DISCUSSION

PACIFIC ENTOMOLOGICAL SURVEY

THIS note has been prepared to clarify the meaning of the term "Pacific Entomological Survey" and thus make unnecessary the confusion indicated in correspondence and printed papers. The survey was organized in Honolulu in 1926 through a cooperative agreement, for a five-year period, 1927–1932, between Bernice P. Bishop Museum, the Hawaiian Sugar Planters' Experiment Station and the Association of Hawaiian Pineapple Canners, and had for its purpose "collecting, mounting, sorting and identifying insects of the Pacific islands (including Hawaii), preparing lists and descriptions for publication and publishing the same." As the director of the survey, the committee in charge appointed C. F. Baker, dean and director of the College of Agriculture, University of the Philippines. On the death of Dr. Baker on July 28, 1927, E. P. Mumford, Commonwealth fellow, University of California, was chosen as his successor, and in association with A. M. Adamson, now professor of entomology at the Imperial College of Tropical Agriculture (Trinidad), and local assistants, collected insects in the Marquesas Islands (January, 1929, to April, 1930; Adamson collected in the Society Islands, September to December, 1928). At the close of the period of cooperative agreement (1932), the organization was extended for one year (1933) and then disbanded with the understanding that papers based on these collections in preparation by specialists in entomology would be published by Bishop Museum and credited to the Pacific Entomological Survey (most of these papers have been issued as Bulletins 98, 133, 114, 142, in press). Since 1933, field studies of the insects of the Pacific Islands have been continued, organized and financed by institutions in Hawaii. In excess of 100,000 specimens have been brought to Bishop Museum from the Mangarevan Islands, Austral Islands, Tuamotu Archipelago, Rapa, Society Islands, Equatorial Islands, etc., in 1934; Micronesia in 1935–1936; Guam in 1936; Fiji, New Zealand in 1937; Fiji in 1938.

Some time after the official termination of the Pacific Entomological Survey and while studies of the Marquesan insects were in the process of publication in Honolulu, there was organized, and the name registered, a "Pacific Entomological Survey" under the directorship of E. P. Mumford, with headquarters at Oxford. Unfortunately, the name applied to the new "Survey" is the same as that long in use in Hawaii, and to avoid misunderstanding it is appropriate to note that the two organizations are entirely unrelated in present personnel, finance and program; that the new "Survey" is distinct from the survey organized in Hawaii, and has no control over the collections made in the Marquesas and Society Islands by Mumford, Adamson, Whitten, Tauraa and Le Bronnec during the period 1928–1933, nor over the publications resulting from their study. All correspondence pertinent to the original survey should be addressed to Bernice P. Bishop Museum, Honolulu.

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DIURNAL CYCLE OF HEAT RESISTANCE IN PLANTS

A DAILY cycle of heat resistance in plants that does not appear to have been reported in the literature has been discovered in the several species of field crops studied including corn, wheat, barley, sorghum and alfalfa.

In these studies the daily maximum resistance to heat was attained by plants at about mid-day and continued during the afternoon. The minimum resistance prevailed early in the morning. Resistance to heat increased in plants when they were exposed to light and decreased in the absence of light. One hour of light, following normal darkness of night, was long enough for plants to acquire a measurable and, in some cases, a marked amount of resistance to heat. Ordinarily plants reached their daily maximum heat resistance within four hours after exposure to daylight following normal night. Plants exposed to electric light during the night were more resistant to heat in early morning than those that had been in the dark during the night.

The loss of heat resistance in plants when exposed to darkness was slower than the gain of resistance in the presence of light.

Most of the investigations were made with young plants, although corn and sorghum were tested also in the flowering stage. Exposure to high temperature for five hours was sufficient clearly to indicate differential resistance. The degree of temperature required to distinguish differences in heat resistance depended upon the species and the condition of the plants.

The following data are presented as illustrations of the experimental results that have been obtained in these studies. Young wheat plants, grown in the greenhouse in January, when tested at 122° F. for five hours beginning at 8 A.M., were injured 68 per cent. as indicated by the proportion of tissue that was killed. In similar tests beginning at 1 P.M. the injury was 18 per cent. Young barley plants which received no morning light preceding the test were injured 84 per cent., while those that had been exposed to the forenoon light preceding the test were injured 21 per cent. Wheat plants which had been three feet below a 200-watt Mazda light during the night were injured 24 per cent. when tested for five hours at 120° F., whereas similar plants that had been in the dark during the night were injured 70 per cent. by the treatment. Wheat that had been kept in the dark during the night and forenoon was injured 95 per cent. compared with 15 per cent. injury to plants that had been treated in the same way except that they were exposed to daylight for one hour immediately before the test. Corn plants in some cases exhibited increased resistance to heat following exposure to light for less than one hour. Wheat that had been in daylight throughout the forenoon was injured 10 per cent. by heat, whereas the plants that were prepared in the same way except for being in darkness one hour immediately preceding the test were injured 30 per cent. Sorghum in the heading stage was injured less by exposure to 150° F. for five hours beginning at 1 P.M. than to 140° F. for the same length of time beginning at 8 A.M.

