(*i*) *Winter Resistance* (Dr. E. E. Tumanov). The work of Tumanov's laboratory was summarized in 1941 in a collection of papers on plant physiology published in honour of Timiriazeff[25]; and he has discussed his own work, together with many other researches, in his book published in 1940, the "Physiological Basis of Winter Resistance in Cultivated Plants". In this excellent monograph, Tumanov discusses critically the different theories of damage due to low temperature, and the physiological basis and practical application of cold-hardening processes. He has recently worked on the effects of growth-promoting substances on frost resistance in fruit trees. His results will appear in the *Isvestiya* of the Academy of Sciences in 1946.

(*j*) *Trace-elements* (Academician D. N. Prianishnikov). Although in November 1945 Prianishnikov celebrated his eightieth birthday, he continues his work on nitrogen and phosphorus nutrition, and on trace-elements, at the Timiriazeff Academy of Agricultural Science, where he holds the chair of agricultural chemistry; but his laboratory of micro-elements, under Prof. Bobko, is included in the organisation of the Institute of Plant Physiology. At the time of his birthday celebrations, Prianishnikov published a new monograph on nitrogen metabolism[26].

In addition to these ten laboratories, the Institute of Plant Physiology has a well-equipped laboratory for optical work, where Prof. A. N. Boyarkin has worked on X-ray structure of collenchyma, and is now working on the microchemical estimation of growth-substances by colorimetric reactions. The Institute has its own glasshouses, workshops and glass-blowing room. The grades of workers are: doctors (some of whom have the title of professor if they hold at the same time a teaching appointment); senior scientific workers (of the level of candidates of science, that is, M.Sc. graduates); junior scientific workers (of the level of aspirants or B.Sc. graduates); and laborants (scientific assistants), some of whom have a university training.

[1] Spornik rabot po fiziologie rastenii, 29–42 (1942) (Russian).
[2] *Uchorni zapiski SGU.*, **15**, 229 (1940) (Russian).
[3] *C.R. Acad. Sci.*, **18**, 69 (1938).
[4] *C.R. Acad. Sci.*, **19**, 543 (1938).
[5] *Isvestya acad. nauk OMEN*, 1297 (Russian).
[6] "Theory of Cyclic Development in Plants and its Practical Application" (Russian) (Moscow, 1940).
[7] *C.R. Acad. Sci.*, **42**, 229, 277 (1944).
[8] *C.R. Acad. Sci.*, **34**, 195 (1943).
[9] *C.R. Acad. Sci.*, **42**, 33 (1944).
[10] *C.R. Acad. Sci.*, **47**, 220 (1945).
[11] *C.R. Acad. Sci.*, **47**, 146 (1945).
[12] *Dokl. acad. nauk.*, **48**, 439 (1945) (Russian).
[13] *C.R. Acad. Sci.*, **47**, 439 (1945).
[14] *C.R. Acad. Sci.*, **42**, 360 (1944); **44**, 33, 162 (1944); **45**, 307 (1945); **46**, 36 (1945).
[15] *Microbiologia*, **2**, 19, 221 (1933); **3**, 523 (1934); **4**, 166, 317 (1935); **6**, 517 (1937); **7**, 75, 143, 445 (1938); **8**, 787, 1043 (1939) (Russian).
[16] *C.R. Acad. Sci.*, **31**, 145 (1941).
[17] *C.R. Acad. Sci.*, **42**, 131 (1944); **45**, 213 (1944).
[18] *C.R. Acad. Sci.*, **14**, 445 (1937).
[19] *Priroda*, 71 (1940) (Russian).
[20] "Practical Handbook for the Artificial Ripening of Fruits" (Acad. Sci. Press, 1942) (Russian).
[21] *Isvestya acad. nauk.* (in the press).
[22] *C.R. Acad. Sci.*, **33**, 373 (1941).
[23] *C.R. Acad. Sci.*, **42**, 313 (1944); **43**, 126 (1944); **44**, 37 (1944); **48**, 1 (1945).
[24] *C.R. Acad. Sci.*, **45**, 165 (1944). *Isvestya acad. nauk.*, in the press.
[25] "Collected Works on Plant Physiology in Honour of K. A. Timiriazeff" (1941) (Russian).
[26] "Nitrogen in the Life of Plants and in Soviet Agriculture" (Acad. Sci. Press, 1945) (Russian).

