Saskatchewan, the eclipse of the sun, saw a meteor flash in the northern sky, the trail of which remained visible near the horizon for about three-quarters of an hour, taking on a form somewhat resembling the later ones depicted by Captain Belknap, and in that time changing its position considerably, both relative and absolute.]

THE TYPHOON AT MANILA, PHILIPPINE ISLANDS, OCT. 20, 1882.

THE accompanying diagram gives an abstract of the curves traced by the meteorological instruments at the observatory in Manila, Philippine Islands, during the typhoon which swept over the central provinces of Luzon, Oct. 20, 1882, from the time when the first indications were noticed at the south-east of Manila, at noon of the 19th. The observers were the Jesuit Fathers under Padre Faura, and the instruments those once used by Father Secchi at Rome. Observations made at the marine and telegraph offices in the city, and on the national war vessels on the coast, are incorporated in the diagram.

Barometer. — The mercury descended at noon of the 19th to 756 mm. (about 29½); varying little till near midnight (19–20th), when it began to go down more rapidly. It has been noticed, that, when it descends to this point in the Philippine Archipelago, it always indicates a storm at a considerable distance. Up to dark there had not been observed the cirrostratus clouds, nor the solar halos, nor the characteristic sunset colors, which usually indicate the proximity and direction of approach of a typhoon. There remained only the direction of the superficial winds oscillating from north-east to north-west (of little value), and the course of the clouds, which, till 1 A.M. of the 20th, came from the north-east. At 3 P.M. of the 19th, warning was given from the observatory, 'Signs of a cyclone at the south-east;' but there were no unusual barometric changes. It was at this time more than 370 miles away, with a destructive diameter of about 80 or 90 miles.

From 10 P.M. of the 19th to 4 A.M. of the 20th, the barometer went down more than .15 of an inch: at this time warnings were sent to all the public offices that danger was imminent, and word was telegraphed to Hong Kong that a typhoon was beginning at the east of Manila, and was proceeding west-north-west. At midnight it began to fall more rapidly till 8 A.M. of the 20th; and then, in two hours, fell from 746 mm. (29) to 728 mm. (28.4). About noon it began to rise as rapidly till 2 P.M., and then gradually to 756 mm. (29½) at 10 P.M.

Thermometer. — At noon of the 19th it stood at 32° C. (89½° F.); it gradually went down to 24° C. (75° F.) at 7 P.M.; it remained at this point till about 11 A.M. of the 20th, and then in less than an hour went up to 31° C. (88° F.), and descended again to 24° C. (75° F.), at 10 P.M. standing at 26° C. (79° F.).

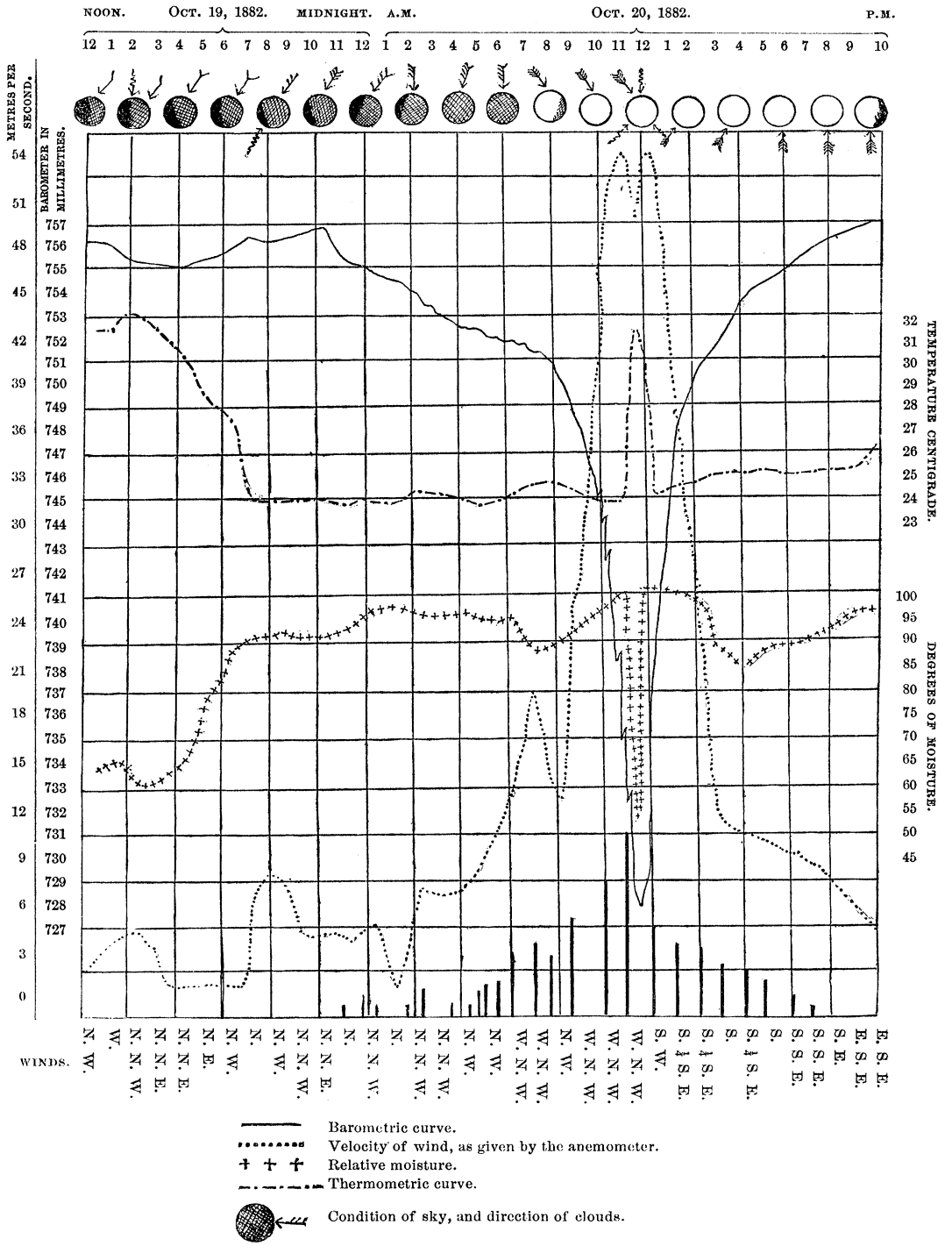
Moisture of Air. — It occurred toward the end of the rainy season, and during the south-west monsoon. At noon of the 19th it was 65, rapidly rising between 2 and 6 P.M. to 90, and varying from that to 95 till 10 A.M. of the 20th; at 10.30 it was 100; then in half an hour it went down to 55, and back again to 100, thence gradually declining to 90–95 at 10 P.M.

