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ADDRESSES AT THE OPENING ASSEMBLY OF THE INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS[1]

THE following addresses were delivered at the official opening of the Seventh Triennial Assembly of the International Union of Geodesy and Geophysics in the Departmental Auditorium, Washington, D. C., on Wednesday evening, September 6, at 8:30.

In opening the assembly, Dr. Richard M. Field, president of the American Geophysical Union, stated that: "Through the courtesy of the Government of the United States of America, the American Geophysical Union, with the cooperation of its parent body, the National Research Council, has both the privilege and the honor of acting as host to one of the most significant international organizations in the promotion of science among the nations of the earth—the International Union of Geodesy and Geophysics. In differentiating the work of this international body from that of national scientific societies, it is the peculiar province of this Union to devote itself to furthering the knowledge of the sciences of the earth in those particular fields where international cooperation is most necessary.

"The program of this seventh assembly now gathered in Washington includes those fundamental aspects of the sciences which deal with the problems of the earth's crust, its oceans and its atmosphere; problems that can not be solved without the cooperation of the many nations to whom are entrusted the various territories of our globe.

"We recognize that this assembly is called at a time of unusual stress, and the Executive Committee of this Union is therefore especially conscious of its

[1] September 6, 1939, Washington, D. C.

responsibilities since both our foreign colleagues and the Department of State have expressed the hope that we may continue our meetings essentially as scheduled in spite of disturbed conditions abroad. I am sure that I express the unanimous feelings of our American Geophysical Union, as an adhering unit of the International Union, when I state that the pursuit of science recognizes and includes those individuals of all races and nationalities whose devotion to extending the frontiers of knowledge make for international good-will and for the enlightenment of mankind.

"May I now introduce the Honorable Hugh R. Wilson, who will read an address of welcome by the Secretary of State, the Honorable Cordell Hull."

Mr. Hull's address was as follows: "I am pleased to have this opportunity to greet and welcome on behalf of the Government and people of the United States the distinguished delegates to the Seventh General Assembly of the International Union of Geodesy and Geophysics. It is regretted that recent events in Europe have prevented the attendance of many of your colleagues, and we all sincerely deplore the circumstances which have made their absence necessary. We deeply appreciate your selection of Washington as the seat of this important conference and we are honored by your presence. I offer to you our warmest hospitality.

"You have assembled not only as official representatives of your respective governments but also as the representatives of one of the most eminent of scientific bodies. The fruits of your tireless efforts are everywhere evident and universally enjoyed. All humanity benefits directly from your findings.

"The discussions at past general assemblies have contributed immeasurably to the store of knowledge of the earth's sciences. Delegates have brought to these international meetings important scientific facts growing out of their researches and experiences and in a spirit of true unselfishness have imparted this knowledge to their colleagues in all parts of the world. This free exchange of scientific information is a practical demonstration of the interdependence of science and a recognition of the benefits accruing to the entire world through the wide dissemination of significant professional truths.

"The work of a number of our governmental bureaus and private institutions is influenced directly by the discoveries and decisions made by members of your international organization. This Government constantly avails itself of the valuable publications of the International Union of Geodesy and Geophysics which could be duplicated by any one government or private organization only with great cost and difficulty. Your studies in the fields of geodesy, seismology, volcanology, meteorology, terrestrial magnetism and electricity, oceanography and hydrology are of daily interest and importance not only to our governmental agencies responsible for official activities in those spheres but also to innumerable private organizations and individuals whose economic existence is dependent upon your efforts. Millions of persons throughout the world owe in a large measure their comfort and livelihood to your notable contributions to the improvement of scientific aids to transportation by water, land and air, of building methods designed to minimize danger from earthquakes, of agricultural practices utilizing knowledge of surface and subterranean water supplies, of geophysical methods of prospecting and of the study of underground formations. It is the good fortune of the Government and people of the United States to have the opportunity of serving as hosts to those distinguished scientists who have labored diligently and unostentatiously in these fields so that the lot of their fellow men may be improved.

