REMINISCENCES OF A VISIT TO THE VOLCANOES OF HAWAII.

By His Excellency, F. A. Weld, Esq., C.M.G.,
President of the Society.

[*Read 12th September*, 1876.]

——"et incedis per ignes
Suppositos cineri doloso."
Hor., Carm. 1., lib. ii.

Some time ago your Honorary Secretary expressed a wish that I should read you a paper upon my visit to the volcanoes of the Sandwich Islands, and my ascent of Mauna Loa, "the great mountain," during the eruption of 1855; and, desirous of doing anything I can to meet the wishes of the Fellows of this Society, I promised to do so. It is now my object to fulfil that promise to the best of my ability, but you will forgive me if I present you with a simple personal descriptive narrative, instead of a scientific disquisition worthy of a place in the proceedings of this Society.

It is a matter of regret to me that my journal written at the time has been left in England, but I have used as a groundwork for the more important part of this paper a letter to Sir Charles Lyell, written by me at his request, and published in the proceedings of the Royal Geological Society; and though so many years have elapsed since 1855, a recollection yet remains to me of my journey up Mauna Loa, as vivid as if it were only yesterday that I toiled over its wastes of lava and gazed into its seething craters with eyes that could scarcely meet the glare.

The Sandwich Islands, as you know, are a group in the North Pacific Ocean, lying a little south of the tropic of Cancer, and between longitude 155° and 160° west, and that one of them, to which I am now about more particularly to direct your attention, is Hawaii, called by Cook Owyhee, and is the island where that great navigator and discoverer lost his life. It is stated that one of these islands was first seen in 1542, by a navigator named Gaetano, of whom I have been unable to learn any particulars, nor do I know upon what authority the statement rests; however that may be, Captain Cook may fairly be said to have been their first discoverer in 1778, in the sense of having first visited them. It is a curious circumstance that, as I was informed on the spot, at the time of his arrival a native tradition existed to the effect that "Lomo," the god of fire, white skinned, and fair haired, had been driven from their island, with his followers, on account of some escapade and indiscretion into which the natural fervour of his disposition had led him. The tradition went on to say that he would one day return across the sea to revisit his ancient abode. When the sails of Cook's ships were seen rising like clouds above the blue waters of the Pacific, and moving shorewards, a cry was raised that Lomo, the fire god, was returning. Priests and people flocked to the beach, and when they saw the strange appearance of the Englishmen, their white faces, smoke issuing from their mouths—owing, no doubt, to the use of that fragrant weed which is generally so dear

to sailors—and still more when they saw and heard the fire of the guns ; doubt was converted into certainty ; victims were prepared, and the great navigator was led to the sacrificial temple, or enclosure of terraced stones; heathen rites were performed, and sacrifice was offered to him. Unfortunately, disputes which arose led the natives to believe that Lono or his followers had not forgotten their ancient propensities, and having failed, as they thought, to propitiate him with their sacrifices and offerings, it was resolved to inflict a fresh term of banishment upon him, and to drive him again across the seas. As Cook was retreating to his boat, under the pressure of the angry and menacing crowd, one native, more excited than the rest, pushed him violently, causing pain, which Cook showed by an exclamation, or gesture. They then saw that he was sensible to pain, and consequently but mortal, and a native at once dealt him a heavy blow with a weapon ; he fell wounded, and was quickly killed, to their astonishment at first, and subsequent regret. You will, perhaps, pardon this digression, as I think these incidents throw light upon the circumstances of the death of this great sailor, when compared with the account given of it in the narrative of his voyages.

It was nearly at the end of October, 1855, when I landed on the Sandwich Islands. I was travelling with an old friend and fellow New Zealand colonist, the Hon. James Frederick Stuart-Wortley, and after visiting Tahiti, we took our passages in a schooner sailing thence for San Francisco, hoping to touch at the Sandwich Islands, which we were anxious to visit, as we had heard that the volcano in Hawaii was in full eruption. We were, after all, only enabled to accomplish our purpose by the kindness of the captain of an American whaler, who allowed us, when near the islands, to transfer ourselves to his ship, and who landed us at Lahaina, on the island of Mawé, in the central part of the group.