Velocity of Wind. — There was comparative stillness till 6.30 P.M. of the 19th; from then to 4 A.M. of the 20th it rarely exceeded 20 feet per second; then in three hours it rose to 63 feet, and, after a half-hour's descent to 40, in 1½ hours, or at 11 A.M., reached at least 180, and probably more, as at the height of the gale the registering instrument was carried away: this is equivalent to about 125 miles an hour, and the velocity may have attained 140 miles. In an hour it began to diminish rapidly, and at 1.30 P.M. had gone down to 33 feet, and to 13 at 10 P.M. After several sudden changes, at 2 A.M. it began to blow from the north-west, and so continued till about noon, when it shifted suddenly to the south-west for half an hour, and then blew from south-south-east and east-south-east up to 10 P.M.

Rain. — Rain began to fall just before midnight, 19–20th, and increased, with occasional lulls, to about 11 A.M., when it fell in torrents; after that it gradually decreased, and ceased about 8 P.M. It was accompanied by some lightning.

Direction. — The storm entered the archipelago over the Catanduanes Islands, near Tabaco and Albay, and went across the east of the North Camarines, near Daet, judging from the successive positions of the vortex, then passing over Manila and to the China Sea, by Subig. The course was therefore from south-east to north-west, and its velocity 19 miles an hour, the greatest ever known here.

Form. — The barometer went down much more slowly than it ascended; whence it may be deduced that the curves of equal pressure were not circular, being wider at the anterior than at the posterior part of the typhoon, forming a kind of ellipse, in which one of the foci occupied the vortex. The tracing of the



The arrows indicate not only the direction of the clouds, but also their velocity, represented by the barbs, six marking a hurricane force; the zigzag arrows indicate lightnings, and the point of the horizon where they were observed; the empty circles indicate a sky completely hidden.

The heavy vertical black lines at the bottom of the chart indicate the amount of rain.

isobaric lines is strongly in favor of the theory of converging winds, and apparently fatal to that of the long-held one of circular winds.

