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AN ASCENT OF FUJI THE PEERLESS.

Thou hast a voice, Great Mountain, to repeal
Large codes of fraud and woe; not understood
By all, but which the wise, and great, and good
Interpret, or make felt, or deeply feel.



F Shelley's lines are true for Mont Blanc, they must, *a fortiori*, be true for Japan's great sacred mountain, Fuji-san. All mountains in the Mikado's empire are revered, but "Fuji the Peerless" preëminently.

Rising on all sides with a majestic sweep from the plains of Suruga and Ko-shiu, the symmetric cone of Fuji, in figure nearly ideal, attains an elevation of 12,500 feet above the sea.

All the mountains of Japan are of unquestioned volcanic origin, and Fuji stands where Hondo, the main island, is broadest. About twenty craters are still active throughout the islands, but Fuji-san belongs to the much greater number which are now inactive. Its last eruption occurred in 1707, continuing more than a month. As far away as Tōkyō, sixty miles northeast, the ashes fell to a depth of seven or eight inches; while on the Tōkaido, twelve or fifteen miles southeast, the accumulation was six feet. At this time was

formed Ho-yei-san, a secondary or parasitic cone on the southeast slope.

No other mountains in Japan reach within three thousand feet of the elevation of Fuji, and it is therefore in prominent view from an immense area, including thirteen provinces of the empire. Certain avenues in Tōkyō are called Fuji-mi, or Fuji-viewing streets, and from all of them the famous peak is a glorious spectacle.¹ All winter long the summit of Fuji-san is unapproachable, and from November to July snows reign supreme. In the latter month, however, when the trails up the mountain slopes are laid bare, the ascent becomes feasible, and remains so throughout the summer and early autumn.

Our interest in ascending Fuji-san was not that of the tourist, merely to say that he had been to the top; nor of the Japanese pilgrim, to pay vows at the shrine of the adorable goddess Kono-Hana-Saku-ya-Himé; nor yet of the poet, who, if he wish still to venerate the lofty eminence, had better stay below; but of the scientist purely, and for the purpose of making sundry observations bearing upon the perma-

¹ Fuji-no-yama, Fuji-san, Fujiyama, Fusi-yama, and Fuji plain and simple—all are designations of the far-

famed peak in frequent usage. Fuji-no-yama and Fuji-san are preferable orthography.

nent occupation of such peaks for astronomical purposes.¹

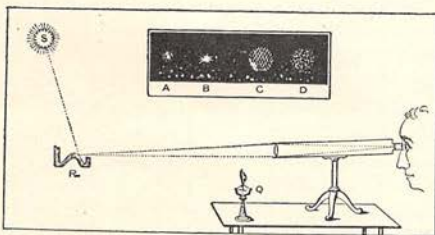
Ten years ago, Uriah Atherton Boyden, a wealthy and eccentric gentleman, died in Boston, leaving a fortune of more than \$200,000 to a Board of Trustees, with discretionary power to employ it in establishing and maintaining an astronomical observatory on some mountain peak. His definite aim was to overcome the hindrances to astronomical work at ordinary elevations, the nature of which we have just explained. This fund is now managed by the Harvard College Observatory, and experimental research has been conducted at high altitudes in different parts of the globe, in order to show the precise nature of the improved conditions of vision, and to ascertain the best location for the mountain observatory.

It was in the interest of this research that our expedition ascended Fuji-san. Nothing could have come more acceptably than the courtesy of General Count Yamagata, Minister of the Japanese Department of the Interior (Naimusho), in detailing Dr. Knipping, the meteorologist of the Central Observatory, as a member of the expedition. Dr. Knipping had already several times ascended the mountain, and mapped the entire region about it, as indeed the whole of Japan. With Dr. Holland, the naturalist of the Eclipse party, Mr. Masato, of the Central Observatory, and the "handy man" Magobe, we set out from Tōkyō in the early morning of September 1, a party of six. Our instruments, though few, were of the best: among them a set of meteorological apparatus, a 3½-inch telescope kindly lent by the Japanese Naval Observatory, and a 7¼-inch telescope brought from the Amherst

Observatory, and arranged for photographing celestial objects. As the accompanying map, compiled from the latest Japanese authorities, will show, the Kyoto railway, running south-westerly from Yokohama, passes nearest the mountain at Gotemba, where the tourist to Fuji-san may now alight. We found the road then open only to Kodzu, whence the journey to the summit of the great cone had to be made by packhorse and on foot. The peak may be ascended by five different trails, according to the route by which the base of the mountain is reached. On the advice of Dr. Knipping, our expedition made the ascent on the east flank, from Subashiri, a moderate village about 3½ *ri*² directly east from the summit. Leaving the train at Kodzu, a small sea-town, a part of an hour's waiting was spent in wandering on the hot, stony beach, where numbers of Japanese children followed us, picking up pebbles and presenting them to us, with faces full of interest and good nature. With the *kori*, or traveling-baskets, the instruments and luggage piled into various jinrikishas, and the members of our party in others, we were a noticeable procession, starting off gaily from the little station.