(*To be continued.*)

INTERNATIONAL RELATIONS OF SCIENCE

THE report, "International Relations in Science: a Review of their Aims and Methods in the Past and in the Future", by the late Dr. W. B. Cannon and Dr. R. M. Field*, was prepared for the Division of Foreign Relations of the U.S. National Research Council. It is based on a questionnaire issued in March 1944 to all available officers of the international scientific unions and international scientific congresses, and represents a definite attempt at a factual appraisal of past experience as a guide in framing the instruments now required to secure the continuity of international co-operative research and the conditions for effective international co-operation in the scientific field. It is thus of considerable interest when the first attempts are being made to resume international meetings, and the activities of the United Nations Educational, Scientific and Cultural Organisation are under discussion. Three of the six specific questions of the questionnaire—about the interchange of information, other than for war purposes, during the past two years, specific scientific projects requiring international co-operation, and whether experience suggests that post-war international co-operation in science and education could best be served by other organisations than international scientific unions or congresses—are indeed designed to provide exactly the information required for decision as to whether new forms of international scientific co-operation are required or whether existing institutions would be adequate.

The majority opinion of the available responsible officers consulted is that international scientific organisations are an essential instrument for the progress and comity of nations. The scientific unions are considered the most efficient existing international organisations both in promoting fundamental science and in implementing the relation of science to human affairs. International congresses which have been primarily organised for national or geopolitical purposes have been neither economical of the public funds, nor efficient in the expenditure of scientific men's time and energy, and there is a strong preference among certain British and American men of science for international scientific conferences arranged by national but unofficial organisations.

Discussing in conclusion the results of the inquiry, the authors recognize that the future role of science will be increasingly social, in that science and human affairs have become inseparable. Popular science must now recognize the relation of science to society, and the sincere attempt by scientific men to see that this information is available not only to a few favoured individuals or groups, but also to all elements of society through whose co-operative efforts their developed environments have been created. The international scientific organisations which seem to have operated most continuously and effectively from 1919 until 1944 are the International Unions of Astronomy, Chemistry, Geodesy and Geophysics and Biology. The International Union of Pure and Applied Physics appears to have been the least active and the least valued by its officers and members. With the possible exception of the chemists,

* International Relations in Science: a Review of their Aims and Methods in the Past and in the Future. By Dr. Walter B. Cannon and Dr. Richard M. Field. (Chronica Botanica, Vol. 9, No. 4.) Pp. 251+298. (Waltham, Mass.: Chronica Botanica Co.; London: Wm. Dawson and Sons, Ltd., 1945.) n.p.

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those concerned with the primary sciences suggest that they can accomplish more in the promotion of their technical interests without the organisation of an international union, and prefer to consider the impact of their technology on society within their national societies and national academies. The fields of anthropology and archæology appear not to have been sufficiently explored from the international point of view, especially by the International Council of Scientific Unions and its Committee on Science and its Social Relations.

Three suggestions are submitted on the assumption that science and technology are fundamental techniques in international relations, and that fundamental science affords an excellent opportunity for improving the art of international collaboration. First, the foreign secretaries of the Academy of Sciences of the U.S.S.R., the Royal Society of London, and the U.S. National Academy of Sciences should explore the possibility of an inter-academy study of their international relations in those phases of science which are of benefit to all men. Secondly, the International Council of Scientific Unions, through its British and American officers, should simultaneously prepare a memorandum for all Governments which have adhered to the unions on how best the unions may collaborate in post-war research and educational problems. Lastly, the Division of Foreign Relations of the United States National Research Council should continue to advise the United States Academy of Sciences in all international scientific matters affecting the welfare of their countrymen. The memorandum contains an appendix giving a summary of Dr. Joseph Needham's memorandum on an international science co-operation service as opposed to the use of the existing international scientific unions, and although Dr. Cannon and Dr. Field appear to pass rather lightly over well-known weaknesses of the unions, their report makes a praiseworthy effort to be comprehensive and to indicate the alternative movements.

