IN QUEST OF A SHADOW: AN ASTRONOMICAL EXPERIENCE IN JAPAN.

BEARS, the barbarous Ainu, the Imperial Agricultural College at Sapporo, and the fine harbor of Hakodate, where the men-of-war of various nationalities are apt to take refuge from the summer heats of Yokohama, — these comprise practically everything that the average traveler in the Mikado's empire connects with the great northern island of Yezo. Indeed, few of the Japanese themselves know much of this island, with its intensely cold winters, its deep snows, and its general life, so different from the pleasure-loving, semi-tropical existence of the lower provinces. A missionary may be encountered here and there in southern Yezo, and still more rarely, perhaps, a foreign or Japanese ethnologist or naturalist makes his somewhat difficult investigations around Volcano Bay or along the southern coast. But the island is largely an unknown region. It is one of the few places in a supercivilized world where primitive nature prevails, where rude aborigines still pursue their unmolested way, and where many hundred miles of trackless forest await the first step from an outer civilization.

Across this island the slender shadow of the sun's total eclipse rushed in its swift passage over the earth in August of last year. Toward localities of the very existence of which few had been aware, scientific men turned, so soon as the track of anticipated darkness was found to lie along those unexplored shores; and for three years the meteorological conditions in the provinces of Kitami, Kushiro, and Nemuro had been the subject of careful investigation by the Imperial Weather Service, at the request of an American astronomer.

Japan is emphatically a country of moisture and decorative cloud-effects, of soft warmth and fitful sunshine. Yet in its remote northern regions the astronomical conditions were more favorable, and the observations in July and August of 1893, 1894, and 1895 showed the chances of clear skies to be equal to the chance of clouded skies. And so it fell out that a scientific expedition from Massachusetts and another from France wended their way in July of 1896 toward this remote portion of the globe, and threw their flags for the first time to breezes blowing straight to Yezo from the island of Saghalien, over the tossing waves of the sea of Okhotsk.

An overland journey to Esashi, the objective point in Kitami province, would have been impossible, involving the transportation of several tons of apparatus by packhorse over roadless mountains, through unexplored forests, and across bridgeless rivers; but the Japanese government, with characteristically generous courtesy, ordered the detail of a steamship especially to convey the American expedition from Yokohama to whatever point it might select for the observing-station; giving free transportation to its members and instruments, and affording every facility for the successful completion of its mission.

Early in July, 1896, an American settlement sprang up in the midst of a greatly surprised little fishing-hamlet. Telegrams from the central government to the chief ruler of the island, and from him to the local authorities, placed practically the entire resources of the region at our disposal. Guards and interpreters, a telegraph operator who understood English, an empty schoolhouse as headquarters, a tract of land adjoining for setting up instruments, and every intelligent Japanese resident as willing assistant so far as possible, were the pleasant outcome of kindliness in high places.

Esashi itself has a few characteristic Japanese features — tea-houses, whose little attendant maids were quite as daintily dressed as those in the far south; while a gnarled tree-trunk formed the street-lamp pillar just outside my window, — a picturesque corner decoration. Strolling pilgrim beggars in dingy white solicited alms. Attempts were made at temple festivals, where, instead of the gorgeous floats of Kyoto, the devotees, supposably riding in grandeur, were really walking amid artificial cherry blossoms, in little floorless inclosures under canopies, simulating rolling cars, — a pathetic deception deceiving nobody; and more secular festivals occurred, when booths were erected and plays were performed. As no other foreign lady had ever visited Esashi, curiosity was even more active than is usual in remote Japanese villages. Children, young people of both sexes, and even a few withered grandparents formed a procession when I walked abroad, and three ecstatic little boys marched close at my side blowing tin trumpets. Truly I had never before made so triumphant a progress. The crowds were chiefly Japanese, but on the outskirts lurked a few of the shy and "hairy" Ainu, who had come to this metropolis from a neighboring village, the men distinguishable at any distance by their bushy black hair and enormous beards, the women tattooed in imitation of their lords.

The most picturesque spot in Esashi was a small Shinto temple with a neatly kept graveled courtyard and two handsome *torii*, one of fine granite. The ministering priest, an odd-looking Japanese with a sparse beard and an indifferent expression, was often to be seen watering various handsome plants growing in vases around the temple. Near by, a little lighthouse rose abruptly from the rocks of the shore, in which every evening a student-lamp was dutifully lighted. The narrow platform around the summit, reached by an open outside ladder, was the point where I was to draw the long and faint streamers of the corona during the precious two minutes and forty seconds of totality on August 9th.

Just beyond our eclipse camp, Professor Deslandres, of Paris, had located his expedition, with a fine collection of spectroscopes for attacking coronal problems; and in the offing lay a French man-of-war to carry away the instruments and members of his expedition after the eclipse should have come and gone. Out in the scrub bamboo, perhaps half a mile from the village, Professor Terao had established his party from the Imperial University; and our own instruments — twenty telescopes and spectroscopes, all attached to one great central polar axis and operated by electricity — were daily becoming more perfectly adjusted for the eclipse. In leaving the south we had apparently left the region of low-lying fogs and constant cloud. Here the sunsets were clear and yellow like autumnal skies in New England, the nights cool after hot and brilliant days. One long storm had been discouraging, but afterward the air was clearer and quieter.

