LETTERS TO THE EDITOR

SIZES OF HAILSTONES.

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As is well known hailstones are formed at the tops of cumulonimbus clouds by the growth of ice crystals. The pellets of hail start falling when they acquire weights sufficient to overcome the resistance of the upward air current, and increase in size in the course of the downward journey, the increase depending upon the liquid water content of the air, the velocity of the upward current and the heat exchanges between the hailstone, the air and the supercooled water. It has been shown that on reasonable assumptions regarding the magnitudes of these quantities, spherical hailstones of diameters of about 8 cm. (or about 3") can occur.

Bilham[1] mentions what is claimed to be a record hailstone that fell at Potter in Western Nebraska which measured 17" in circumference and weighed 1·5 lbs. indicating a diameter of 5"·4 and a density about one-half that of water. The present writer has recently come across a report of a very violent hailstorm which occurred in the Nirmal Taluk of Adilabad district in the Hyderabad State on the 17th and 18th March, 1939, in which the largest hailstones weighed 7½ lbs. Even assuming a density of 0·917 gm./c.c. (or 57·2 lbs./cu: ft.) the diameter of spherical hailstone of this weight should be 7"·6 (or 19 cm.). The report has come from a responsible officer of the Hyderabad State, *viz*: the Assistant Engineer, Public Works Department, Nirmal. The following is a summary of the hailstorm report.

"The fall of hailstones in these storms lasted for fifteen minutes and seven minutes respectively followed by heavy wind and rain about an hour and a half in duration. The largest hailstones weighed about 7½ lbs. on the first day and 5 lbs. on the second. The first affected seventeen villages with a total area of thirty square miles. The hails stood 1 to 1½ inches deep and took two days to melt towards the west of Nirmal. Roofs have been blown away and tiles all smashed to pieces. Leaves from trees have been torn away and only branches left. Sheep and cattle died by hundreds and dead fish floated along the shore of the tanks. Both the storms together are estimated to have damaged 700 tiled houses, 1400 thatched homes, 2000 acres of thabi crops, 800 acres of rabi crops, 1000 sheep and 200 cattle."

According to Humphreys[2], the vertical velocity of the air 5 kilometres above sea level would have to be at least 62 miles per hour to sustain a hailstone 1" in diameter (and density 0·9), and 243 miles an hour if the diameter is 5". For a hailstone 7" in diameter, the convective updrafts should be much higher. It is difficult, however, to imagine convective updrafts of such tremendous velocities. One can only assume as pointed out by Blair[3] that hailstones were of ordinary size when they started falling but that they grew with great rapidity by contact with droplets when falling through a thick stratum of super-cooled water.

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June 14, 1949.

REFERENCES:

1. Bilham, E. G., *Q. J. R. M. S.*, 63, 159 (1937).
2. Humphreys, W. J., *Mon. Weather Rev. Washington*, 56, 314 (1928).
3. Blair, T. A., *Mon. Weather Rev Washington*, 56, 313 (1928)