On Mawé is the immense extinct crater of Mauna Haleakala, or mountain of the House of the Sun. It is variously estimated at from 24 to 35 miles in circumference, and is not much less than 3000ft. deep. It stands about 10,000ft. above the sea level. Within this enormous basin, which would hold several of the largest cities in the world, rise numerous funnel-shaped cones, which formerly belched forth flame and molten lava, and still, though crumbling away, rise to the height of several hundred feet. The walls of this crater, which is, I believe, the largest known in the world, are burst through in two places, by the force of eruptions of lava. Our stay in Mawé was too short to enable us to visit it, an opportunity having offered itself which enabled us to proceed to Hawaii, the principal aim and object of our journey ; where we visited, as I am about to describe, the similar though smaller crater of Kilauea, in full activity. The opportunity of reaching Hawaii was afforded us by the departure thither of a small schooner of about 35 tons, called the Manu o ka wai, (" Bird of the Water"), and here let me remark, as an instance of the great similarity of the Maori or New Zealand language to the Kanaka, or Sandwich Island dialect, that in Maori the name would have been Manu no te (or ke) wai ; in fact, the language of these two groups, the one in the same latitude as Tasmania, and the other at the northern tropic,

is so nearly identical, that I soon found that what I knew of Maori was readily adapted to intercourse with the Sandwich Islanders.

It was on the evening of November 3rd that our little schooner got under weigh, and glided out from among the fleet of whalers in the roadstead, and away from the scattered cottages and houses, and cocoanut trees of Laihaina. It was a glorious evening, and the great volcanic mountains of Mawé, and the neighbouring islands, loomed grandly in a golden haze, as the sun got low, and we stood out into the open sea. Our tiny craft presented a singularly curious and picturesque appearance ; her cargo, most closely packed, was human ; a very fat chieftainess, with about a dozen of her ladies in waiting, filled the little cabin, and on deck we counted between eighty and ninety persons, almost all women and girls, going on a visit, they told us, to their friends in Hawaii, all dressed in light calico " roundabouts " of bright colours, and all wearing wreaths and flowers in their hair. This looked well enough in the sunlight ; but I well remember in what a dark blue-black the last island to the westward stood out against the fading streaks of red on the sky, when the sun went down. The wind began to whistle shrilly ; we took in sail ; our poor lightly clad fellow-passengers huddled together, and a shiver ran fore-and-aft as the first cold spray swished over them. They laughed at first, and throughout bore up bravely ; but it grew worse and worse, and nearly all night long heavy seas broke over us ; but, even had not the deck been flooded, there was not room on it to lie down ; Wortley and I spent the night sitting against the bulwarks, now and again helping to work the vessel, or taking a turn at the tiller, when the native skipper—who behaved admirably—had to go forward to see to the head sails, or to keep his crew up to the mark. When at length a dull leaden morning dawned, we were hove to in a tremendous sea, our binnacle and compass smashed, and no land anywhere in sight, though the clouds were beginning to break. Our deck presented a marked contrast from yesterday evening. It was hidden by superincumbent strata of drenched and shivering feminine humanity, blended in one chaos of sodden calico, wet dishevelled tresses, draggled wreaths, and general misery, on which the native sailors trod without the slightest compunction, for there was no stepping room between. At noon it began to clear up, and the sea moderated ; still we in vain looked out for the mountain tops. The captain had run before the wind out to sea all the first part of the night, and calculated that we were about 80 miles from land. We steered in search of it by my pocket compass, and when night again came the stars shone out, to thecaptain's great delight ; he, however, was utterly exhausted, and turned in. The native left at the helm had also a theory of the stars and navigation, and was bent on steering in the wrong direction, besides performing most surprising nautical aberrations ; remonstrance being unavailing, Stuart-Wortley and I were obliged forcibly to depose him, and take command. Under these circumstances of some responsibility, and perhaps with the slightest possible shade of doubt as to our own perfect capability as navigators, and the exact correctness of our course ; for we did not know exactly where we were, and had neither charts nor ship's compass—under these circumstances, we

were not sorry when we saw high above the morning mist the great smooth gently rounded dome of Mauna Loa, with smoke rising from two craters, the somewhat more rugged crest of Mauna Kea, and the dark mass of Mauna Hualalei. The scene was imposing, calm, and grand, rather from vastness than from any beauty of outline. These three mountains of Hawaii are respectively 13,700, 13,800, and 10,000ft. in height. They have not the sharply defined peaks and crags common to most volcanic mountains.