Shortly after leaving the town our road bade good-by to the ocean, turning off into a narrow valley which led apparently to the heart of the hills. The intense green of a summer landscape in Japan is perhaps its most beautiful characteristic. To this luxuriant appearance the groves of bamboo add exquisite grace. Often as high as forty feet, their masses of delicate yellow-green foliage, almost angular in the sunlight, give an effect of matchless airiness. The higher we climbed, over a well-

¹ A word and a picture will explain. At the low elevations where observatories are ordinarily built, the atmosphere offers a serious obstacle to the prosecution of work with the telescope. For the most part this is due to the nocturnal radiation of heat stored up during the



AN EXPERIMENT TO ILLUSTRATE THE DISTURBANCE OF TELESCOPIC VISION CAUSED BY HEATING THE AIR UNEVENLY.

day by the ground and buildings near by. The actual phenomena are well illustrated if a telescope is placed as in the figure, and focused upon any sharply curved glass surface, thirty or forty feet away; as, for instance, the convex bottom of a broken champagne bottle *R*. When the sun *S* is shining upon such an object, a brilliant artificial star will be seen in the field of view, and

surrounded by a few diffraction rings, as shown at *A*. Push the eyepiece in, or draw it out, and the image of the star will enlarge to a disk, like *C*; and if the telescope is all right, this disk will be perfectly circular, and evenly illuminated throughout. Now place a lighted lamp at *Q*, and observe the effect. *A* will become like *B*, an irregular lump of light with rays shooting out in every direction; and *C* like *D*, a disk bright in some parts and dark in others, with a continual dancing and vibration of the illuminated and unilluminated parts over the entire area. Remove the disturbing heat-source *Q*, and *A* and *C* soon appear as before. In a greater or less degree, these conditions of disturbed vision are always present in telescopic observations of the stars, while if the planets are looked at with high magnifying powers, the sharp details of their surfaces become a confused blur, and often so wavering that the astronomer has to make them out, as best he may, from momentary glimpses when the images are least unsteady. The atmospheric shell encircling the earth is a hundred miles and more in thickness; but by its own weight is so much denser in the lower than the upper strata, that an ascent of twelve to fifteen thousand feet is sufficient to leave one third of the total atmospheric mass below, and with it the main source of interference with telescopic vision.

² The Japanese mile, or *ri*, is equivalent to 2.44 English miles.



traveled road, the more delightful the country became. Rich ferns grew from the mountain-side, almost overhanging the road; frequent springs gushed out of mossy banks on one side, while on the other was a foaming stream now far below. What with the strange and lovely plants, the picturesque villages where tea and sweetmeats awaited us, the fascinating stream growing more impetuous in its rush to the sea, and the sea itself far behind, closing up our vista of green valley, we reached our stopping-place all too soon. Long before the sun had begun to think of setting we found ourselves high among the hills, ten *ri* from Kodzu, rattling over the stony street of Miyano-shita.

The air here was delicious, and hot sulphur-springs have made the place a famous resort, possessing two excellent European hotels. The town seemed to be especially noteworthy in its display of fine wood-inlaying. Small screens and large ones, desks, tables, boxes, cabinets—all were of some dark wood, most exquisitely inlaid with various lighter-colored woods, in strange and beautiful patterns. We were told later that both the fine bamboo carvings and this inlaid wood cannot stand the dry heat of American houses. Our bamboo carvings have split here and there, while the Miyano-shita inlaying is unaltered.

Sunrise the following morning found us far on our walk toward the night's sleeping-place, Subashiri, at the base of the great sacred mountain, and 2500 feet above the sea.

The road—chiefly bridle-paths through cool woods and over hillsides, up and down, in and out—is impracticable, for the most part, for

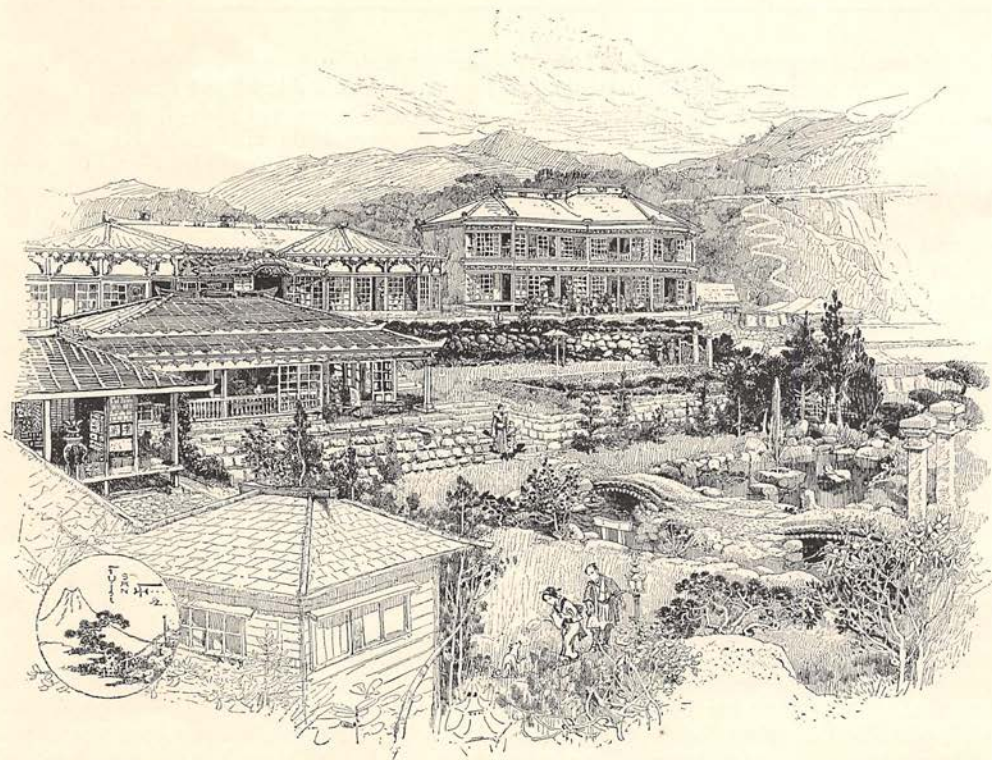
jinrikishas. The distance is seven *ri*, and pack-horses were available for the heavier luggage, with *kago* for occasional ease. Passing through the attractive little village of Kiga,—cool, shady, damp, with its ponds of goldfish, and filled with water-murmurs,—we walked on and on to the top of a bare hill, from which we looked down on the thatched roofs of Kiga nestling among its myriad trees, beyond to Miyano-shita, and still beyond to the gray-blue sea and its misty horizon. The breeze was cool and refreshing, and after a brief rest we struck into a high sort of moorland which the Japanese call *hara*, a heath where grow nothing but tall, soft grass and low shrubs. Gradually the path grew steeper, and Dr. Knipping informed us that we had reached the ridge separating Fuji-san from the level country surrounding Fuji-san. Up this pass—Otomi-toge—we made our way. It is more than three thousand feet high, and a hard pull over a stony path bordered with flowers and shrubs. At the top a magnificent view greeted the eye. Miles of level farming-lands lay spread out below, the bright green rice-fields looking hardly larger than pinheads, and whole towns mere specks of brown. Fuji himself, to crown this view, would have been grand beyond description; but, as usual, his majesty was wrapped in a gigantic white cloud, covering his imperial head and shoulders, if not more. We saw only for an instant a half-defined glimpse of the lofty cone—