EARTHQUAKES IN SWITZERLAND

FROM a seismic point of view, Switzerland is part of the Mediterranean or Alpine-Himalayan geosyncline. Thus it experiences more earthquakes than the whole of northern Europe*. According to figures given by Montessus de Ballore, for every 100 earthquakes humanly felt per unit area in Italy, there are 86·1 in Switzerland and only 5·6 in France. Catalogues of Swiss earthquakes date from the sixteenth and seventeenth centuries, and in 1755 Elie Bertrand published his "Relation Chronologique". After the Viège earthquake of 1855, Otto Volger published a very detailed catalogue showing epicentres. In 1879 the Swiss Seismological Commission began to publish annually lists of earthquakes with intensities, description of effects, and geographical position. This was replaced in 1914 by the Swiss Seismological Service under Prof. E. Wanner, forming part of the Swiss Meteorological Institute at Zurich.

During 801–1929, 491 places in Switzerland had experienced earthquakes greater than degree 7 on the International Intensity Scale which is used by the Swiss. This scale is briefly as follows :

* Les Séismes de forte intensité en Suisse. By Frédéric Montandon. *Revue pour l'étude des Calamites*, **5**, Nos. 18–19 (1942) ; **6**, No. 20 (1943).

Degree 1.	Movement only registered by seismographs.
Degree 2.	Movement felt by a few people at rest.
Degree 3.	Movement felt by people at rest sufficiently for duration and direction to be appreciated.
Degree 4.	Movement felt by people moving. Loose objects are moved and plaster is cracked.
Degree 5.	Felt by everyone. Heavy objects moved. Some bells rung.
Degree 6.	All sleepers awakened. All bells rung. Some clocks stopped.
Degree 7.	Chairs and tables overthrown. People alarmed. No damage to well-constructed buildings.
Degree 8.	Chimneys collapse. Walls are cracked.
Degree 9.	Buildings partially destroyed.
Degree 10.	Solid buildings destroyed. Faults and cracks in the ground.
Degree 11.	Catastrophic destruction of buildings, bridges, etc.
Degree 12.	Greatest catastrophe.

The two greatest earthquakes ever to have occurred in Switzerland, so far as records go, were those of Viège and Basle.

Great earthquake of Viège. On July 25, 1855, about 1 o'clock in the morning, there was an earth shock at Berne and one at Basle. Just after midday on the same day, about 12.50 p.m., and without any immediate premonitory shock, an earthquake of extreme violence shook the Viège Valley from the town of the same name to St. Nicholas. The mountains began to sway, rocks fell and the inhabitants of the district fled from their homes. Immediately afterwards walls of houses collapsed, roofs slid into the streets and earthquake sounds and underground rumbling added to the commotion. One eye-witness was seated at a table in the inn "Zum Kreuze" at St. Nicholas. Without feeling the slightest preliminary tremor, or hearing the faintest sound, he was suddenly thrown to the ground and just had time to escape amidst a hail of household goods and tiles. Several tourists, journeying between Stalden and St. Nicholas, saw two chalets not far from them carried away by an avalanche of rocks; one had his horse hit and their guide was seriously injured. At St. Nicholas most of the hundred buildings were so badly damaged that they had later to be rebuilt. Several persons were injured, but none was killed. At Grachen, a similar state of affairs happened and one child was killed. At Stalden the church was seriously damaged though some of the building, including the belfry, still stood. The buildings in general were not so badly damaged as at St. Nicholas. The belfry of the church at Törbel did not collapse, but was seen to oscillate several times from north to south with amplitudes of about 2 metres at the top. Shortly afterwards, Prof. Morlot visited the place and wrote : "Viège, without being absolutely in ruins, is uninhabitable and will have to be entirely rebuilt little by little. Its population is camping in tents and one would do well for the time being not to stay there. At St. Nicholas and at Stalden many houses are completely destroyed but a good number are habitable and inhabited." Cracks and faults in the ground were visible near Stalden and Unterbach and springs occurred in different places, for example, at Visperterminen. At Eyholz, Mund, Gamsen and Glis, nothing collapsed but cracks appeared in the walls of buildings.

The first aftershock occurred at about 10 o'clock in the morning of the next day (July 26), the epicentre being near Unterbach, about 6 km. to the west of the Viège Valley. A second aftershock also occurred on July 26 at about 2 p.m., and three others at 3.40 p.m., 4.40 p.m. and 5 p.m. According to the Abbé Tscheinen at Törbel, between July 25 and December 31, 1855 (160 days), only eleven days were without earthquake disturbance of some sort. In

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