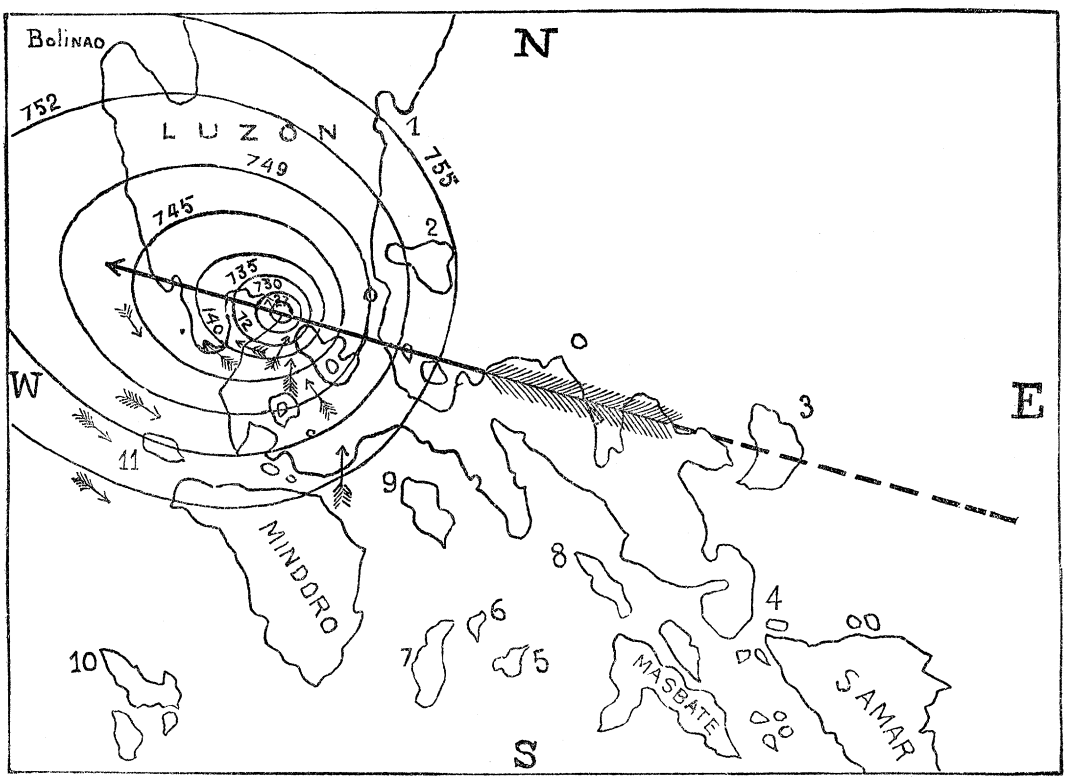
Vortex. — At 11.46 A.M. (20th), after a violent rush from the west-north-west, Manila was in the vortex. The calm was not absolute, but with alternate gusts and lulls for about eight minutes; at 11.52 the calm was absolute for two minutes; then alternate calm and gusts from the south-west. Blue sky was not seen, but it cleared to a dense watery vapor; the dark belt of the storm could be traced on the horizon. The diameter of the vortex was probably not more than 14 or 16 miles.

Changes. — The most striking phenomenon was the sudden change of temperature and hygrometric condition of the air, as revealed by the curves traced; the former from 75° to 88° F., and the latter from 53 (rarely observed here, and only in April and May) up to saturation. Persons who opened their windows during the calm were instantly compelled to close them, for the air 'burned' as in the Italian sirocco.

Barometer. — The lowest barometer was at 11.40, or 6 minutes before entering the relative, and 10–12 before the absolute, calm; at this time Manila was probably the nearest to the centre of the vortex. At 11.54 it began to rise rapidly, the wind changing suddenly to the south-west, but with equal violence. The blow lasted $2\frac{1}{2}$ hours; and its traced fury for the last half of the diagram was estimated, but not observed for want of instruments.

At 12.30 the dense clouds began to rise quickly, indicating that at the posterior part of the storm the winds had also mounted higher. It was peculiarly destructive, as Manila was exactly at the point of this sudden change of elevation.

Force. — The observatory is about 113 feet above sea-level. Just before 11 A.M. the wind tore up a palma brava some 1,000 feet



MAP SHOWING THE COURSE OF THE HURRICANE, AND THE DISTRIBUTION OF THE ISOBARIC LINES AROUND THE CENTRE.

1. — Bay of Casiguran. 2. — Island of Polillo. 3. — Catanduanes Islands. 4. — Strait of San Bernardino. 5. — Island of Sibuyan. 6. — Island of Romblon. 7. — Island of Tablas. 8. — Island of Burias. 9. — Island of Marinduque. 10. — Calamianes Islands. 11. — Island of Luban. 12. — Bay of Manila. The large arrow indicates the course of the hurricane, and horizontal section of the same, as it passed over Manila. 755 to 727 mm. (29.45–28.35 in.) the fall of the barometer.

away, raised it to the height of the observatory, and carried it against the cast-iron column through which pass the connections between the top and the registering apparatus; destroying the same, and preventing further observation of the anemometer. Manila was in the centre of the greatest violence; at a short distance from the city, the barometer stood 3½ tenths higher.

