photography and radar. Particular attention was paid to the growth-rates of the clouds, their development during the day and the onset of precipitation. Careful studies of the glaciation of cloud summits indicated that this sometimes occurred at temperatures as high as −4° C. Showers sometimes fell from clouds little more than 1 km. deep.

The instrumentation of the aircraft of the British Meteorological Research Flight was described by R. J. Murgatroyd. A very rapid hot-wire thermometer was used to determine the thermal structure of the air below the bases of cumulus, while the airflow around the sides of the cloud was studied by following the relative motions of packets of 'window' with radar. Vertical currents inside clouds were measured with an integrating accelerometer and the liquid-water content with both a hot-wire instrument and a refrigerated icing disk. With the latter instrument, full adiabatic values of the water content were found in cold clouds. Measurements of the drop-size distribution in clouds by means of slides coated with either magnesium oxide or oil showed drops of radius 20–25 μ near the bases of stratocumulus clouds which were occasionally observed to produce rain if more than 4,000 ft. thick. Mr. Murgatroyd has evidence that in southern England summer showers are often released by coalescence and that even small cumulus often contains many drops of diameter 50 μ. Ice crystals appeared in detectable numbers only at temperatures below −12° C.

V. J. Schaefer (United States) outlined the cloud physics programme of the Munitalp Foundation, in particular the attempts to make a survey of cloud development at various sites in the United States with the help of voluntary observers using ciné cameras. He showed a number of colour films of clouds taken by members of the United States Forestry Service and of cloud systems which were associated with jet streams. M. Bossolasco (Milan) described some observations of precipitating clouds made at a mountain observatory and attempted to correlate the onset of precipitation with the temperature at screen level. G. Fea (Rome) reported on methods which were used to measure liquid-water content of clouds on Monte Cimone. G. Yamamoto (Japan), in his studies of the initial growth stage of ice crystal on nuclei of silver chloride and silver nitrate, has found crystals which are square rather than hexagonal prisms.

The main contribution on cloud seeding came from E. Bollay, who has conducted large-scale commercial trials in the United States, mainly with the object of increasing the snowpack in the lee of the Sierras. Silver iodide smoke was released on all occasions when clouds in the target area surpassed the −5° C. evel. The results were evaluated using a regression method in which past rainfall data were used to obtain a regression curve between the rainfall of the target and a control area, this being used to predict the rainfall to be expected naturally in the target area during the seeding period. Mr. Bollay estimates that in four successive years of operations in the Central Sierras they increased the snowpack by 27, 21, 7 and 22 per cent respectively. An independent assessment of three other operations by the Statistical Laboratory of the University of California suggests that in one case the rainfall showed a decrease, in another there was a considerable increase, the third being inconclusive.

In recognizing that there are certain factors which militate against commercial undertakings being able to carry out seeding experiments in the most scientifically acceptable form, Mr. Mason said that it is important for those interested in the purely scientific aspects of the problem to give considerable thought to the design and execution of a large-scale experiment. The results can be evaluated only on a statistical basis, and he indicated how an experiment might be designed using control and target areas, the decision to seed being made on the basis of a random choice. Such an experiment would probably take at least five years if rainfall increases of order 15 per cent were to be detected with reasonable confidence. Dr. Fournier d'Albe showed a film to illustrate how warm cumulus clouds were inoculated with salt particles dispersed from the ground in two areas in Pakistan. Particles of mass greater than 10^{-9} gm. were dispersed at a rate of 10 gm./sec., about half being carried aloft by the air. Although there was some preliminary indication that the rainfall was higher in the target regions than outside, a complete analysis of the results has not yet been made.

After three days of lectures and discussions, visits were arranged to the Institute for Snow and Avalanche Research on the Weissfluhjoch, Davos, and to the observatory of the Meteorologische Zentralanstalt at Locarno. These gave delegates an opportunity of seeing something of this beautiful country in which they were received with such friendliness and hospitality.

B. J. MASON

MARIE CURIE CELEBRATIONS IN WARSAW

THE twentieth anniversary of the death of Marie Sklodowska-Curie was celebrated at a special session of the Polish Academy of Sciences at Warsaw during October 6–8. This session was attended by Mrs. Irene Joliot-Curie, Madame Curie's daughter, and by specialists on various aspects of radioactivity from China, Czechoslovakia, France, Great Britain, Hungary, Norway and the U.S.S.R., as well as by a large number of Polish scientists who had gathered there from all parts of the country. Madame Curie's elder sister was a guest of honour, and in spite of her great age she was present at all the numerous functions of the session.

The first two days of the session were partly devoted to official speeches and surveys of the various physical and medical applications of radioactivity. Noteworthy was the speech by Mrs. Irene Joliot-Curie, in which she analysed her mother's work in a most vivid and personal way. Moreover, the participants attended the inauguration of a museum devoted to Madame Curie and installed in the newly rebuilt house where she was born in the so-called "New City" (which is actually an eighteenth-century extension of the Old Town). In this museum an extensive collection of documents and apparatus pertaining to Madame Curie is displayed in a most effective manner. The successive rooms are devoted to Madame Curie's childhood and family circle, her years of study in Paris, her great work in collaboration with her husband, her activities in promoting the medical use of radioactivity and her leadership of the Institut du Radium at Paris. The last rooms evoke the development of nuclear physics, which had its origin in the discovery of radioactivity, and lead the visitor to an impressive display of photo-

graphs illustrating on one hand the devastating use of nuclear energy in destroying cities and their inhabitants, and on the other the applications of nuclear energy for medical and industrial purposes (including a photograph of the first nuclear power station recently put into operation in the Soviet Union).