About mid-day on the 5th we made the shore, and landed at the village of Kawaihae, on the north-eastern coast of Hawaii, situated some 30 miles north of the Bay where Captain Cook was killed. At Kawaihae we visited the remains of a Heiau, or heathen temple, an enclosure surrounded and paved with stones, and with stone terraces in front, on a slope descending towards the sea. Leaving Kawaihae and its few clumps of cocoa nut palms, my friend and I, with a native guide, turned our backs on the sea, and walking westward ascended a long rise, where the wild indigo plant, the prickly pear cactus, some grass and other vegetation, grew in thin red volcanic soil amongst stones and scoriæ. A few miles brought us to an elevated tract of table land of better soil, and to a settler's homestead, where we obtained a horse and a little pack bull, and secured the services of one or two more natives, a pleasant relief from carrying our own food and baggage. Our journey then lay along an upland valley, the Waimea, tolerably well grassed, with here and there a grove of trees or bushes, and next entering forests chiefly composed of Koa *(Acacia falcata)* which bears a remarkable resemblance to the Eucalypti in leaf and seed vessel, we rounded the northern shoulder of Mauna Kea, the most northerly of the three great mountains, sometimes catching glimpses of the snow on its summit range through the trees. It was near here that the botanist Douglas met his death by tumbling into a pitfall, into which a wild ox had already fallen, which gored and trampled him to death. We met a few of these animals, with long horns like a buffalo. We had only a shot gun and revolvers. They gazed at us and retired; had they charged, our little pack bull might have fared badly. Passing through these forests, where the wild strawberry and raspberry abound, as does the "Cape Gooseberry" at a slightly lower elevation; and having attained a height as nearly as I recollect of about 3,000 or 4,000 feet, we commenced to descend on the north eastern side of the island, in a beautiful and very well grassed country which, deeply cut through by ravines filled with the candle nut tree *("Aleurites triloba")*, bread fruit, banana, and other vegetation, and dotted with clumps of Pandanus *(Pandanus odoratissima)* and bamboo, slopes down from the upland forests to the cliffs, which rise abruptly from the sea. Nothing can be more beautiful than this Hamakua district, or perfect than its climate. Turning now to the southward, and crossing a seemingly interminable succession of very deep ravines, and wading through clear fresh streams and rivers, that dash down their rocky beds, and often fall in cascades over the cliffs into the sea, we reached the town of Hilo, on Byron's Bay, on the 9th of November. As we approached it, we passed a few small coffee and sugar plantations; and just before we reached it, we were amused by seeing a great part of its native

population disporting themselves by jumping from a rock into the Wailuku River, floating on their back down to its waterfall, going over a perpendicular fall of 30 or 40 feet, feet foremost—plump into a deep still pool below. The Sandwich Islanders are probably the best swimmers in the world, and their feats in the surf are far more wonderful than this.

Hilo is a pretty village or small town embowered in cocoanut, breadfruit, and banana trees, and straggling along the shore of Byron Bay. It is, or then was, a great resort of whalers, and is the principal town of Hawaii. The ground rises gradually from it to Mauna Loa, the summit of which is about 40 miles distant in a straight line ; and when I arrived at Hilo the lava of the great eruption was steadily flowing down towards it and threatening it with speedy destruction. On our arrival we hired a vacant hut embowered in a grove of bananas from a native, and at once sat down to debate " ways and means," for we had wrongly calculated on being able to get money from Honolulu before this, and we found ourselves with a most dilapidated wardrobe and literally penniless, without introductions, and unknown to any one. I only wish that I could ever hope to be able to make some return for the generous confidence with which Mr. Pittman, the principal merchant of the place trusted us, advanced us everything we wanted, and not only extended to us assistance, but the most cordial hospitality.

