551·578·7

HAILSTONES OVER GAUHATI AIRPORT ON 13 APRIL 1962

Gauhati airport experienced a brisk hailshower at about 1600 IST on 13 April 1962 which continued for about 8 minutes. The thunderstorm cell which caused the hailshower was an isolated one and developed locally at a distance of 10 nautical miles southwest of Gauhati airport as observed visually as well as by radar. The hails were of various sizes and shapes which were very uncommon (Fig. 1). A few of the large hailstones were collected and studied. Most of the hailstones were spherical in appearance. But some were cubical

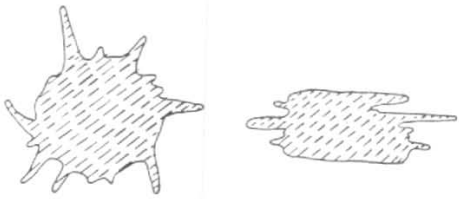

Fig. 1

(a) Spherical hailstone with protuberances all around
(b) Rectangular hailstone with protuberances along the length

in shapes with dissimilar faces. Almost all the hailstones had protuberances all around in the case of spherical stones and along the elongated sides in the case of others. Synoptic situation and radiosonde observations over Gauhati airport on the day were studied. The result of this study has been presented in this note.

At least 5 hailstones could be studied as regards their dimension, weight, length of protuberances and various layers inside the hailstones. The dimensions and lengths of protuberances of all the hailstones were measured by means of an ordinary scale and their weights were measured with a balance immediately after drying up the hailstones by blotting paper. All the stones were dissected by a blade and their core diameters were measured with a scale. These measurements are shown in Table 1.

The 00 GMT upper air charts of the day were indicative of the passage of a western disturbance over the eastern Assam Himalayas. A feeble cyclonic circulation was detected over Assam at a height of 5000 ft a.s.l. On analysis of 'vertical-time section' chart it could be found that a trough in the lower level (850 mb) passed over Gauhati in the evening of 13th and a trough in the upper air passed the following day (Fig. 2). After the passage of the thunderstorm, atmosphere over Gauhati airport became stable and the station did not experience any weather at all for the next few days. 00 GMT T-ϕ gram of the day showed presence of convective (potential) instability. Liquid water

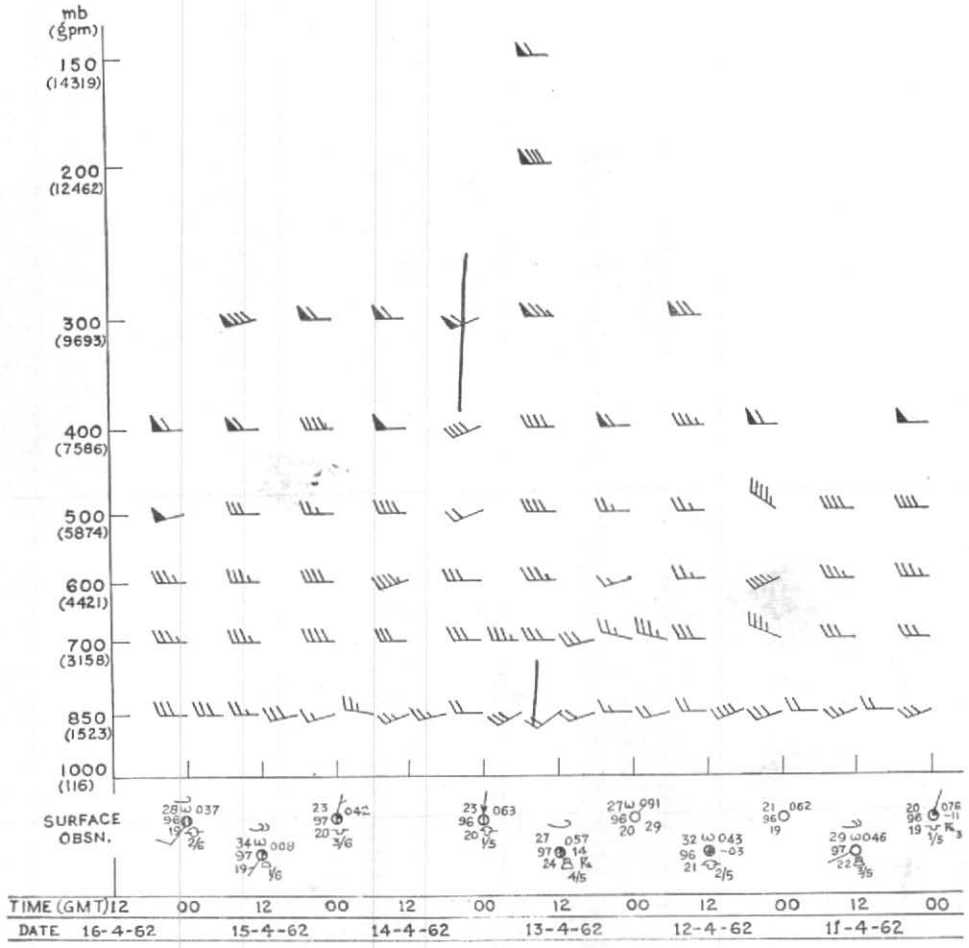

Fig. 2

content in the air was calculated from the 12 GMT T-ϕ gram (Fig. 3) and the result is reproduced in Table 2.

