scientific foundation of the art of electrical communications of to-day. The other part is the asset with which this art entered its twentieth century period.

There is another service of the electronic workers which deserves a special mention here. It is that of the vacuum tube oscillator. When by a simple provision a part of the responsive reactions of the local battery circuit is added to the external electrical force which the transmitted magnetic action produces in the third electrode of the vacuum tube then there is a progressive increase of the stimulating action of the third electrode and, therefore, a progressive increase of the signal strength. When the local battery circuit contains inductance and capacity it is capable of oscillatory electrical motions; that is to say, oscillatory motions of electricity are started in it by any external disturbance and, therefore, continuous oscillations will result if the provisions exist to carry a part of the electrical reactions of the battery circuit to the stimulating third electrode. The period of the oscillations is accurately adjusted by adjusting the inductance and capacity of the circuit. This is the vacuum tube oscillator, a most effective instrument in radio broadcasting.

Summing up the fifty years' progress of electrical communications one can describe it concisely as follows: It is, in the first place, the progress in the application of Maxwell's electro-magnetic theory to the method of transmission of what Faraday called magnetic action. In the second place, it consists in the harnessing of the electrons emitted by a hot filament in a vacuum tube. This gave us the amplifier and the vacuum tube oscillator, the instrumentalities which have during the last sixteen years advanced the art of telegraphy, telephony and radio more than any other contribution from abstract science during the last twenty-five years. I can not miss this opportunity of pointing out the remarkable fact that since Faraday every great advancement in the art of electrical communications originated not in the operating rooms of this art or in the research laboratories of its industries but in the research laboratories of the universities.

When we speak of electrical communications we usually mean exchange of messages between man and man. But a careful study of the static, of the fading of radio communications, and of the so-called earth currents in cables will undoubtedly reveal that they are not, as usually believed, disturbances only which annoy the clumsy methods of human operators. They are messages which are far more important to mankind than mere communications between mortals. For instance, I can not help feeling that the so-called earth currents in cables are messages telling us many secrets which are going on in the sun, the central power station which supplies the moving power to all our organic and human activities.

M. I. PUPIN

COLUMBIA UNIVERSITY

THE INTERNATIONAL UNION OF SCIENTIFIC RADIO TELEGRAPHY

ONE of the most active of the international scientific unions is the U. R. S. I. (International Union of Scientific Radio Telegraphy). The several international unions are organized under the International Research Council and their American sections are under the National Research Council. Since its organization in July, 1919, the U. R. S. I. has made notable progress in the direction of its aims, which may be stated as follows: (1) to promote the scientific study of radio communication; (2) to aid and organize researches requiring cooperation on an international scale and to encourage the discussion and publication of the results; (3) to facilitate agreement upon common methods of measurement and the standardization of measuring instruments. The International Union itself is an organization framework for carrying on the international phases of the administrative work. The actual technical work is done by the various national sections. The officers are:

President—General G. Ferrié, France.
Vice-Presidents—
Dr. L. W. Austin, United States.
Dr. W. H. Eccles, England.
Dr. Vanni, Italy.
Dr. V. Bjerknes, Norway.
General Secretary—Dr. R. B. Goldschmidt, Belgium.

The International Union holds a general meeting every three years. The next such international meeting is to be held in Washington in 1927 during the time of meeting of the International Radio Conference. For the purpose of correlating the work done by the several national sections, the International Union has four international "commissions." These are: (1) Methods of measurement and standards; (2) radio wave transmission phenomena; (3) atmospheric disturbances; (4) liaisons. The American section of the U. R. S. I. was organized in 1920. It is made up of an executive committee and five technical committees. The executive committee is made up as follows:

	Representing
Dr. L. W. Austin, Chairman	(Vice-Chairman, International Union)
Dr. J. H. Dellinger, Technical Secretary	(Department of Commerce)
Dr. W. E. Tisdale, Corresponding Secretary	(Div. of Phys. Sciences) ex-officio
Prof. J. S. Ames	(Div. of Phys. Sciences) ex-officio
Major-General C. M. Saltzman	(Army)
Dr. A. H. Taylor	(Navy)