Fast fixed to earth,
But ever heavenward tending.

After a comfortable luncheon and rest on the pass we began the descent, far more wear-

some than the climb. Sunny fields, full of summer scents and sounds, led us at length to Gotemba, a pretty village only five miles from Subashiri, and where at the tea-house we found watermelons so delicious that the memory of them haunts us yet. The road thereafter is level and fine, overarched most of the way with large trees. All the hotels in Subashiri, except one, refuse to entertain foreigners. So to the Yona-yama we repaired, well content to rest and be waited upon after our day's walk. Jiu-hei, as we understood the proprietor's name, saw that excellent rooms with chairs and a table were provided. Through a long passage where the wood shone from its repeated polishings, past the general bathing-tank, past a little garden where the sun could never penetrate to the mossy stone lanterns and luxuriant ferns, up four steps, and the rooms were reached. Through the long, low, sliding windows we

About three o'clock the following morning we had our breakfast by the feeble light of candles. The Japanese appear to be up all night under the best of circumstances, so it seemed perfectly natural that the smiling little maids should serve us apparently in the middle of the night. The moon was just setting behind Fuji, looming very near and black, when we set forth upon our walk of twenty-two miles to the summit. For seven miles we had the services of an obliging packhorse, through a level country, dreary and monotonous, partly wooded by scrub-pines. Volcanic remembrance already began to turn smiling, genial Japan into a sullen land, thinking of woe. In the midst of this desolate region, a hopeful brightening in the east soon became the oncoming glories of a superb sunrise, and soon after this we reached the first station of the real ascent. Uma-gayeshi ("horse-turn-back") is 4400 feet



DRAWN BY HARRY FENN.

FUJIYA HOTEL AT MIYANO-SHITA.

FROM A PHOTOGRAPH.

looked out over a hundred gardens, thatched and flowery roofs, and immense well-sweeps whereon the bucket was balanced by a stone, as may be seen occasionally on back-country New England farms. Beyond, the black sides of the kingly mountain brooded, though the crown was still veiled.

above the sea; and as nothing less than humanity is allowed to proceed farther up the sacred slopes of the peerless mountain, and even the *kago* is forbidden, twelve coolies apportioned our load of instruments and luggage, and started ahead. Hundreds of pilgrim banners hung upon the walls of the inn, and after



DRAWN BY HARRY FENN, FROM A PHOTOGRAPH.

ENGRAVED BY C. SCHWARZBURGER.

KIGA.

a slight refreshment, chiefly in the form of pale-yellow tea, we followed on. From here the ascent is divided into stages, each marked by small stations, or halting-places.

Devout pilgrims, to the number of fifteen or twenty thousand, with banners in hand bearing the name of their town, annually ascend Fujisan as a religious obligation, and to propitiate various deities. The prayer frequently made upon these occasions runs thus: "Purify me from my six roots of evil—the eyes, ears, nose, mouth, touch, and thoughts."

After leaving Uma-gayeshi, the walk for a long distance was thoroughly delightful. The sunshine sifted softly through greenest foliage to a mass of wild-flowers and ferns. The path—a sort of gully, sunk at least two feet below the general level of the wood—was fringed with ferns and delicate asters, while great roots protruded and overhung the edge like colossal petrified snakes. Airy white birches shook their fluttering leaves in the soft breeze, the Japa-

nese maples, beeches, and ash joined the evergreens in making a shady canopy above; while maidenhair ferns, belated wild roses, yellow lilies, dwarf sunflowers, tall white serpentaria, and purple monk's-hood combined to hide the delicious wild strawberries lurking in the grass. At intervals through this lovely wood were temples and shrines,—many of them deserted for the year,—and an occasional intermediate station where tea and sweetmeats formed welcome greeting. The summer heat was slightly tempered with a brisk and cooler air, making the sunshine friendly; and flowers bloomed not only all about us, but even in the picturesque thatched roofs of the miniature temples: the whole was idyllic.

