee, of which the other cabinet officers were honorary vice-chairmen. On the organizing and advisory committees were nearly all the outstanding men of science in the United States. Those chiefly responsible for the success of the congress were the Honorable Sumner Welles, Under Secretary of State, president of the congress and chairman of the organizing committee; Dr. Warren Kelchner, chief, Division of International Conferences, Department of State, executive vice-president of the congress and vice-chairman of the organizing committee; Dr. Alexander

Wetmore, assistant secretary of the Smithsonian Institution, secretary general of the congress and secretary of the organizing committee; Dr. Frank B. Jewett, president, National Academy of Sciences, chairman of the advisory committee; Mr. Roland S. Morris, president, American Philosophical Society, vice-chairman of the advisory committee; Mr. Clarke L. Willard, Division of International Conferences, Department of State, executive secretary of the congress and assistant secretary of the organizing committee; Mr. Michael J. McDermott, chief, Division of Current Information, Department of State, public relations director of the congress; Mr. Henry Charles Spruks, Protocol Division, Department of State, ceremonial officer of the congress; and Dr. André C. Simonpietri, executive assistant to the secretary general.

The congress was adjourned with the same note of uneasiness and apprehension with which it had been opened by President Roosevelt. In his farewell address President Welles said:

> You scientists have been free to seek the truth for the sake of that truth. You have been free to use your great powers without hindrance. You have been free to publish the results of your quiet study in your laboratories, or your often hazardous observations, sometimes at the far ends of the earth, without fear that because these results might differ from accepted concepts, you, and even your families, would be subjected to the control and the oppression of the state.
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> The suppression in some parts of the world to-day of the right of free inquiry, and the endeavor to control the thoughts of men, is therefore of intimate concern, not only to all scientists but likewise to all persons who believe that science has within its grasp the capacity to remedy in great part the ills of our present civilization. We can not but speculate whether, in those parts of the world where free inquiry is no longer possible, there will not be, at least in so far as the things of the mind and the spirit are concerned, a return to the Dark Ages. What hope is there for future generations in countries where the state by fiat has declared that all persons must believe glaring distortions of the truth; where evil is declared to be good; where falsehood is paraded as the truth; and where aggression, pure and simple, is represented as self-defense? . . .
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> I believe—as firmly as I believe that the sun will rise once more tomorrow—that the present menace to civilization will pass and that the day will come when the now destructive forces of evil which men themselves have created will be vanquished. I believe that mankind will again be afforded opportunity to lay the foundations of a better world—a world in which freedom from fear will be established for all mankind and the right of every person to worship God, to think, to speak, to know the truth and to search for the truth will be made sure.

NUCLEAR FISSION[1]

By Dr. KARL K. DARROW

BELL TELEPHONE LABORATORIES

SOME time this summer the art of transmutation will come to its majority; that is to say, twenty-one years will have passed since the day it was born in Rutherford's laboratory. Infancy and adolescence for this art have been marked by more stages than we generally count for human children; I propose to distinguish six. Here follows a table of six great events in the story of transmutation, beginning with birth and ending with fission, which, by the way, bears a name that in biology means a certain sort of birth. Each of them lifted the art to a higher level with a broader scope. It is only the sixth and latest which is my topic, but all the others lead up to it, as I will show immediately with the table for my text.

Table of great events in history of transmutation

1919 First success with helium nuclei (energy of activation derived from radium, etc.).

1932 First success with hydrogen nuclei (energy of activation derived from voltage).

1932 Recognition of the liberated neutron.

1934 Recognition of radioactive bodies resulting from transmutation.

1934 Slow neutrons used to produce transmutation, this resulting in radioactive bodies.

1939 Recognition of fission.

Be it said that in general, transmutation takes place when two nuclei meet and enter into a reaction with each other. They are made to meet by projecting one against the other, and accordingly we speak of one as the projectile and of the other as the target. Transmutation does not occur whenever a projectile comes into the neighborhood of a target nucleus, but only on rare occasions which I will call "lucky hits." There are four principal kinds of projectiles in use for transmutation: helium nuclei—hydrogen nuclei of two sorts, the light and the heavy—and neutrons. Three stages of my chronology have been marked with their names. The phenomena of fission are produced with neutrons as the projectiles and uranium[2] as the target, and they therefore belong in the fifth stage of the chronology. But they also depend on the first and the second stages, for neutrons are always obtained by

[1] Delivered before the National Academy of Sciences at its Washington meeting, April 23, 1940.

[2] The lecture was confined to the fission of uranium by slow neutrons. "Fast" neutrons (of energies amounting to a million or millions of electron-volts) produce fission of a different isotope of uranium, and also of thorium and of protactinium.