We now began to prepare for our journey to the volcanoes. The three great mountains of Hawaii are all recent volcanoes ; Mauna Kea the most northerly of the three is somewhat the highest. Its summit bears evident traces of activity at no distant period ; but for many years it has not been in eruption. Mauna Hualalei, more to the southward and on the western coast, was in eruption a few years before my visit. By far the most active is Mauna, Loa, Kilauea, on its south eastern acclivity, and is the largest active crater in the world. It has been frequently visited by travellers. Above it Mauna Loa proper, presents an immense bare area, I should say 40 miles in diameter, smooth and gently rounded at its distant aspect ; but one mass of rough volcanic debris, scoriæ, and lavas of different ages, cut by deep lava ducts, and heaped with scoriæ and ashes ; and few years pass by without its bursting forth in one direction or another. Often it is, as it were tapped, by an eruption of Kilauea, which as I have said stands, like a great abscess in its side, some 8000 feet below its summit. In 1840 a flood of molten matter burst through underneath the rocky walls that form the basin of Kilauea, lowering the level of its floor by 60 feet.

For ten miles it flowed underground, occasionally lifting the earth and rock above, and sending forth smoke, inflamed gases, and burning lava ; then tearing its way out of the hill side, it rolled a flood of liquid fire through forest and jungle, which spread sometimes to a width, as Mr. Coan a resident missionary says, of four miles. In three days it had traversed 30 miles, and rolled itself in a cataract of fire a mile wide, over a cliff 50ft. high into the sea. For 20 miles around the sea was heated, and innumerable quantity of fish were thrown upon the coast killed by the heated

water, and two islands were formed as the lava cooled after flowing into the sea, for two weeks. In 1843 a great eruption took place from the top of Mauna Loa itself. The melted lava ran down the northern side of the mountain for 30 miles, dividing itself into two streams from one to three miles broad. I owe these details to the Rev. Mr. Coan of Hilo, who, with much danger to himself, ascended the mountain and traced the stream.

In 1832 an erruption again took place at the summit of Mauna Loa, which threw up an immense fiery column of incandescent scoriæ, and inflamed gases to the height of about 500 feet, some say 1000 feet, and again poured forth a flood of lava. Mr. Coan this time also visited the mountain.

Many former eruptions have been recorded, and an account of them may be found in the journals of the Geological Society, Vol. 12.

I am not aware if besides Mr. Coan and myself, many, or indeed any, other persons have ascended Mauna Loa proper excepting Commodore Wilkes, of the American Expedition, who went up with a large body of natives and sailors, established a hospital on the side for those who suffered in the attempt, made some interesting observations, and returned after an absence of some duration to Hilo. A detailed account of his expedition may be found in the narrative of his voyage; he seems to have considered the difficulties of the undertaking much greater than a person more accustomed to bush work and mountain travelling would have found them. The mountain was not in eruption when he ascended.

Kilauea, 4104 feet above the sea, is easily reached; it has been several times described, I think first by Commodore Byron, after whom Byron's Bay is named.

I now come to the great eruption of 1855, which I was so fortunate as to witness. On the 11th of August 1855, the lava burst forth at about 12,000 feet above the sea level on the very crest of the range, but about 1000 feet below its highest part, and on the northern side; it was rather remarkable for the enormous and unprecedented flow of lava than for any projection of inflamed substances into the air, though its light illumined the horizon for many miles, and the column of fire or its reflection was said by some to have been at first apparently 500 feet high. The Rev. Mr. Coan again made the ascent and visited it. At the commencement the lava ran northwards with great rapidity into the upland valley that divides the summit of Mauna Loa from that of Mauna Kea; then taking an easterly direction, it poured down towards Hilo. The main stream was in many places about three miles wide, but as it reached comparatively level country, with forests, jungles, swamps, and streams, it spread to a width of five or six miles and flowed more slowly. At the time we left Hawaii (November 23rd, 1855), it had been gaining about a mile a week, but during the last week it had been making a somewhat greater progress. The whole length of the flow of the lava, including bends in its course, was then computed by residents at considerably more than 50 miles from the craters; I should myself put it at about 35 miles as the crow flies, not allowing for sinuosities. It was then only about 8

miles from Hilo, which it threatened, but it did not advance much further, and ceased to flow not long after I left.

