STRUCTURE AND DYNAMICS OF THE THUNDERSTORM BY HORACE R. BYERS, UNIVERSITY OF CHICAGO (SCIENCE, SEPTEMBER, 1949).

Structure and Dynamics of the Thunderstorm has formed important subjects of discussion of many meteorologists in recent years, as it was felt that the actual structure of thunderstorm is not exactly what has been interpreted in different text books on meteorology. Until recently no precise means of verifying or modifying the text-book interpretation was available and the discussions were more or less theoretical. In 1946, the U. S. Weather Bureau in co-operation with the U. S. A. A. F., the U. S. Navy and the Nautical Advisory Committee for Aeronautics organised an intensive campaign of observations and measurements which was known as 'Thunderstorm Project' with a view to make a critical study of the subject. The observations were carried out by the U. S. meteorologists under the leadership of Dr. H. R. Byers in Florida in the summer of 1946 and in Ohio in the summer of 1947. Besides a surface micro-network and radiosonde stations with radio-direction finding equipment working in the project, simultaneous aeroplane ascents were made at five different levels *viz.*, 5,000', 10,000', 15,000' 20,000' and 25,000' to measure the turbulence, updraughts, and downdraughts, temperatures etc., and long-range radar was used to detect the development of thunderstorms. All observations were synchronised to give the instantaneous and progressive structure of the atmospheric processes in the state of development, maturity and decay of the thunderstorms observed.

In his paper on "Structure and Dynamics of the Thunderstorms," Dr. Byers has described the summary of the results of the "Thunderstorm Project" mentioned above and has brought out in an excellent way, the observed structure of thunderstorm in its different stages. He has recognised in a large thunderstorm area a number of distinct convection cells joining together or developing as appendages to an original mother-cell and has described the growth of these cells occurring in much the same way as the growth of masses of certain kinds of bacteria. He has identified the rainfall patterns on the surface corresponding to the distribution of the cells. It has been found, that the cells are not all alike in structure, some are found to consist of an updraught only, some have both updraugnt as well as downdraught, while others have only downdraught. These differences are associated with different stages in the development and dissipation of the cells. Dr. Byers has described the life history of the cell under three distinct stages: (1) Cumulus stage, in which the updraught prevails throughout the cell; (2) Mature Stage with pronounced downdraughts adjacent to the updraughts in the lower levels upto about 20,000 ft. and only updraughts above this level, the surface rain being associated with the downdraughts; (3) dissipating stage, with downdraughts in the entire lower part of the cell and negligible vertical motion in the higher levels. Like other investigators, Dr. Byers recognised the action of the outflowing cold air in triggering the growth of new cells.

Apart from the most valuable information which Dr. Byers has given in his paper about the actual structure of Thunderstorm in its different stages, the paper is very useful to aviators, as it gives a vivid picture of different currents in the cells and the aviation hazards which are likely to be experienced in its various stages. Above all, the paper is a great help to the Meteorologists who have been studying the structure of thunderstorms on theoretical grounds, in pursuing their problem from a more practical point of view. Dr Byers and his associates deserve credit of the meteorological world, for throwing light on a very intricate though very interesting and important meteorological problem.

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