

JOINT COLLOQUIA

21 September 1961

The opportunity was taken to invite three of the eminent scientists who were in Australia to attend an international conference, to give addresses on their special subjects.

Professor Horace R. Byers of the Department of Meteorology, University of Chicago, U.S.A., spoke on "Research in Cloud Physics at the University of Chicago". A summary of his talk is given below.

Dr. R.J. Murgatroyd of the Meteorological Research Flight, Farnborough, England, spoke on "The Atmosphere between 20 and 80 km". His talk is given in full on page 30 of this number.

Professor M. Neiburger, Chairman of the Department of Meteorology, University of California, Los Angeles, spoke on "Atmospheric Pollution in Los Angeles". A summary of his talk also is given below.

RESEARCH IN CLOUD PHYSICS AT THE UNIVERSITY OF CHICAGO

by H. R. Byers

After completing the Thunderstorm Project in 1949, the Chicago group turned its attention to convective clouds in the pre-thunderstorm stage of development and began studying the micro-physics of cumulus, including natural and artificial nucleation. Having learned from radar studies that much of the precipitation is initiated in the warm stage without the benefit of the Bergeron process, we tackled the warm-cloud problem. Methods were developed for counting, sizing and identifying chemically the particles capable of serving as condensation nuclei. We found a greater concentration of chloride and sulfate particles over the ocean than over the land, in contradiction with the Australian findings, but we were dealing with larger particles.

We treated trade-wind cumulus with water spray from an airplane and, from randomized tests, showed that we could double the probability that rain would fall from such clouds. The amounts of rain were quite small.

We then turned our attention to cold clouds, making flights through summer cumulus in the Mississippi Valley and in Arizona. We are continuing to work on this problem.

Dr. Motoi Kumai came to Chicago and worked on the identification of the natural nuclei of snow crystals, obtaining specimens from snow in aerosol-free regions. From an electron-microscope technique he determined that clay minerals provided 85 per cent or more of the nuclei.

Artificial nuclei, especially silver iodide, have been examined. A test for the presence of silver iodide in the cloud particles has been developed. The adsorption of water on silver iodide was found to be strongly influenced by the presence of contaminants, including those substances used to make solutions for silver-iodide smokes released in seeding activities.

Laboratory tests on the freezing of cloud droplets indicated that the ice phase in clouds is most likely brought about by direct transition from the vapour rather than by freezing of droplets.

The field work now going on in southern Missouri is concerned with summer cumulus. In addition to seeding with silver iodide, we are investigating the physical properties and meteorological histories of the clouds, using radar and aircraft for various measurements.