Our first good view of the eruption from Hilo was at night, from the deck of a ship in the bay, as the trees obstructed the view from the shore. The distant craters were scarcely visible, but the burning forests above and behind the town showed the front of the advancing lava torrent lightening up the night with a mighty glare, with sometimes a column of red light shooting up, occasioned probably either by an explosion of the half-cooled upper crust (from under which little streamlets of red hot lava keep running out and covering fresh ground like fiery serpents in the underwood) or by dried trees falling into the fire. The inhabitants of Hilo were justly alarmed, and many were preparing to put their effects on board ship. I was particularly requested when it became known that I was about to attempt the ascent, to endeavour to ascertain as nearly as possible the rate at which the lava was flowing, that it might be known whether the flow was moderating since Mr. Coan's expedition. Most people, however, said that I should never get to the craters; Mr. Coan said it would take me a week or more. He kindly pursuaded a native who had been with him to accompany me, and with much difficulty I engaged two more, all strong and active men. We got horses to take us as far as Kilauea, and after completing our arrangements and spending a few pleasant days at Hilo we started.

The ascent, though very gradual, may be said to commence at Hilo itself. The weather was unpropitious, and where the path was not old lava it was deep mud; indeed these two component parts of our track were so mixed up together that our horses were soon tired out by plunging along from hard to soft, and it was not till the second afternoon that we reached Kilauea, a distance not very much over 30 miles. The country varied between woods and jungles, chiefly of a tree of the myrtle family, bearing red and sometimes yellow flowers, not unlike the New Zealand Rata *(Metrosideros?)* and open tracts of fern "Ti" *(Dracœna terminalis)*, which is also the Maori name for similar species, and grass. A little before reaching Kilauea we entered the region of the Koa tree, already mentioned, which is a useful timber tree, and also remarked a handsome yellow acacia, the raspberry, strawberry, and some tree ferns; the soil, of a red colour, was covered with masses of scoriæ, and in many places we crossed hardened streams of old lava.

Our journey had been about 30 or 35 miles, at first about south by west, and latterly more westerly, when, on the afternoon of November 14th, we stood on the brink of the great crater of Kilauea, 4104 feet above the sea. We found a grass-built hut on the upper rim of the crater, and here we took up our quarters. The mountain of Kilauea may best be described as the base of a broad low truncated cone, standing on a high level plateau; an excrescence, as it were, growing out of the side of the huge Mauna Loa. It looks as if the apex had subsided, leaving in the centre of the mountain a flat-floored sunken crater the upper rim of which is about seven miles in circumference; sometimes the level of the bottom of the crater is tapped and lowered by underground eruptions that burn out at a lower level on the side of the mountain.

From our hut we looked down on two partially sunken ledges covered with grass, fern, and bushes, which, as well as the place where our hut stood, were in many spots steaming. In one place especially we noticed a large bank or mound composed apparently of a chalky substance, probably a deposit of some chemical salts with a great deal of sulphur, from which issued a considerable body of steam. Below these ledges lay the great crater like a flat-bottomed round basin. The depth from the top of the highest of the containing walls or cliffs to the bottom of the crater, has been calculated at 1,500 feet, though in many places it is considerably less. These cliffs or walls are in most places perpendicular, and appear to be composed partly of gravelly clay of a yellowish colour, and partly of dark basaltic or trap rock. The bottom or floor of the crater is constantly changing, quickly melting or hardening. Sometimes part of it is a lake of molten lava, red hot. Some Americans, that we met returning from it as we ascended, assured us that such was the case the day before we arrived. Such a lake is often a mile in length, by half-a-mile wide. When we saw it, however, nothing of the sort was visible. Looking down into the crater it had the appearance of a flat plain of dull lead-coloured lava, more or less broken and rugged in places, and containing an infinity of small mounds or cones, whence issued clouds of smoke, especially towards evening. As night came on, the action of the volcano seemed to increase, and the light of the subterraneous fires was seen in many places. Mr. Stuart-Wortley, who was prevented by indisposition from proceeding with me up Mauna Loa and remained at Kilauea till my return, observed some of the small cones or craters within the great crater occasionally ejecting hot stones and liquid lava, and on the night of my return from Mauna Loa, I observed the sam thing on a small scale. I may here mention that after my return from Mauna Loa, we climbed down a part of the wall where it is not very precipitous or difficult, and descended into the crater. This can easily be done, and some years ago a native chieftainess, named "Kapiolani," having become a Christian, performed a gallant act, which should ever be remembered to her honour. She descended into the crater, and advancing to a pit of fire defied the Heathen divinity to whom the place was sacred, broke the "Tapu," that is its inviolate sanctity, and safely returned to her trembling and awe-struck attendants, who had expected her instant death. Pelé is the name of the goddess who, until that day, was supposed jealously to guard her fiery dominion, and to luxuriate in her bath of flames, as her votaries did in the cool waves that dash over their coral reefs. The capillary lava, which is supposed to be formed by the action of wind on liquid lava, strongly resembles hair of reddish, brownish, or golden hue, and is called by the natives Pelé's hair; I brought away several specimens, but regret that I have none by me. The floor of the crater of Kilauea, on which we spent an hour or two, is simply the cooled upper crust of fused lava; the numerous small mounds or miniature craters scattered over it, have orifices at their tops or in their sides like the mouths of limekiln, often double, through which you may look into the red hot depths below, and into caverns of