"This evening you meet as friends and colleagues to inaugurate the seventh in this series of scientific discussions. Through modern international cooperation science has progressed with strides which would have been impossible if restricted within national and economic borders. This cooperation is made possible through international gatherings such as we are opening this evening. Individually and collectively, your work is facilitated through the knowledge that your fellow scientists throughout the world are friends whose unselfish efforts are directed toward the creation and clarification of knowledge that can be utilized in every-day life to the advantage of all. The prevailing spirit in this assembly is one of friendliness, good-will and mutual understanding and respect. It is my fervent hope, which the people of this country share, that the day may soon come when the statesmen of the world will take a leaf from the book of the scientists and solve international political problems in the same dignified and friendly spirit."

Professor S. Chapman, chairman of the British National Committee, replied as follows: "As representing the nation which last received this Union, at its Edinburgh Assembly, I have been privileged by the American Organizing Committee and by the United States Government with the invitation to respond, in the name of the International Union of Geodesy and Geophysics, to the address of welcome, on behalf of the Government of the United States of America, with which we have been favored by the Honorable Secretary of State, Mr. Cordell Hull.

"During its twenty years of life now past, the Union has hitherto always met in one or other of the historic national capitals of Europe—in Rome, in Madrid, in Prague, in Stockholm, in Lisbon and in Edinburgh. At these assemblies an important share

in the activities and the success of our meetings was taken by the large and influential American delegations which came to meet with us in Europe. On the occasion of this assembly the direction of travel has been to and not from these shores. Across the Atlantic and Pacific oceans we have come to meet together with a still greater number of our American colleagues in this no less historic capital of Washington.

"We are indeed glad to be present in this home of the greatest of all national societies for the study of geophysics, the American Geophysical Union—a society which has grown and flourished under the long-fostering care of its secretary, Dr. Fleming.

"The hospitable good-will shown by the United States Government toward our Union, in making the necessary provision for these arrangements, is further testified by the cordial address of welcome which we have to-night heard from Mr. Wilson on behalf of the Honorable Secretary of State. For this welcome I wish in the name of the Union to express our hearty thanks, and I would also affirm our confident hope that, despite the shadow of war which has fallen upon us while we have been gathering together here, this Washington meeting will prove to be one of the most harmonious and successful of our assemblies."

Dr. Cloyd Heck Marvin, president of George Washington University, then welcomed the International Union in the name of the local institutions as follows: "On behalf of the City of Washington, and on behalf of the George Washington University, I greet you. The Commissioners of the District of Columbia bid me transmit to you their personal welcome to the Nation's Capital. We of the University count it an honor and a privilege to have you assemble within our halls.

"Probably never before in its history has the Union met under conditions so difficult as those that confront it to-day—deprived of the collaboration of some of its member nations; its delegates harassed by thoughts of what is transpiring beyond the seas.

"Yet these very circumstances serve to emphasize the transcendent importance of what you are doing and what you represent. The Union has, indeed, become a symbol, standing for those enduring values, those fundamental phases of human activity that will continue even during the present crisis, and that will resume in full force when the stress of these days shall have passed. It is inspiring to know that those delegates who were called back to their countries have so earnestly desired and requested that the Assembly be not interrupted, and that you who remain—many of you in the face of deep personal anxieties—are going forward so splendidly.

"The earth sciences—there is something in the very phrase suggestive of eternal verity. If the disinterestedness, the selflessness, of the scientific discipline could be carried over into the management of human affairs, then might the peoples of the earth be enabled to live together in accord, directing their energies not toward destruction, but toward human betterment.

It is for this reason that at this hour we are peculiarly glad to have you in our midst, because for us you connote Science—Science that knows no national boundaries, no ideological frontiers, but that calls to all men of intelligence, everywhere."

Dr. Frank B. Jewett, president of the National Academy of Sciences, spoke as follows: "I feel it an honor to have been asked to participate in this official welcome to you who come as representatives of many countries of the world to form the Seventh General Assembly of the International Union of Geodesy and Geophysics. This is your first general meeting in the United States, and, speaking for American science, I trust that it will prove both pleasant and profitable. I know that we shall enjoy having you in our midst.

"It is a difficult thing to phrase a welcome to an international gathering at this time when the world of yesterday and to-day is being plunged headlong into the unknown world of to-morrow. All we can know is that the horror, devastation and destruction of a world war is beyond human imagining. How it will affect us individually or as nations no one can know—probably it is well that we can not.