Nothing could have exceeded the interest and courtesy of the leading inhabitants. The mayor, or "chief officer," even gave orders that on eclipse day no fires were to be lighted anywhere in town. No chance smoke should be suffered to make the air thick or unsteady. All cooking should be done the day before, or else only the *hibachi* with its glowing charcoal could be used; and if dry weather had prevailed, the streets were all to be carefully watered against the risk of rising dust.

Early in the morning, just as the sun was rising, and sleep had been effectually banished by the awkward waltzes of the crows on the shingled roof over our heads, was the favorite time for official calls. A knock preceded the immediate entrance of our interpreter with members of the Board of Education and govern-

ment officials who had come to Esashi to see the eclipse and to assist in dedicating a new schoolhouse. So with ante-breakfast coffee prepared by our smiling cook, and gifts of the interesting fossils and jasper of the region from them, these occasions could not fail to be mutually gratifying.

We received these visitors in the office or headquarters of the chief of the expedition. Around the walls, on convenient shelves, were eyepieces, lenses, electrical appliances, a few books, object-glasses in their shining brass holders, levels, a transit, photographic plates, and other valuable paraphernalia of an astronomical expedition. During one of these impromptu receptions at five in the morning, the mayor, glancing about the apartment, gave utterance to a long and elaborate speech, duly accompanied by low bows and the most friendly smiles. It must have lost much of its grace in translation, but it seemed to be to the effect that on those shelves the children in former days had been wont to keep their shoes. He hoped a sort of reflex action from the wonderful objects now filling the same space might extend to every child whose straw or wooden clogs had once occupied it, giving them something of the scientific and devoted spirit that animated the famous men who had come so far for a sublime celestial spectacle.

On Friday the 7th no callers arrived; it rained heavily. The next day, too, no one came through the storm. But in the evening a glorious sunset filled the sky; the clouds broke into shreds of pink and salmon and lavender against a yellow background, and all the guests of distinction in the village, with the mayor and the leading citizens, came in together. Elaborate speeches were made again, wherein they said that while it rained for two days their hearts had failed them; they could not bear to look at all the fine apparatus and the extensive preparations, with the prospect of cloud on Sunday. But now, in the face of the sunset glory, they came joyfully, with congratulations from all the fishermen, who knew the signs of the sky; and with hopeful portents from a book of prophecy, and a local oracle just interrogated at a neighboring shrine. In truth, everything promised well. Stars enough came out in the evening for testing the instruments, and hearts more contented slept than awoke once again to the sound of rain.

The nerve-tension of that Sunday morning was beyond what one would often be able to endure. Shower succeeded sunshine, cloud followed blue sky, northwest wind supplanted a damp breeze from the south full of scudding vapor. The hours rolled on toward two o'clock and "first contact." The chief astronomer kept calmly at work, giving final directions to each person for every instrument, keeping each of the multitudinous details in mind, with a philosophy as imperturbable as if the skies had been unchangingly clear, and cloudless totality were a celestial certainty. The vagaries of the western horizon, the moods of the wind, and the prevailing drift of cirrus and cumulus had no further charm. Time was too precious. It remained for the unofficial member of the party to feel the alternations of hope and despair.

At one o'clock almost half the sky was blue; two o'clock, and the moon had already bitten a small piece from the bright disk of the sun, slightly obscured by a drifting vapor; half after two all the people of the town were ranged along the fence about our inclosure, looking once in a while at the narrowing crescent of the sun, but generally at the instruments, the sober faces in curious contrast to the sooty decorations made by looking through the wrong side of smoked glass. And still the drifting vapor passed, — sometimes so thin as to be hardly perceptible, often heavy, but constantly changing.

Then perceptible darkness began to creep onward. Everything grew quiet. The black moon was stealing her silent

way over the sun, until the crescent grew thin and wan. The Ainu suppose an eclipse to be the fainting or dying of the sun, and they whisk drops of water from sacred god-sticks toward him, as they do in the face of a fainting person. But no one spoke.

Just before totality, to occur at two minutes after three o'clock, I went over to the little lighthouse, taking up my appointed station on the summit, an ideal vantage-ground for a spectacle beyond anything else I ever witnessed. Grayer and grayer grew the day, narrower and narrower the crescent of shining sunlight. The sea faded to leaden nothingness. Armies of crows which had pretended entire indifference, fighting and flapping as usual on gables and flag-poles with unabated fervor, finally succumbed, and flew off with heavy haste to the pine forest on the mountain side. The French man-of-war disappeared in gloom, the junks blended in colorlessness; but grass and verdure suddenly turned strangely, vividly yellow-green.

It was a moment of appalling suspense; something was being waited for, the very air was portentous. The flocks of circling sea-gulls disappeared with strange cries. One white butterfly fluttered by, vaguely.