subterraneous fire. We also remarked in places, long ridges of smoking masses and fragments of rock that had evidently been upheaved through the lava pavement, and piled confusedly upon one another. The lava itself upon which we walked was sometimes very hot, especially near steam vents and open abysses. The exhalations of sulphurous acid and other noxious gases were also in places an impediment to our explorations. The lava is generally of a dull glossy lead-colour when quite cool ; but of a brighter green or blue when more recent. Symptoms of melting of the crust upon which we walked, and increasing heat and vapour, came on as we left the crater and regained the fresher atmosphere of the upper world.

After a night's rest in the grass-built hut on the verge of the rim of the Kilauea crater—leaving my friend, whose strength was hardly equal to the enterprise, to keep house at Kilauea—I started on foot with three natives at early dawn on the morning of the 15th November to ascend the "great mountain." After walking a couple of miles we entered a wood, and commenced the actual ascent ; in about two hours we began to emerge from the wood, and by 9 p.m. we were fairly upon the bare lava. It was an old lava stream with various species of Epacris, a red whortle-berry, and similar plants growing in its crevices. Before us lay for miles and miles a wilderness of stones and scoriæ ; high up, far in the distance, rose the wreaths of smoke that marked the site of the new craters, the goal of my ambition. Our course this morning had diverged a little to the north, and then again to the south of west ; but now we made right for the upper crater on the rounded back of Mauna Loa bearing about west. Before us lay a waste of desolation ; on either hand belts of wood, that had escaped comparatively recent eruptions, struggled yet a little higher up the mountain side. We passed several large caverns ; lava-formed themselves, they had been once the ducts of streams of liquid lava. Some heaps of stones marked a place where a horse, and if I understood my natives rightly, some people had perished ; how they got the horse so far ; how they could have hoped to get him yet further, and for what possible purpose they brought him there at all, is a mystery to me, which my imperfect power of conversation did not enable me to solve. About 50 years before, and, so far as I could ascertain, not far from that spot, a native army, attempting to move from the eastern to the western side of the island, with the design of issuing forth upon their enemies from the gap between Mauna Loa and Mauna Kea, were smothered by a shower of ashes, similar to that so graphically described by Pliny, the younger, when Pompeii and Herculaneum were destroyed, and in which the elder Pliny lost his life. Proceeding onwards over lava and loose porous stones like pumice, only harder and somewhat heavier, we arrived, at about 11 a.m., at a few bushes and koa-trees, a little oasis of coarse grass, an old hut, and a deep rock-pool of delicious water in a cave. Here we halted to refresh ourselves, and then, leaving the old track which turns northward leading to the north-west side of the island, and which was, doubtless, that which the ill-fated army intended to pursue, we kept on our toilsome ascent over bare lava, now absolutely destitute