On inspection it could be found that the liquid water content varied with height which is in agreement with the findings of Bowen (1952).

The most important observation reported in the present note is about the shape of the hailstones. Available records of Gauhati do not show any occurrence of hailstones with spikes on them. It is not known whether such stones occurred elsewhere in India. Agarwala (1950) reported one occasion in January 1941 when a few hailstones were observed to have rather an uncommon form more or less resembling the shape of a round headed nail 1—1$\frac{1}{4}$ inch in length and $\frac{1}{4}$ inch in diameter, the size of the head being $\frac{1}{2}$—$\frac{3}{4}$ inch in diameter. Assuming that there was only one spike in those nail-shaped

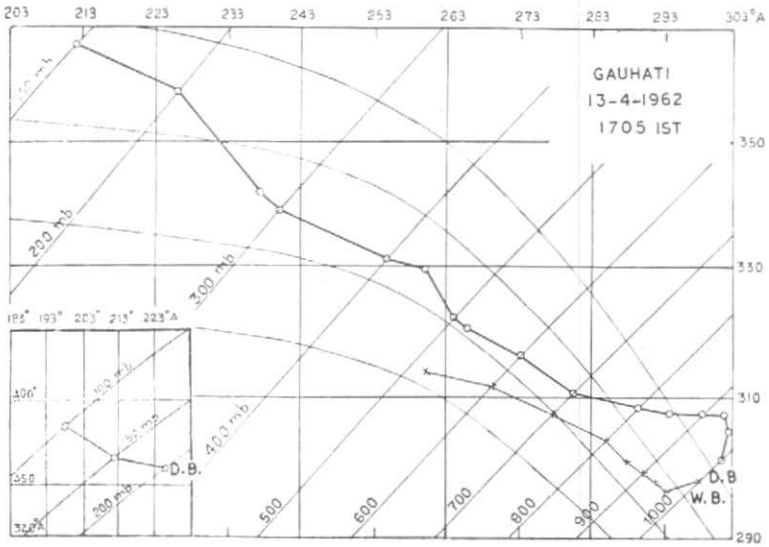

Fig. 3

TABLE 1

Observations and measurements of hailstones

S. No.	Shape	Outer appearance	Dimension (Max. dia.) (cm)	Weight (gm)	No. and measurement of spikes			Core appearance	Core diameter (cm)
					No.	Max. length (cm)	Min. length (cm)		
1	Spherical	Transparent	3·6	25	10	2·0	0·6	Opaque	1·5
2	Do.	Do.	2·5	..	8	1·8	0·4	Do.	1·0
3*	Do.	Do.	2·4	..	7	1·6	0·5	Do.	1·0
4	Rectangular	Do.	2·2×1·8×0·7	..	10	1·6	0·4	Do.	Not measured
5	Irregular (resembling tetrahedron)	Do.	..	15	..	..	..	Do.	Do.

*This particular hail on dissection showed presence of 3 distinct layers around central opaque core. The layers were transparent and opaque alternately. The diameters of its different layers were measured as 1·0, 1·5, 1·8 and 2·4 cm respectively. Others did not show any such layer structure

TABLE 2

Liquid water content in air over Gauhati on 13 April 1962

Height above station (ft)	Liquid water content (gm/cm)
7000	1·0
10000	3·0
15000	2·5
19000	2·6
25000	1·4
32000	0·5

hailstones collected by Agarwala our observations are similar in some extent to those made by him. In the present observations spikes resemble needles. While working on the freezing of water droplets Mason (1959) observed the formation of spikes of ice when water is squeezed from the frozen shell and sometimes in the explosive shattering of the droplets. Although the dimensions of the droplets used by Mason differ by several orders from those of the observed hailstones, yet the spikes on the hailstones were probably formed by the same mechanism.

D. K. RAKSHIT
C. M. BARMA

Meteorological Office,
Gauhati
July 18, 1962

REFERENCES

Agarwala, K. S. 1950 *Indian J. Met. Geophys.*, **1**, 4, p. 309.
Bowen, E. G. 1952 *Quart. J. R. met. Soc.*, **78**, pp. 37-45.
Mason, B. J. 1959 *Weather*, **14**, pp. 81-97.