Then an instantaneous darkness leaped upon the world. Unearthly night enveloped all things. With an indescribable outflashing at the same second, the corona burst forth in wonderful radiance. But dimly seen through thinly drifting cloud, it was nevertheless beautiful, a celestial flame beyond description. Simultaneously the whole northwestern sky was instantly flooded with a lurid and startlingly brilliant orange, across which floated clouds slightly darker, like flecks of liquid flame, while the west and southwest gleamed in shining lemon-yellow. It was not like a sunset; it was too sombre and terrible.

Still the pale circle of coronal light glowed peacefully, while Nature held her breath for the next stage in the amazing spectacle. It might well have been the prelude to the shriveling and disappearing of the whole world. Absolute silence reigned. No human being spoke. No bird twittered. Even the sighing of the surf breathed into silence; not a ripple stirred the leaden sea. One human being seemed so small, so helpless, so slight a part of all the mystery and weirdness.

It might have been hours, for time seemed annihilated; and yet when the tiniest possible globule of sunlight, like a drop, a pin-hole, a needle-shaft, reappeared, the fair corona and all the color in sky and cloud flashed from sight, and a natural aspect of stormy twilight filled all the wide spaces of the day. Then the two minutes and a half in memory seemed but a few seconds, — like a breath, a tale that is told.

The fine detail of the corona was lost in the thick sky, but its brilliance must have been unusual to show so plainly through cloud; and it was remarkably flattened at the solar poles, and extended equatorially, thus indicating to the astronomer new lines of research for eclipses in the future. A few photographs of the corona were taken, — too misty through vapors for much subsequent scientific study. One or two hand-drawings give its general outline well; and a most interesting experiment seems to indicate the presence of Roentgen radiations in the corona, — singularly enough, since they appear to be absent in sunlight.

But the invention, the perfect working, and the manifest advantage of an automatic system of celestial photography, operated electrically, by which twenty telescopes can be manipulated by one observer and his assistant, and between four and five hundred coronal photographs secured in two or three minutes, was the most practical result of the expedition, only hindered from its fullest success by cloud at the critical moment.

Just after totality, a telegram came

from the astronomer royal of England, far away on the southeastern coast: "Thick clouds. Nothing done."

Nature knows how to be cruel, — though it may be mere indifference. But until, in his search for the unknown, man learns to circumvent clouds, I must still feel that she keeps the advantage. On that Sunday afternoon, the sun, emerging from the partial eclipse, set cheerfully in a clear sky; the next morning dawned cloudless and sparkling.

The astronomer must keep his hope perennial. The heavens remain, and sun and moon still pursue their steady cycle. In celestial spaces shadows cannot fail to fall, and the solid earth must now and then intercept them. In January of 1898, India will be darkened; in 1900, our own Southern States; in 1901, Sumatra and Celebes will be the scientific Mecca for six wonderful minutes of totality. Somewhere the shadow will be caught, beneficently falling through unclouded skies.

Mabel Loomis Todd.

A MAN AND THE SEA.

On the great shiny plain of the Atlantic, hushed and passive as though resting after the gale, the dismasted, storm-stricken hull of a vessel rolled sickishly from side to side in the trough of the sluggish swells. Her decks, previously a tar-lined stretch of boards shadowed by the sails above, now lay desolate beneath the sun, strewn with broken bits of planking from the shattered deck-house and covered with a meshwork of tangled ropes and spars. The after-part of the starboard gunwale had been washed away, leaving the deck in that section open to the sea; and facing the gap, propped up against the jagged stump of the mainmast, sat a man.

There had been six of them in all when the vessel cleared from Rio Janeiro. Five the sea had already taken. This one had yet to wait. He was a large man, well along in middle age. His face was dark, heavy-featured, almost hard; with a bold, self-contained look about the black eyes that showed him to be a man determined to have his own way in all things, and accustomed to dominate over his fellow men. But a falling yard-arm had broken his leg, and he remembered, with a half-cynical smile on his pain-drawn lips, how, when the gale was screeching and seething about him, he had seen the fifth man sweep down the deck in the swash of the boarding sea, hurled straight through that gap in the gunwale; and how he had sat there powerless even to cast the poor devil a rope.

So all through the morning of the calm he gazed stupidly out over the illimitable heaving level of the sea to where the blue dome of the heavens bent down to the sun-white water, drawing at the imagined meeting the curved and delusive line of the horizon. He seldom moved, for the pain in his leg was less intense when he kept very still; but he knew the sea was the same behind him, and over the bows, and over the stern the same.

Now and again he heard a strange bumping, and felt the shocks tremble through the hull. At first he thought it some hindrance in the ceaseless clanking of the wheel-gear; then it occurred to him it was the end of the mainmast, held close to the vessel by the ratlines, thumping against her quarter. After that he waited for the shocks. But they came irregularly. When two of them followed each other in quick succession it startled him; when a longer spell of quiet intervened, he thought he must snatch up the