But suddenly, emerging from the trees, another world appeared. Before, above, around, lay miles of fire-baked lava, dull and hopeless in the sunshine—finished, dead. For a short distance now and then there were oases of verdure, where the hardest of shrubs and flowers

had gained a slight foothold; and here, again, the charming wild strawberries grew luxuriantly. But these wooded spots—smaller, fewer, farther apart—soon ceased altogether, and we were left alone with the wind and the sky, and a stupendous mountain-cone,—all but overhanging us,—cold, lifeless, pitiless. For a time the sweeping wind was welcome; but it increased with every step. Straight down into our faces it pelted, as if indeed some mighty guardian of the mountain resented the invasion of impious feet. The difficulties of the climb had begun, and Dr. Knipping's oft-repeated caution against a too-rapid pace became almost unnecessary. Sharp lava in enormous masses lay in the path, and, indeed, on every side; very soon there was no path at all. The coolies with their burdens could be seen far ahead, clambering up and over and around, each in his own way, with cat-like agility. The wind became a hurricane; it beat upon us, it pounded us; frequently we had to cling fast to the lava-ledge with both hands until some particularly fierce gust had passed. Verily, hard-hearted is the god who would not be propitiated to the bestowal of any favor by a climb like this! And yet when some luckless pilgrim dies upon the summit,—and this occasionally happens,—he becomes, not, as might be expected, a martyr to his piety, but a being thereby proved too wicked to live any longer!

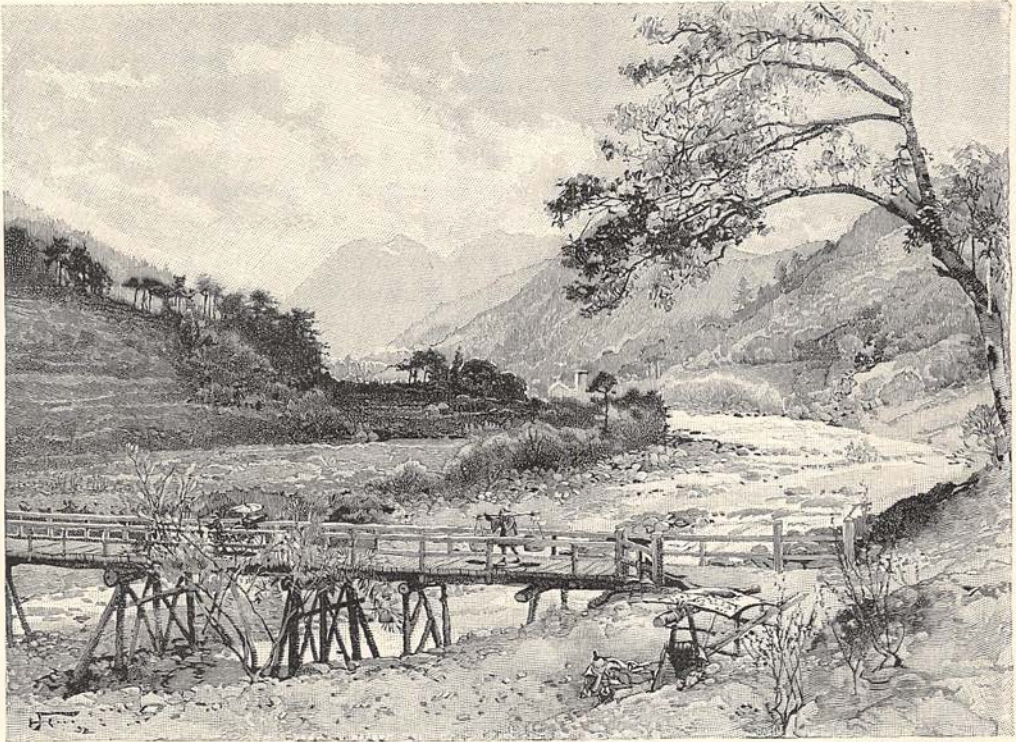
At one of the poor little stations—all of which, however, were inexpressibly welcome—soft rice-paper, India ink, and camel's-hair brushes were brought out for us to inscribe our names. The collecting of banners, *kakimono*, or scroll-pictures, and autographs seemed to have been a task dear to the heart of the proprietor, and he proudly exhibited his treasures. Among the hundreds of Japanese mementos were the names of a party of Europeans who had climbed Fuji two or three years before. The sudden sense of companionship on this lonely mountain, the instant leap of the heart at seeing the familiar letters, were sensations as agreeable as they were curiously new. We willingly painted our names for the old man, who, with all our coolies, watched us, deeply interested.

Farther than the sixth station, 9800 feet above sea-level, foreigners and women have not been allowed to ascend until recently. Since the dawn of wider intelligence, and a receptive opening of the national mind toward whatever is better in other countries, these restrictions have been removed. At five minutes after one o'clock in the afternoon we reached this station, and immediately upon sitting down the pulse was counted, and found to be 144 in the first minute. After a rest of fifteen minutes it registered 100.

Sweetmeats much more delicate and fresh than might have been expected were found at each station. But the most genuinely sustaining of our comforts was chocolate, of which Dr. Knipping had provided a generous supply. A mouthful or two, a bite now and then during some particularly hard pull, refreshed lagging energies and added greatly to our strength; while if angels are ever met in pith helmets and gray suits, Dr. Knipping was certainly one of that kindly fraternity when, having climbed ahead, he met us at one station with steaming cups of this same delightful chocolate ready for each nearly spent traveler.