"Nor can we sense in what way it will affect science—particularly fundamental science. We do know from the experience of twenty years ago that certain sectors of applied science were tremendously stimulated and that the drain of research men into some phase or other of the maelstrom retarded temporarily certain advances. Whether the retardation was not more than overcome during the 1920's and since none can say, however.

"Because of all that war on a world scale portends; because I am low in my mind at the thought that man after untold thousands of years has not yet evolved any better way of settling his mass difficulties than by mass murder; and because I do not even know how many of our foreign friends have been prevented from coming, my remarks are not at all those I had originally planned to give. If they seem quite inadequate I trust you will be charitable and remember that they are given against the background of an experience I dread having to face again.

"You are here as the guests of the American Geophysical Union acting with the cooperation of the National Research Council. It is therefore my pleasant duty to-day to represent what in reality is the parent of your host. As most of you doubtless know, the National Research Council, technically a committee of the National Academy of Sciences, is in reality a sort of business organization subsidiary to it. I need

scarcely explain to you how such an arrangement is at times a very convenient one. For instance, it permits the parent to do certain things of which he imagines the child will remain ignorant; but actually, as in family life, the child is seldom so unobservant. It also permits the child to indulge in many liberties, ostensibly without the parent's being aware of what is going on. Let me assure you, however, that when the academy's offspring, the National Research Council, joined in inviting the Seventh General Assembly to convene in Washington, it was not one of those childish tricks of waywardness which the parent found it convenient to overlook. On the contrary, I am here to-day as president of the National Academy and I assure you that both the academy and American science as well feel honored by your visit.

"It seems inevitable and also fortunate that as the bounds of our knowledge expand, there should be increasing occasion for international cooperation in scientific endeavor. Just as mathematics and music are already international languages, the work of organizing to advance science is based upon a community of interest which can scarcely be expected to bear much relation to such accidentally conceived things as geographical boundaries. From the standpoint of science, lines of political separation can scarcely measure up in significance to the lines of demarcation which we arbitrarily and solely for the sake of convenience create when we speak, for instance, of physics, chemistry and biology as different departments of science. We know from the present-day activities which we label by such hyphenated terms as bio-chemistry and chemical-physics how fruitful the eradication of boundaries can be. Further, as one looks around at the present scene in world politics, he is tempted to venture a guess that if there were some way short of mass killing to eradicate the other kind of boundary we might all also stand to gain by the process.

"But history discloses many periods during which one or another department of science has lain fallow or quiescent. And perhaps the least that we can expect is that, from time to time, there will arise such sets of circumstances as to throw the international aspects of science into the background. In many respects we have been passing through such a period for the past half dozen years, and now that national issues have been joined in war, it will be accentuated. No one can say that it is an irretrievable loss however. After all, there is much sound philosophy in that line from Shakespeare which now amounts almost to a proverb, that by indirections we find directions out. I need not recall to your minds that science itself, although actuated only by the most enlightened of motives and guided solely by the most rigorous of logic, has on many occasions had to resort to indirections, finding the correct course finally by the method of trial and error.

"While your cooperative efforts and your sessions may be somewhat handicapped by the lack of political understanding which now manifests itself between nations, you are, relatively speaking, fortunate in another regard. So far as I can see, you are unembarrassed in your deliberations by the hoard of economic and sociological quandaries which at the moment beset the applied scientist either when he looks backward to contemplate his past achievements or forward in an attempt to plan the constructive contributions to the future.

"From the dawn of the human race man has existed in an environment which, if it changed at all, changed by only imperceptible amounts. But science has upset this provision of nature, and a creature which through the centuries was called upon to adapt itself only to slow changes finds itself in a veritable maelstrom. It helps not that the maelstrom is largely of his own making, no more than it helped Pandora to know that she herself had opened the troublesome box.

"As you have doubtless noticed, whenever applied scientists and engineers congregate these days, their discussions sooner or later veer over into the sociological and economic fields. I foresee no such anti-climax for your present deliberations. By refining the measurement of an arc of the earth's circumference or by adding another significant figure to the acceleration of gravity or another region of ionization to the upper atmosphere, your conscience need not—at least for the moment—trouble you with any thought that you are enspiriting that famous bugaboo known as technological unemployment. Your researches appear to be at least one stage removed from such sociological considerations. I therefore envy the air of detachment which, for the next few days at any rate, you are at liberty to indulge in.