The last day of the session was entirely devoted to a more technical discussion of physical problems, and was held in the main lecture room of the Physical Institute. Among others, Prof. J. Rayski, of the University of Toruń (who is well known to nuclear physicists in Great Britain), presented a new interpretation of the various kinds of particles recently discovered in cosmic radiation. The Academy of Sciences and the State authorities also organized official receptions of the participants, who enjoyed, during the whole duration of their stay, the most cordial hospitality.

For the occasion the Academy of Sciences, which displays considerable activity in publishing scientific periodicals and excellent journals aiming at the popularizing of science, had issued a series of valuable books. These comprise Polish translations of Madame Curie's "Traité de Radioactivité", of Mrs. Irène Joliot-Curie's shorter text-book on nuclear physics, and also of Madame Curie's delightful short biography of her husband which originally appeared in French in 1924. Another book contains a collection of articles by various Polish scientists surveying Madame Curie's work and its implications, as well as a reprint of two articles written in Polish by Madame Curie. Last, but not least, a magnificent volume has been prepared containing a reprint in the original language (mostly French or Polish) of the complete works of Madame Curie. It is interesting to see to what extent Madame Curie was anxious to write popular articles or more technical surveys on the development of radioactivity in her native language. A bronze medal bearing the figure of Madame Curie was struck to commemorate the celebration.

The present writer had the opportunity of visiting in detail the Warsaw Physical Institute and of discussing questions of common interest with Polish physicists there. He was much impressed by the activity with which the newly reorganized Institute was teeming, and with the results already achieved in a surprisingly short time in trying circumstances. The Experimental Department of the Institute, under the direction of Prof. L. Sosnowski, pursues no less than four lines of investigation. Prof. Sosnowski himself is interested in problems of semiconductors; there is a section on nuclear physics (Prof. A. Soltan), a section on the study of cosmic rays by the emulsion technique (Prof. M. Danysz), and a section on optical and X-ray spectroscopy, which was set up by the late Prof. S. Pieńkowski, the creator of the Institute after the First World War. The Theoretical Physics Department occupies a new wing which was recently built in the space of a few months and which offers a group of very keen and active young theoreticians ideal conditions of work under the leadership of the two well-known theoretical physicists, Prof. L. Infeld and Prof. W. Rubinowicz. There are flourishing centres of research in physics at the other universities, which the writer had, however, no time to visit. The general impression from his brief contact with Polish physicists is that of a remarkably vigorous activity and growth, worthily upholding the brilliant traditions of Polish science.

L. ROSENFELD

SOCIAL IMPLICATIONS OF THE GENETICS OF MAN

IN his presidential address to the Pacific Division of the American Association for the Advancement of Science, Prof. A. H. Sturtevant, of the California Institute of Technology, dealt with two matters. First, he emphasized the peculiar difficulties in the way of building up a sound body of knowledge on the formal genetics of man. These account for our gross ignorance of the part played by heredity, for example, in mental differences. Secondly, he considered the problems set by the genetical consequences of atom and hydrogen bombs.

Stressing that, for their effects on heredity, there is no lower level at which high-energy radiations are harmless, Dr. Sturtevant deprecated the statement by the Chairman of the Atomic Energy Commission that "... after every test ... there is a small increase in natural background radiation in some localities within the U.S.A. ... far below the levels which could be harmful in any way to human beings ...".

Dr. Sturtevant made the point that the risk is one to which the whole of mankind is already being subjected, and, if mankind survives for many generations, the bombs already exploded will ultimately and inevitably result in an increase in the harvest of defective individuals.

Few biologists will disagree with Dr. Sturtevant's criticism of the attitude exemplified above. The genetical consequences of a world atomic war would, clearly, be trivial compared with the immediate results. If mankind cannot avoid such a war there is not much point in speculating on the genetical consequences. But if it should be avoided, then a permanent increase, no matter how small, in radioactivity, be it due to industrial waste products or to the tests mentioned by Dr. Sturtevant, might become of tremendous importance. With present knowledge we are not even in a position to make a few intelligent guesses. It is to be regretted that Dr. Sturtevant, besides deprecating the light-hearted attitude towards biological problems mentioned above, did not also consider the consequences of the development of atomic energy for peaceful purposes. It seems to the reviewer that we are taking incalculable risks by building the factories without concentrating as much energy and money on the study of the long-term biological consequences of the atomic age.

G. PONTECORVO

UNITED NATIONS TECHNICAL ASSISTANCE BOARD

REPORT FOR 1953

THE sixth report on the United Nations Expanded Programme of Technical Assistance for Economic Development*, submitted by the Technical Assistance Board to the Technical Assistance Committee of the Economic and Social Council, describes the progress

* United Nations Technical Assistance Committee. Sixth Report of the Technical Assistance Board. Economic and Social Council—Eighteenth Session—Supplement No. 4. Pp. vii+267. (New York: United Nations; London: H.M.S.O., 1954.) 2.50 dollars; 17s. 6d.; 10 Swiss francs.