And now, to add further novelty to the day, a soft white cloud drifted down and about, or perhaps we climbed into its embrace, and its moist caresses added immense discomfort to every motion. If it hid the steep dangers below, it also enveloped the mighty cone above, and removed even the questionable pleasure of seeing what remained to be done. So we climbed blindly onward, drenched and chilled, seeing only the next step ahead, knowing no path, but keeping instinctively upward. Each pilgrim is provided with several extra pairs of straw sandals to replace those constantly worn through by the sharp lava. If, as is said, fifteen thousand pilgrims ascend the mountain every summer, and each one discards half a dozen pairs of this foot-gear during his climb, it is evident that there must be some straw sandals on the mountain-side. In the prevailing mist these cast-off *waraji* were now the only reliable indication of the trail. Occasionally the tiny tinkle of some pilgrim bell would steal softly through the thick white mist, growing louder as its owner came swiftly downward by another path than ours, then becoming fainter and yet more faint as the pilgrim, still unseen, strode quickly down toward the real world. Or perchance, looming through the cloud, a human form was barely discernible, a great, impalpable shadow, passing with its little bell in unknown nearness, to be speedily swallowed up in the encompassing gray.

Each station was poorer than the last,—many of them were closed, the pilgrim season practically ending with August,—but despite the increasing barrenness of those yet open, we could hardly have dispensed with their rude shelter and rest. Patience now seemed the most desirable virtue to add to strength of limb. Perseverance was after a time rewarded, for we climbed out of the cloud, and reached sunshine once more, though in a barren world. But small ills were speedily forgotten as we reveled in the sunshine and blue sky. The huge summit seemed overhanging,—the effect was startling,—while the path so lately traversed looked most precipitous. For an instant we seemed



DRAWN BY HARRY FENN, FROM A PHOTOGRAPH.

ON THE ROAD TO OTOMI-TOGE.

ENGRAVED BY G. P. BARTLE.

suspended in mid-air; the impression was irresistible and all-pervading. The black and red doleritic lava, dismal, fire-baked, monotonous, spread in countless acres around. Hundreds of feet below it was merged in the drifting fog through which we had made our laborious way to this bright and sunny but indescribably desolate region. The wind was still a hurricane, and directly above stood the eighth station, nearly eleven thousand feet from the sea-level, and the last available resting-place before the tenth, or summit-station. Straw sandals still lay thickly strewn upon the cinders, and after clambering with one great, final "spurt" over the steepest way we had yet come, the eighth station was reached about twelve hours after the early morning start.

"An angle of forty-five degrees" is an expression commonly used in conversation to indicate any sort of path somewhat out of level. As a matter of fact, a slope of even ten or fifteen degrees is far from easy. Applying the clinometer to the path now and then, its largest reading showed an incline of 35° .

The air by this time was too rare to breathe with entire ease, and the cold was intense. With no real window, and a sliding door generally closed against the tearing wind, the eighth station now held at least twenty-five persons; while a fire, smoldering in a hole in the floor and

without any chimney, bestowed its smoke impartially upon all. It would have been pleasanter, after resting awhile, to complete the climb and to sleep at the tenth station—Chodjo; but the majority of the party preferred to spend the night here—an impossible sort of thing, it seemed, with the circle of coolies crouched about the fire, the painfully smoke-laden atmosphere, and the absence of all comfort and convenience. But we unpacked the quilts and baskets, and tried to turn one corner into a series of attractive sleeping-apartments. This to a certain extent accomplished, we wrapped ourselves in cloaks, and stepped outside. Flecks of the great white cloud still hovered far below; but the sky was clear, and the sun had almost reached the vast mountain-shoulder behind us. The stupendous isolation of this vast peak now became fully apparent.

Rising from a level plain, undisturbed by lesser peaks to share the glory, its whole gigantic mass stands clearly cut, awful, unapproached. Far to the right was a shimmering, pale-blue sea with its curved beach; and northward, filling the distance, lay mountain-ranges and lakes in superb association: Hakone, the Otomi-toge, Nikko, and the rest, while Subashiri showed only as an elongated gray thatch. But the whole thing was too immense and impressive. Details vanished. As the sun sank

farther behind Fuji,—while yet the day was bright away from his dark influence,—an immense black triangle of shadow gradually crept outward and eastward from his base, until it covered leagues of smiling field and forest. The cold, the smoke, the strangeness of the air, mingle with all the grandeur in the memory of that night's passing. A shower of fine, wind-swept lava beat an incessant tattoo upon the roof, and when morning looked faintly in through the crevices of the hut, it was shrouded in another thick, wet, heavy cloud, which soaked even the lava to a sharper blackness than usual.

From the eighth station upward a toilsome climb of an hour over the slippery masses brought us to the artificial ledge, or narrow pathway along the front of the twelve huts constituting the tenth and final station. Testing the pulse at once, it was found to be 160 during the first minute, and must have greatly exceeded this during the actual exertion of climbing. After an hour's rest it was reduced to 100. Thoroughly drenched as we were, and hardly able to see a yard ahead for the fog, a warm room and dry garments seemed the acme of personal luxury. But it was found that a number of the houses had been closed for the winter, so that choice was even more limited than appeared at first. Each hut was a single room, each room too low to stand upright in, while lava blocks and rough boards proved small protection against the fierce wind and penetrating mist. Moreover, a strange heaviness of limb weighted every motion, and the rapidity of the pulse was most fatiguing.