Effects. — The typhoon was the most severe that has visited the islands for fifty years. Houses were unroofed, vessels driven ashore, whole villages prostrated, trees torn up by the roots; metal plates, tiles, timbers, and heavy weights were carried to great heights and distances. Millions of property were destroyed in the city and its suburbs; the growing cane and hemp in the provinces were seriously damaged, thousands of people are houseless and penniless, and general distress and business prostration are the result. The rain saturated every thing that the wind exposed; what was left, more or less injured, was further ruined by another typhoon of almost equal violence, which occurred Nov. 5.

SAMUEL KNEELAND.

CAPTAIN C. E. DUTTON ON THE HAWAIIANS.

CAPTAIN DUTTON of the United-States Army has just returned from a sojourn of seven months on the Hawaiian Islands, where he went for the purpose of studying the volcanic phenomena. Although most of his time was necessarily devoted to geological investigation, he yet found time to collect a large mass of ethnological data, which he presented in a most interesting form at a meeting of the Anthropological society of Washington, held Jan. 2.

He said that in color the inhabitants are of a bronze shade about midway between the color of the North-American Indian and the Malayan. The general features, however, are very unlike those of our Indians, and partake in part of the character of the European and in part of that of the African tribes, though more strongly of the former. In stature the Hawaiians are large, and equal the Anglo-Saxon race. There are, however, two broadly marked social castes, and these differ physically almost as widely as they do socially. The ruling class are lighter in color, and larger in stature, being usually above six feet in height, and sometimes reaching six feet seven inches. They also tend to obesity, and are readily distinguishable from the lower classes in numerous other ways. The Hawaiian Islanders belong to the finer and better of the two great races of men which about equally share the Polynesian Islands. They were never cannibals, and nothing offends them more than the charge of having eaten Captain Cook.

Many facts point to the East-Indian Archipelago as the portion of the globe from which these people originally came; and among these evidences are their possession, when first seen by Europeans, of the dog, the pig, and the domestic fowl, none of which could have come from America. Their language allies them very closely to certain Bornean tribes, and particularly to the Dyaks. This affinity is especially observable in their numerals.

Their legendary lore, which is amazingly rich, also belongs to the East-Indian type, and even partakes in a striking manner of the character of that of India, Western Asia, and Egypt. Their myth relating to the creation of woman is identical with that in Genesis, and may have been borrowed from the early missionaries; but against this view is the remarkable fact that it appears in an archaic form of their language which only the priesthood can fully understand. The present king Kalakaua is much interested in the ethnology of his people, and believes in their American origin, — a belief which the speaker did not share.

The population of the Hawaiian Islands is dense, and every thing points to the conclusion that this has been the case for a very long period. The arable lands are confined to belts around the islands extending inward from six to twelve miles to the beds of lava or steep sides of the mountains. These lands are divided up into very small lots by means of stone walls.

The state of society is by no means low or savage. Society is well organized according to a rigid system. This system very closely resembles the feudal system of European history, having all the classes which characterized that system. Prior to the consolidation of all the governments of the islands by Kamehameha I., in the early part of this century, there existed on each island a number of independent kingdoms. The kings were the proprietors of all lands, which they parcelled out to subordinate chiefs, whose tenure was strictly analogous to enfiefment, with this exception, that, in addition to homage and military service, tribute was also exacted of them. The latter subdivided their fiefs among their retainers on similar conditions, and these turned them over to the lowest, or working classes, to cultivate; which latter were the true *villeins*, who were merely tenants at will. Still this latter form of tenure was the most permanent; since the chiefs were liable to be changed by military reverses and royal displeasure, while the villeins remained, as in Europe, practically *adscripti glebae*. The priesthood was almost always found supporting the king. This class maintained, down to the reign of Kamehameha II., the most despotic sway over the people, and chiefly through the principle involved in the terrible word *tabu*. The fundamental idea underlying this term is *divine prohibition*, and the penalty for the breaking of a tabu was always death. The people submitted to this in the firm belief that death in some form was certain to follow such offences; and that, if man did not inflict it, the gods surely would. Tabus were either permanent, recurrent, or merely temporary and arbitrary. Among the permanently tabued acts was that of the sexes eating together. Special tabus were prescribed by the king, with the advice of the priesthood.

The speaker went on to describe in detail the mode of subdividing the land for agricultural purposes, the skill displayed in irrigation, the principal products of the soil, the leading articles of food and how they are prepared, the character of the houses, the manufacture of tappa-cloth and of mats out of the screw pine, the culinary utensils and dishes used; the implements manufactured and the materials yielded by the country for these purposes; the modes of fishing; the kind of dress worn; the elaborate robes, cloaks, helmets, etc., made for the kings, of yellow and red feathers; and the use of nuts as candles. He further treated of the military tactics of the Hawaiians, and the arms employed; of their