"Whatever the future has in store for the world and its inhabitants, it is, I think, safe to say that every increment to our store of real knowledge is potentially an increment added to a better way of life. It may be a long way off, but the possibility of its attainment justifies our continuing the quest. The field you represent is one of the most important in the whole domain because it is concerned with the very foundation on which all else rests.

"On behalf therefore not only of the National Academy of Sciences and of the National Research Council but of American science in its entirety I wish you an outstandingly successful conference."

Dr. D. La Cour, of Denmark, then delivered his presidential address.

ADDRESS OF DR. D. LA COUR

IN the name of the International Union of Geodesy and Geophysics I have the privilege to express the sincere thanks of the Union to the speakers who have so kindly welcomed the Union at this meeting. We are greatly honored by what you have said and enjoy the feeling of having your sympathy, and we are grateful for your contribution to the festival opening of our Assembly.

It proceeds from my heart when I express the very sincere thanks of the International Union of Geodesy and Geophysics to our hosts for the very great preparatory work they have undertaken in order to make us feel comfortable and to be among friends in this magnificent capital of the United States, but, particularly, we are grateful to the Local Organizing Committee for the great care taken on every point in order to further facilitate our work under your hospitable roofs.

Although this Congress is the seventh General Assembly of the Union, this meeting is the first to be held in the New World. Several of us have never been here before, although we have always been attracted to this country by its greatness and by admiration for what has been done here. Never could fate have guided the Union better than in leading us to meet just this time in the New World, where, thanks to your careful and thoughtful arrangements and with the help of so many distinguished American colleagues, the Union can carry through the great program for scientific work, drawn up by the Associations, in spite of the gales which sweep the world.

However, we all strongly feel that the American Organizing Committee merits more than words of thanks for what the committee has done in order to receive and help us. The most adequate expression of our gratitude would be not words but useful results from the discussions and the deliberations of the forthcoming days. It is our sincere hope that the results of this meeting may be so fertile for the growth of the sciences of geodesy and geophysics that this Washington Assembly will stand forever in the history of the International Union as a meeting of outstanding importance.

You will also allow me, in my capacity as president of the union, at this inauguration of the General Assembly, to thank all delegates and guests of the International Union present to-night, for having listened to the call and to welcome them to the meetings of the union and of the associations. Especially, I heartily welcome the great number of American colleagues who take part in our assembly at a very critical moment and fill out our ranks in such an excellent way. It is the hope of the International Union that our American colleagues who now for the first time attend a meeting of the union, will enjoy making our acquaintance as we enjoy their presence and are interested in their work and counsel.

I also wish on this occasion to send a friendly greeting to those of our colleagues who, on account of the unfortunate conditions in the world, are prevented from being present here. We know that wherever they are, at home or on their way back from here, every one of these distinguished men will look forward with longing to meet us again as we are longing for the moment when we can join them again and resume friendly and fruitful cooperation.

But there are some colleagues whom we shall never meet again. I beg you to rise from your seats, my dear colleagues, in commemoration of Professor Charles Lallemand who died 18 months ago after a long and active life. We shall always feel deep gratitude towards Lallemand, the founder of this union, for what he did when among us, and we heartily wish that the spirit and enthusiasm of this noble man of science may stand as guiding stars before the army of the union. Honneur soit à sa mémoire! Thank you.—

Many other colleagues have passed away since the last meeting of the union. The associations with which their work has been connected will individually recall their labors. On this occasion we remember with reverence all these who have passed away after lives devoted to the search for truth.

Since Benjamin Franklin undertook the truly dangerous, but permit me to say local experiment in Philadelphia, in order to try whether it was possible by means of a kite to fish the mysterious electric spark out of a thunder-cloud, and up to the present day when cosmic rays of still unknown origin are caught in strong American steel bombs, not only locally in America but also in other countries, the whole world knows that geophysical work made *in* America, or elsewhere *by* Americans, has been one long uninterrupted and always increasing activity of the greatest influence upon the development of both geophysics, pure physics and allied sciences, and for the opening of the fountains of the earth's riches.