It would almost seem that there must be something peculiar about this mountain. It is more than 12,400 feet high; but while travelers sometimes speak of entire absence of disagreeable sensation on other mountains of fifteen and even seventeen thousand feet of elevation, the usual testimony as to Fuji is of great discomfort. Of "mountain-sickness" proper, in its usual manifestations, we had none; neither any special lung-oppression, nor increase of respiration above the normal. But the heart beat tumultuously, and even slight muscular exertion sent the pulse well up to 120 or 130.

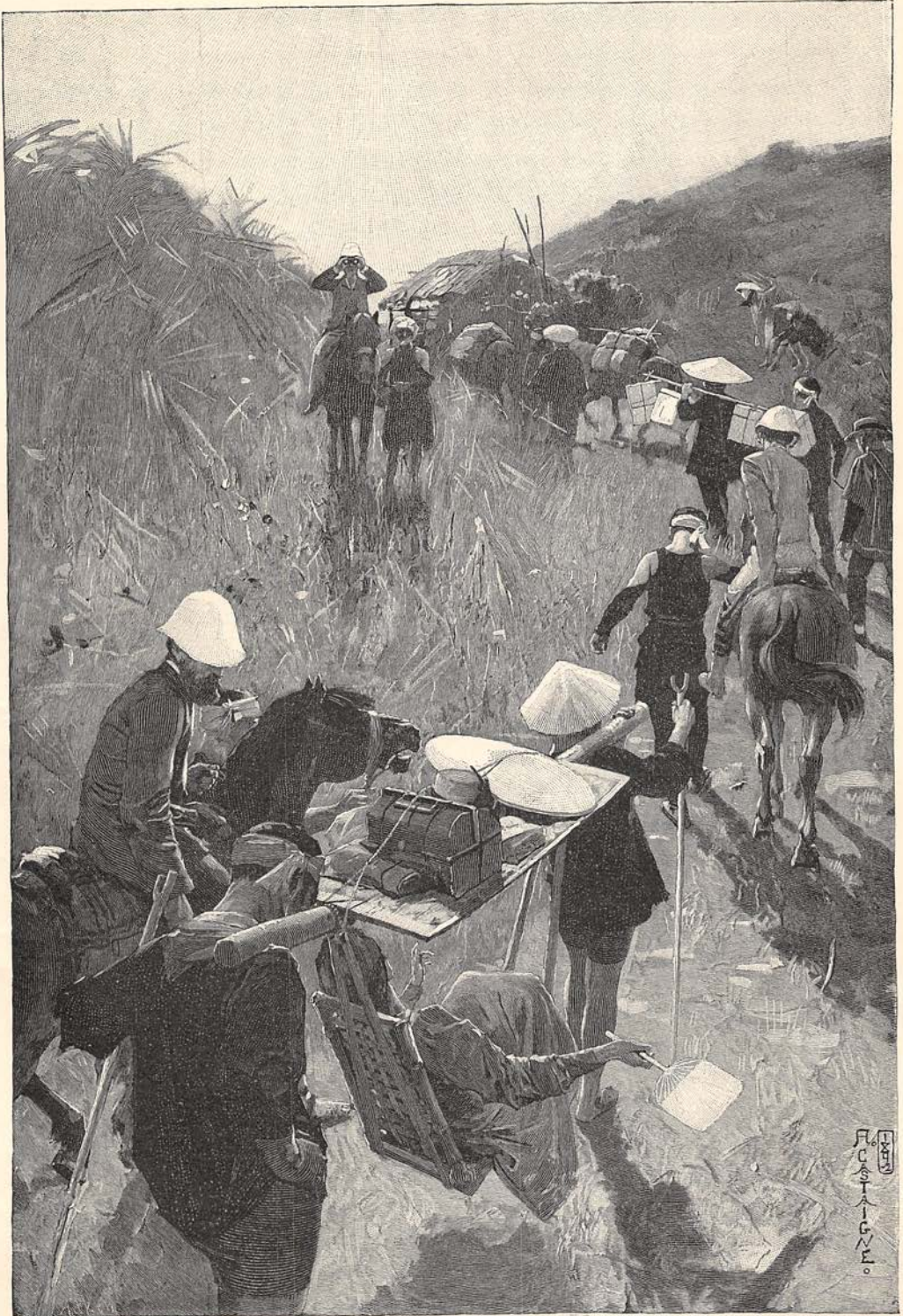
After much preliminary conversation the owner of the least repulsive hut agreed to let us have the use of it. Just why we should prefer to have it to ourselves, and what possible objection there could be to his allowing any number of stray pilgrims to sleep there also, he failed to see. But persuasion won the day, and he finally consented to our exclusive occupation, though in surprise and disapproval. His entire outfit for living was comprised in three or four plates and cups upon a shelf, a kettle making a feeble attempt to boil over the smoke in one corner, and a small skin upon

which crouched the proprietor of all this luxury. The time of our host was chiefly occupied in blowing his weak-minded fire through a bamboo tube, to keep in it even the semblance of life; in the intervals he smoked a tiny Japanese pipe. His stolidity and uninterested though persistent watching of our small efforts to promote order in our corners outwardly expressed our inner feeling. We ourselves were utterly stolid and heavy—dull, edgeless. We wanted to be warm, we wished for sunshine, to see one green, growing thing, to have the heart slow down its tempestuous beating; but everything was far away, and very much in general. The air seemed made of lead. In the afternoon the fog began to blow off, and we were soon in clear air, with the clouds dispersing in shreds far below. The same wide-reaching panorama which filled all the world from the eighth station now began slowly to unfold again. Here and there a distant mountain-top emerged from the whiteness; later, the cool green lakes were gradually uncovered, and the ocean, silvery in the soft atmosphere, began to shimmer in the east.