Dr. A. N. Goldsmith	(Institute of Radio Engineers)
E. F. W. Alexanderson	(Member-at-large)
Major-General Geo. O. Squier	" " "
Dr. A. E. Kennelly	" " "
Dr. W. Wilson	" " "
Prof. E. M. Terry	" " "
F. Conrad	" " "

The American section holds an annual meeting in Washington, D. C., in April. At this meeting the chairmen of the several technical committees present progress reports on the status of work in the field of the committee, and technical papers are presented by the various members of the committees. The committees are as follows:

Methods of measurement and standards.
Radio wave transmission phenomena.
Variations in radio wave direction.
Wave phenomena above three megacycles.
Atmospheric disturbances.

The work of the committee on methods of measurement and standards (chairman, Dr. J. H. Dellinger, Bureau of Standards, Washington, D. C.) is the determination of radio measurements and standards, with particular view to the types of measurement work done by the other committees of this organization. The committee promotes and participates in the improvement and standardization of methods for measuring frequency, field intensity of received waves, intensity of atmospheric disturbances, automatic recording devices, fading, and other types of radio measurements.

The committee on radio wave transmission phenomena (chairman, Dr. L. W. Austin, Bureau of Standards, Washington, D. C.) devotes itself to the encouraging and conducting of measurements upon received field intensities. It investigates, in connection with these measurements, diurnal and seasonal variations and effects of transmission under various conditions by day and by night, sunset and seasonal effects, observation phenomena, etc. For the assistance of participants in this work, certain high power stations send special signals to facilitate measurement.

The committee on variations of radio wave direction (chairman, Dr. Gregory Breit, Department of Terrestrial Magnetism, Carnegie Institution, Washington, D. C.) encourages and correlates research on the variations of wave direction with time, effects of topography on direction finder work, and the bearing of polarization and other variations upon apparent observed directions.

The committee on wave phenomena above three megacycles (chairman, Dr. A. H. Taylor, Naval Research Laboratory, Bellevue, Anacostia, D. C.) studies such phenomena as the daily and seasonal variations of received field intensities from high frequency stations, character of fading and atmospherics, determination of skip distances, comparison with other phenomena such as magnetic and solar variations, weather, etc.

The committee on atmospheric disturbances (chairman, Mr. H. T. Friis, Bell Telephone Laboratories, New York) promotes and coordinates measurements upon the intensity and direction of atmospherics, including daily and seasonal variations, characteristics of the various types of atmospherics, their frequency distribution, and methods of measurement including recording devices.

It is believed that this organization has a distinct field of usefulness in furnishing a meeting ground for the numerous workers on the various aspects of radio wave phenomena research. Committees and committee activities in the past few years have furnished a means of promoting acquaintance and a meeting place of ideas. The work covered by the several committees should be fruitful in the years just ahead in contributions to the better understanding and use of radio and in certain related problems of geophysics, composition of the atmosphere, etc. Observers contemplating participation in the work should, wherever possible, plan to continue for at least a year thus covering seasonal variations. It has been demonstrated that radio is unique among the fields of scientific work in having special adaptability to a large scale international research program. The phenomena that must be studied are world-wide in extent, and yet are in a measure subject to control by the experimenters. The chairman of each of the technical committees will be glad to receive communications from any persons desiring to cooperate in the work or to receive information on the organization or on measurement methods.

J. H. DELLINGER
BUREAU OF STANDARDS

JAMES FURMAN KEMP

JAMES FURMAN KEMP, professor of geology in Columbia University, was unexpectedly and fatally stricken on the morning of November 17 as he was about to board the train leaving his suburban home at Great Neck, Long Island, to come to the university. Only the day before he had met his classes and conferred with his associates with the same spirit and evident interest and enthusiasm that always marked him at his best, with not the faintest suspicion of impending calamity. Only thirty-six hours previously he had been the speaker of the evening at a largely