The activities of the United States of America in geophysics have not been limited to investigations of electricity of the atmosphere; the exertion of energy has spread over all branches of geophysics and over geodesy, and the advancement of the whole of these sciences in other countries rests to a very large extent on discoveries and progress first made in the United States of America. Our host, the American Geophysical Union, is an ideal model of a body for coordination of researches. The American union is by far the greatest of the National Committees which have joined the International Union of Geodesy and Geophysics. The list circulated shows that the number of members of the American Union is no less than 1,095. Only a great country, the soul and power of which are based

upon the pleasure of its inhabitants to unite their forces, can raise and maintain such an army of scientists and provide this army with instruments and other expedients necessary for working in the first line on all fronts. The regular reports of the American Union, recording the activities of Americans, are generally recognized as a most valuable source of information and stimulus to the whole world. In other countries we can admire your Union, but never reach you on this point. The International Union of Geodesy and Geophysics heartily congratulates the United States on having this army, as the Union congratulates itself upon its close collaboration with this efficient American organization. The collaboration, on an equal footing, of the American Union with National Committees even of small countries, is a remarkable evidence of real brotherhood between nations.

When I spoke to you about Franklin's historical experiment with his kite and about the strong American steel bombs for catching cosmic rays in various places on the earth, I referred to the expansion over the world of the spiritual forces of the United States. It is just as reasonable when foreign scientists meet in your country to remember also the great material support which over and over again has been given by America to assist science in other countries. This readiness of American institutions to further scientific activity wherever in the world science is germinating, has often meant a great stimulation to scientists, and many flowers grown abroad adorn the name of this nation, which has risen above the narrow walls of egoism in order to help other nations to attain prosperity and health through science. From my own field of work I can testify to the great encouragement it meant to numerous countries taking part in the undertaking known as the "International Polar Year" some years ago when institutions and men of science of the United States joined the work and took a leading part in it. Similar personal testimony as to precious help in other scientific fields of work generously extended to other countries by the United States, could be given by many other colleagues present here to-night and by a still greater number of those working in other branches of science.

Naturally, in declaring this seventh General Assembly of the International Union of Geodesy and Geophysics to be opened, I must refer to the actual unfortunate political situation.

Dark clouds have shadowed for a time the sunshine in which the union would like to work. During these very days of our meeting we have had sad evidence of the use of man's knowledge for the injury of human beings and the devastation of civilization. But it is a profound reason for great encouragement to know that truth, friendship and mutual understanding are germinating and growing within the walls of the union whether the sun shines or not. Truth, friendship and mutual understanding are all precious fruits of human virtue, and they are just the medicinal plants the world needs for its sickness that it may become the bright home for mankind, and for peace, we all would like to see. Scientific work is work done for the benefit of all peoples, and the union labors to increase that common fortune. At this very moment there are on each sides of the frontiers between fighting countries remarkable men, our colleagues, who are near friends, who continue to collaborate and who pay homage to the same truths. By proceeding along that path, common sense and brotherhood among the peoples must ultimately rule the world. During the coming days we shall remember with satisfaction that colleagues and friends, prevented from taking part in the assembly, will direct their eyes with sympathy towards our meeting and share our wishes for the success of the congress to the benefit of all.

No gloomy cloud is everlasting, and at this festival occasion it is well also to rejoice in the role the union has to play. I shall not go into details, for one thing because the work in the seven associations will be elucidated in presidential addresses during the coming days. Nor are details necessary to indicate the importance of international collaboration within geodesy and geophysics. The field of work of the union is not limited to the very thin shell round the globe where life is possible. The interests of the union stretch down through the deeps of the oceans, down to the sea-bed, and still further through fiery masses right to the center of the earth. Our interests also stretch upwards far beyond the blue of the sky, up into the crystal heavens where billions of ions are produced in bright sunshine and swarm by day as by night under the stars of heaven. Which empire on the earth rules these regions? Which empire rules the winds and the drifting clouds? Only organized international scientific collaboration can solve the problems of this marvelous globe.