The summit shrine was at a point slightly above our hut, and we went to it, walking over lava literally covered with rusty *rin*¹ left by the devout. An occasional pilgrim arrived while we stood there, deposited his *rin*, and made straight for the lower regions with enviable alacrity. From this point the immensity of the desolate region became appallingly apparent. To the west, straight down 500 feet, lay the mighty crater, cold and dead, whose gloomy recesses were shaped by a power too terrible to conceive. One must walk about two miles to encircle the crater. Tons of grimy snow-masses filled the ravines of its southern slope. The immensity of the mountain appears nowhere more impressive than when looking upward from the bottom of the crater. There is no trail down the interior walls, but the descent into the cavern may be made in less than an hour, and is well worth the making. In large part the walls are very steep, and bits of lava now and then rattle down the slopes. A pool of green snow-water stands here a considerable portion of the year.

Too grand for words, too strange and fearful for enjoyment, too desolate and dreary for endurance, night at last covered this solitary mountain-top, seemingly forgotten even by God. Through the chinks and crevices in the lava hut the wind howled with an indescribably bitter and hopeless moan. Colder and colder grew the night. Water standing in the room was covered nearly an inch thick with ice (which in the morning the proprietor calmly broke for us to wash our faces!), yet the exer-

¹ A small coin, worth about $\frac{1}{4}$ of a cent.



CASTAIGNE
A. G. N. E.

DRAWN BY A. CASTAIGNE, FROM A PHOTOGRAPH.

ENGRAVED BY P. AITKEN.

ON THE OTOMI PASS.

tion of getting more clothing was so great that the sharp chill was preferable.¹

The stars shone constantly clearer, and toward midnight we had the instruments all at work. A few yards from the long row of huts was a small open space, where the telescope might command a clear horizon view in every direction. A stiff wind blew out of the west, with the thermometer below the freezing-point. To the east were the precipitous slopes of the mountain-side, and, opposite us, the overhanging crags of the cavernous crater. The telescope was mounted upon a large lava boulder, and much of the time had to be held in position lest it should be upset by the wind. Any one in quest of comfort would not elect to make astronomical observations under conditions such as these—and on top of a mountain two or three miles high, besides. However, the program was executed in spite of merely physical obstacles, and the hours of clearest sky lasted until even astronomers became weary. At stars in every part of the sky, to the north, south, east, and west, and at all altitudes from the zenith to the horizon, the telescope was pointed, and the conditions of vision tested by the steadiness of the spectral disks or images, just as in the case of the artificial star. So fine were these images, so nearly optically perfect the air, that for moments together there was scarcely a trace of atmospheric effects.

These were general tests. If they were satisfactory, of course the telescope could not fail to do its best work upon any special objects of whatever sort. A few double stars, suited to the capacity of the instrument, were tried, and the advantages were at once strikingly apparent. Companion stars hard to see, and "doubles" hard to divide, with the same glass at lower elevations, here were readily discerned. Even in looking at so ordinary an object as the moon, the edge or limb of which has been seen absolutely sharp by few astronomers, the effect was indescribable. So sharply defined were the details of the lunar surface, that if a suitable object-glass had been at hand, a magnifying power of 2000 diameters would at first have been used. The structural irregularities of the limb were so marked, and in many parts the moon's edge was so excessively jagged, as to lead one to wonder that the usual type of lunar observations can be made as accurately as they are. As dawn approached, Saturn had risen to an available altitude, and the ring-system was seen to the best advantage. While with

the moon high up it was impossible to detect even the slightest trace of "boiling at the limb," as the astronomer sometimes says, Saturn was less favorably situated, and a slender trace of undulation was now and then evident. Still, had the glass been large enough, a power of 1500 might have been used.

Of course these results were not surprising after the spectral images of the stars had behaved so finely. One great advantage of the spectral-image tests is that they can be made satisfactorily with a small telescope, while the tests upon specific objects usually require large and bulky instruments, which are hard to manage in mountain work. Just at sunrise we found that while all the lower world lay impenetrably shrouded in a thick white cloud, out of this smooth, soft sea Fuji-san rose like a volcanic island—a deep blue sky above without a fleck of mist, and the sun shining as through lambent crystal. After sunrise the astronomical observations were continued upon the sun, in order to detect the gradual changes in the optical quality of the atmosphere. At first, with the sun about half an hour high, there was very fine solar definition, with slight flickering of the limb, but little or no genuine "boiling." Rarely is the sun better seen. A crag of the crater wall was found whose shadow would, during the morning, fall at an accessible point within the cavity, several hundred feet away. Upon this crag was set a disk just a little larger than necessary to occult the sun. At the proper point behind this disk the eye was placed, and, when the sun came in range, the corona was carefully looked for. The degree of atmospheric illumination immediately around the sun was surprisingly small, and the conditions for seeing the corona without an eclipse seemed in every way favorable; but not a trace of it could be detected. There was still enough atmospheric and other matter above the mountain-summit to catch the sunlight and to render the background of the corona as bright as the object itself, and thus make it invisible. There is, of course, very little reason for expecting to see the corona in this way, but so simple an experiment seems always worth trying.