The photosynthetic production of organic material suggests itself as an explanation for the increased resistance of plants to heat. It appears, however, that the amount of organic material that might be manufactured during the short exposure to light, which is needed to bring about a marked increase in resistance, would probably be insufficient to account for so much change in resistance. Perhaps a photochemical change or some other influence of light which can be induced quickly may be responsible for the increased resistance of plants to heat when they are exposed to light.

Investigations seeking an explanation for the phenomenon resulting in a daily cycle of heat resistance in plants are being continued.

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NIEVES PENITENTES NEAR BOSTON, MASSACHUSETTS

ON March 11, 12 and 13, approximately 11 inches of snow fell in the Greater Boston area. This, together with what had already fallen, made 14.2 inches of snow. For ten days following this storm, the temperature remained below freezing much of the time (Table 1). During this period the humidity was continuously low and there were several clear days (Table 1).

As these conditions are ideal for the formation of nieves penitentes, it is not surprising that on March 21, 22 and 23 the writer observed larger and more perfectly formed nieves than he had ever before seen around Boston. These features are usually found on the snow fields of lofty mountains. They have been

TABLE 1

U. S. WEATHER BUREAU, BOSTON, MASSACHUSETTS

Date	Max. temp. F°	Mean temp. F°	Humidity at noon	Sunshine
March 14 ...	38°	30°	59	clear
" 15 ...	38°	30°	74	cloudy
" 16 ...	45°	36°	95	cloudy
" 17 ...	38°	32°	47	clear
" 18 ...	35°	29°	52	partly cloudy
" 19 ...	31°	24°	35	clear
" 20 ...	40°	32°	64	cloudy
" 21 ...	36°	30°	54	clear
" 22 ...	35°	28°	44	clear
" 23 ...	41°	31°	40	clear
" 24 ...	58°	46°	43	clear

described from the Himalayas,[1] Sierra Nevada,[2] Kilimanjaro[3] and also from the Andes,[4] where apparently they reach their greatest size and most perfect development.

As is shown in A of Fig. 1, a great many were

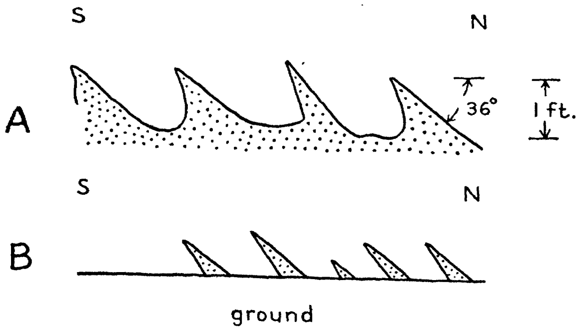

FIG. 1. Diagrammatic sketch of nieves penitentes near Boston, Mass. A—Pinnacles separated by snow. B—Pinnacles separated by bare ground.

approximately one foot high. They ranged, however, from a fraction of an inch to 2 feet in height. They were usually separated by pits, although some of the smaller ones were separated by east-west trenches. The pinnacles pointed toward the south, and the back slope (north facing) of many was approximately 36 degrees. Some of the pinnacles were separated from each other by bare ground, the result of complete melting and evaporation of the snow between them (B of Fig. 1). Many of the snow banks, which were originally of irregular shape, had cliffs two and three feet high on the south side and a flat slope on the north. As March 24 was a warm day with the temperature almost continually above 32 degrees (Table 1), much melting took place and the nieves were largely destroyed.

It is generally agreed that the nieves are produced

[1] W. H. Workman, *Zeitschrift für Gletscherkunde*, 3: 241–270, 1909.

[2] F. E. Matthes, Trans. Amer. Geophy. Union, 15th annual meeting: 380–385, 1934.

[3] F. Jaeger, *Zeitschrift der Gesellschaft für Erdkunde*, No. 2: 101–103, 1908.

[4] H. Meyer, *Zeitschrift der Gesellschaft für Erdkunde*, No. 2: 98–101, 1908. See also R. Hauthal, *Zeitschrift der Gesellschaft für Erdkunde*, No. 2: 95–98, 1908.