The future of the union is bright because great results lie on our way. Modern science and technique have devised valuable instruments for our work, and their results are more wonderful than even authors of fairy-tales could have imagined. Not very many years ago, tedious and troublesome mountain ascents were necessary to gain but a slight knowledge of the temperature and humidity of the air at a few kilometers height. Nowadays it is possible with radiosondes to measure in less time than an hour those meteorological elements from the ground upwards to the air-streams flowing far above the highest mountains, and to get such measurements in the atmosphere made not only in places where mountains can be found and climbed but everywhere, also over the oceans; geodesists and seismologists can now get time-signals by wireless to

a hundredth of a second wherever they are on the earth; high-going planes carry photogrammetrical instruments of high standard for quick and exact mapping of even the most inaccessible regions; naval submarines can do peaceful geophysical work under the waves of the seas and give information about the material below the oceans; seismologists have found improved instruments for exact records of the moments of the earth's crust and of the earthquakes, the sound-waves of which pass through the interior of the earth and reveal the inner structure and properties of the globe—somewhat as a doctor does when he examines the inner organs of a human body by means of his stethoscope. Instruments for counting in less than a second how many ions swarm in each cubic centimeter of the air several hundred kilometers above our heads, and methods of analyzing the properties of large and small ions or even of small subdivisions of these ultra-microscopic particles, have been made available; certainly the tools which geodesists and geophysicists have to work with nowadays are not only useful, they are simply wonderful.

And now, gentlemen, the union is going to take up its pleasant work. We shall enjoy and profit from the personal contact with each other, we shall unite our forces in the study of scientific problems pertaining to the welfare of the 2,000 millions people who now live on the earth and of the unknown millions who will follow us, we will in a time of trouble give an example of the great value of collaboration among men, we will contribute to the conquest for mankind of the bounties of this beautiful earth, handsomely decorated as it is with radiant crowns of polar lights, with deep blue oceans, and with snow-covered volcanoes raised on its surface as signs of the fervency of its interior and as memorials of the birth of our star.

Expressing once more our most hearty thanks to our hosts for their hospitality and for the excellent arrangements of this meeting, and conscious that the union is now, *as ever,* going to work for truth, friendship and mutual understanding, I have the honor to declare this congress, the Seventh General Assembly of the International Union of Geodesy and Geophysics, to be opened.

La Septième Assemblée Générale de l'Union Géodésique et Géophysique Internationale et ouverte!

OBITUARY

WARREN PLIMPTON LOMBARD

ON July 13 America lost one of her early leaders in the field of physiology, for Warren Plimpton Lombard was among the small adventurous group who introduced experimental physiology to this continent. With that same death was lost a leader in humanity, for Dr. Lombard stood head and shoulders above his fellows in the better traits of man. He was truly a great gentleman.

A son of Israel and Mary Ann Plimpton Lombard, both descendants of early New England settlers, Dr. Lombard was born at West Newton, Mass., on May 29, 1855. It was here that he grew up and received his preparatory education in the Boston and West Newton public schools. This period of Lombard's life was a happy one, for his father had vowed that no son of his would experience the pangs of sorrow of his own childhood. This early training in happiness became a philosophy of Lombard's and guided him in his later life.

In 1878 he graduated from Harvard and continued there three years longer to receive his medical degree. Lombard realized how meager the facilities of this country were for physiological investigation and left for Europe to work in the laboratory of Ludwig. Three years later he returned to America to accept an assistantship in physiology in the College of Physicians and Surgeons in New York City. He left again for a short period of study abroad and then returned to become assistant professor of physiology at Clark University in 1889. In that same year Henry Sewall, who was then professor of physiology at Michigan, departed for the more friendly climate of Colorado. William Howell took Sewall's place. In 1892 when Howell accepted the professorship of physiology at the newly organized Johns Hopkins Medical School, Lombard was called to fill the chair of physiology at the University of Michigan. Here he remained in active charge for a period of 31 years, when he retired.

Dr. Lombard's appointment at Michigan was an important one, as may be gathered from his account of Henry Sewall and the department of physiology:

> When Sewall came to this university the whole method of teaching physiology changed. Not only did he know the subject as it is taught in the textbooks, but he was thoroughly acquainted with the most advanced methods of physiological investigation. . . . Nor did Sewall neglect the laboratory side of the subject. In the catalogue of 1884–1885 we read: "The equipment of the physiological laboratory contains most of the more essential instruments used in physiological demonstration and research." Then follows a list which is quite imposing, an equipment which was greater than that of any laboratory in the country, with the exception of the older laboratories of Harvard Medical School and the biological departments of Johns Hopkins. . . . This was the first laboratory course in physiology offered in any medical school in the country.

Under Lombard's directorship of the department