The usual unpleasant effects of the direct rays of the sun upon the complexion were not escaped by all of the party, and the skin of several faces gradually peeled off. Mountaineers often maintain that snow-reflection is the cause of this well-known trouble; but such could not have been the case here, as there

¹ The low temperature generally prevalent on Fuji-san is at one spot slightly modified by the intrinsic heat of the mountain. Satow and Hawes, without whose admirable "Guide-book to Northern and Central Japan" no one should attempt extended travel in the empire, say, at page 118, of the ascent of Fuji-san:

"The interesting phenomenon may be observed of steam still issuing from the soil in several places. . . . A few inches below the surface the heat is great enough to be unbearable, and an egg may be fairly cooked in about half an hour."



DRAWN BY HARRY FENN, FROM A PHOTOGRAPH.

FUJI-SAN FROM OMIYA.

ENGRAVED BY H. E. SYLVESTER.

was no snow on the mountain, except in protected gorges in the farther side of the crater half a mile away.

As the sun ascended higher toward meridian, the telescopic definition grew somewhat worse, but it never became so bad as at sea-level. The vast ocean of cloud below gradually rose as the morning advanced, and about noon the great mountain seemed entirely immersed. Celestial observations being no longer possible, we addressed ourselves to the task of locating the future observatory, should one ever be built on Fuji-san. A short distance northwest of Chodjo we discovered a fine plateau which with little labor might be enlarged for the reception of a permanent structure. Here the lesser apparatus and the observers' quarters might be established, there being ample means of protection against the severe and prevalent west winds. This point commands an incomparable view to the north and east, and communication by heliotrope with any of the towns below would be simple. If a great telescope were to be mounted on Fuji-san, an ideal

location is available on a saddle inside the crater, a few yards below the summit, where the buildings might be perfectly protected against the wind. Many advantages of a high-level observatory on Fuji-san are not realizable elsewhere. For a period of four or five months each year, the continual ascent of the mountain by pilgrims would make it possible to communicate directly with the world below. Furthermore, the keepers of a dozen or more huts at the tenth station are always living there during the season, and the little company of observers would never be quite alone. On no other isolated peak of like elevation on the globe would these advantages be gained. If, as often occurs, the series of high-level observations requires a corresponding series at a lower level, Fuji-san meets such conditions perfectly. For example, at Subashiri and on the summit might be established a pair of stations, each plainly visible from the other, with a vertical difference of nearly 10,000 feet and a horizontal distance of about seven miles.

While scientific men are supposed to be ob-

livious to discomfort in their surroundings, those who follow in their train sometimes preserve a few of the natural instincts unaltered. The strain of longer stay in that abomination of desolation was getting too great to bear. In spite of enthusiasm over the limpid air only occasionally thickened by passing clouds, blinding headache and a pulse above a hundred for more than forty-eight hours had made life a burden. There were those among us who bade

seemed impossible that this loveliest of walks could so soon be over; we could not see enough of the sweetness of verdure after the hopeless barrenness of Fuji's lonely peak. But the tea-house where horses are allowed to come was already reached, and we mounted the cumbersome pack-saddles, made softer by quilts strapped upon them. Jogging peacefully onward, noting the multitude of new and lovely wild-flowers on every side, we gradually



DRAWN BY E. B. CHILD.

THE CRATER OF FUJI-SAN.

ENGRAVED BY K. C. ATWOOD.

a glad farewell to that frowning peak, plunging joyfully into the yielding lava of the downward path. From that unique summit the kingdoms of the earth and their glory lay spread out to the gaze, but too far, too foreign, too remote, for companionship or sympathy. Grandeur and majesty, with desolation and loneliness unspeakable, form the crown of Fuji-san.

After descending two or three thousand feet, headaches disappeared suddenly, our heartbeats ceased their abnormal rush, and the heaviness in every motion turned into a renewed delight in life. On we plunged through the soft lava, aided by our long sticks, and with fresh pairs of straw-sandals over our boots every ten or fifteen minutes. The mist was very thick; the coolies in front and those behind became invisible; the dull thud of their approaching footsteps was a positive relief from the sensation of weird isolation, and even more so their dim shadows slowly growing into recognizable figures. The enthusiasm of delight in reaching vegetation at last can never be forgotten. The hardy little white and pink flowers which followed the cinders far up the height were welcomed as an advance-guard of joy; we could hardly pass by the oases of verdure with their sweet wild strawberries, and when we reached the trees it was like a region enchanted. It

emerged from the cloud, and its last traces floated calmly off above us, leaving a wide and sunny landscape, which even the volcanic soil could not render dreary. But long before we reached Subashiri the great triangular shadow of Fuji began to spread over the hills and fields. Growing larger and more portentous with every moment, it swept irresistibly onward, until we too became enshrouded in its veil, and as we rode along the one street to the Yona-yama, night was already come.

Once more in the same little rooms as before, with the *hibachi* full of red-hot coals set near, and the chicken and rice well under way for dinner, life had few unsatisfied desires. Warmth, comfort, ease of breathing, had acquired a new significance.

When, many days after this climb and descent, we steamed slowly at evening out of the beautiful bay of Yokohama, Fuji graciously vouchsafed a glorious parting glimpse of his majesty. Deep purple against a yellow sky, his regular, matchless cone rose solitary and superb over a foreground of coast-bluffs, and water rippling with sunset fire. Insensible, calm, unmoved by homage or effort, he lives his vast, pulseless life—the mighty landmark of all Japan.

Mabel Loomis Todd.
David P. Todd.