HAIL IN THE PHILIPPINES

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The belt of the greatest frequency of hailstorms lies between the 35th and 60th parallels in both the northern and southern hemispheres. Hail is infrequent in the Tropics, specially over the lowlands. In the Philippines the phenomenon has been considered so rare that even its existence has been denied.[1] Without exception, any true case of hail reported by the press is sure to draw considerable comment on the part of the eyewitness and to attract unusual attention on the part of the public in general. The object of the present paper is to collect and study the various cases of hailstorms that have come to my notice, either in the investigation of old documents or in the examination of the present weather reports. As the decrease of temperature is an essential factor in the formation of hail, and the temperature decreases with elevation, the natural division of the cases to be reported seems to be into hailstorms of high altitude and hailstorms of the lowlands. For the purpose of the present paper, places located below 500 meters elevation, will be considered as stations of low altitude above sea level. All the other places will be considered as high stations. Within each group, the cases will be given according to the decreasing latitude of the stations; if more than one case has been reported from a station, the cases will be given chronologically. The paper has two parts: the first gives the facts; the second attempts to explain the facts in the light of our present knowledge.

I. THE OBSERVATIONS

A. HAILSTORMS IN HIGH ALTITUDES

The hailstorms of the Cordillera Central of Luzon.—Even reasoning a priori it would not be rash to suspect that hailstorms are likely to occur in the great Cordillera Central of Luzon. Starting from the Caraballo Sur, this cordillera extends to the northernmost part of Luzon, keeps its high elevation practically throughout the whole extent, and is subject to torrential rainfalls, that produce rugged peaks and formidable canyons. A posteriori we know from the reports of the Spanish governors under the Spanish régime and from the returns of the weather observers under the present administration that true hail has been observed several times in the uplands of Bontoc, Sagada, Cayan, Cervantes, Atok and Baguio.

The hailstorms of Bontoc.—Fifteen years ago, Dean C. Worcester wrote thus: "When the Mountain Province was established, the town of Bontoc was made the capital, as Cervantes which has been the capital of Lepanto–Bontoc was hot, had proved unhealthful, and was not centrally situated. Bontoc has a cool delightful climate.[2]" It

[1] Both Juan Francisco de San Antonio and Pedro Murillo Velarde deny the existence of *hail* in the Philippines. The international symbol for hail and frost was excluded from the list of Meteorological symbols in the blank forms of the Philippine Weather Bureau. I presume the reason to be the relative infrequency of the phenomenon in the Philippines.

Dr. C. F. Brooks thought it extremely unlikely that hail could ever fall at sea level in Panama: however, Cornthwaite writing about the Panama Canal Zone states: This phenomenon (hail) is unusual in a low-lying tropical country, but severe hailstorms are experienced frequently at high altitudes in mountainous regions in the tropics. (Monthly Weather Review v. 47, [1919] p. 723). Up to 1919 three times hail had been observed in the Panama Canal Zone. (Monthly Weather Review v. 47, [1919], p. 723; and Monthly Weather Review, v. 48, [1920], p. 276.)

[2] Dean C. Worcester, the Philippines Past and Present, v. II, p. 586.