of any vestige of vegetation. So rough and loose were the scoriæ boulders, and so sharp the vitrified lava like slag and clinkers from a factory, that I found my strong English shooting-boots cut through in many places, and blood was flowing from my feet, knees, and even hands; my natives were also in evil plight. I therefore tore strips off my shirt and bound them round my boots, and continued this operation as long as my shirt lasted. When I left the mountain two days after I was shirtless, and had utterly destroyed two pairs of boots. At about 3 p.m. the guide, disappointed in his expectation of finding another cavern containing water, after consultation with me, altered his plan, and instead of keeping his westerly course for the upper crater, turned to the right, north-west, hoping to find water at a spot some miles below the lower one. The consequence was, that bad as the walking had been before, it became, if possible, worse as we left an old lava bed and toiled mile after mile over nothing but loose sharp rocks and scoriæ of every possible size and shape, and piled in the wildest confusion. We succeeded, however, in finding a little water amid a few solitary stunted bushes, the sole residue of a burnt-out forest, and then again tending upwards and to the west, shaped our course directly for the lower crater of the two that were sending out dense volumes of smoke above us. We lay down for the night on a little patch of half-vitrified ashes. I suppose that we were then about 9000 feet above the sea, but we might have been considerably more. The next morning we started before sunrise. Having found to my surprise a few dry sticks, I thought so good an opportunity was not to be lost, and endeavoured to make some tea, but owing to the height the water boiled without attaining sufficient heat, and as water was very precious, I did not long continue the experiment, but returned what remained in the pannikin to our calabash. Our way now lay, mile after mile, over scoriæ boulders, yeasty-looking basins, and tortuous folds and waves of solidified lava, caverns and small chasms whence the hot lava had flowed away, hillocks generally of small stones burnt to a deep orange red, and here and there little smooth places covered with ashes,—altogether dark and dreary in colour, without a living thing or a green blade. That morning we passed the site of the eruption of 1852. The view thence of the opposite mountain of Mauna Kea was glorious. The old conical craters on its summit covered with newly fallen snow, its huge outline, shadowy and dim; the clouds of smoke that rose round its base from the intervening valley down which the present eruption was flowing; the wild dreariness of the foreground and the tropical sky above. Who could fitly describe or paint it!

And now a disaster occurred. A native fell and broke one of our two calabashes or gourds of water. One only remained, and it was not full. Our supply was reduced to a pint bottle of beer and less than two pints of water. We descended into a cave, and scraped off some damp moss and squeezed it into the pannikin, obtaining, after half-an-hour's labour, little more than half-a-pint of dark yellow liquid, tasting strongly of sulphur and dirt, so undrinkable that we decided on mixing it with the rest, a proceeding that had this advantage, that no one was afterwards inclined to drink more than nature absolutely demanded. The natives, now

tired and worn out, lagged behind, and at noon I found myself alone at the lava of the present eruption, at a spot about a mile and a half below the lower crater, and about three miles below the upper one.

As far as the eye could reach, down the valley between Mauna Loa and Mauna Kea, I could trace the devouring flood in the valley and forests below ; the stream of fresh lava at this point was about two miles in breadth, of a dark greenish colour, and dull metallic lustre where it had cooled or partially cooled on the surface ; below it was liquid, and moving on under the upper crust. The surface, as cooled by the air, had congealed into every possible form and distortion—here wreathed about like rolls of shrivelled parchment—there split into slabs and fragments, sometimes with a smooth surface only broken by cracks and fissures—in other places twisted like strands of coiled rope, or rolled out into huge waves and serpentine convolutions. Through large cracks and openings one looked down into the fire below; and many of these fissures had to be jumped across. Smoke, steam, and gases, rose from many of these places, and often, when walking on apparently hard surface, an upper blister broke beneath the tread, causing a fall amidst steam and hot lava. I was fortunate in receiving no injury worse than a burn or two and the loss of a finger nail. As the day advanced I was somewhat uneasy at the non-appearance of my natives, for though I had no doubt of being able to find my way back, it would be difficult to find them amidst such a chaos of rocky ground ; and I had neither food nor water, and time under those circumstances would have been a question of life or death. Mr. Coan, too, had said that it would at the least take two, if not three days, to get back to Kilauea ; however, I felt sure that I could see both craters that day, and I had left Kilauea only the preceding morning, and I felt that it was possible by aiming straight for it, to reach it even without food or water by next night. Moreover, I had said at Hilo that I would bring back word as to the speed with which the lava was flowing, and it was of consequence that I should do so, for from its rate of flow might be calculated the probability of the continuation of the eruption, and the likelihood of its reaching the town. Now, to do that, I saw that I must walk on the surface of the cooled or partially cooled lavas till I reached its centre, where large open gaps in the crust showed the fiery flood beneath. They were a long way off, but I could know them by the glare that tinged the dull mantle of smoke and steam that rested on the lava. Besides my nerves were strung up, and, Englishman-like, I did not wish to be beaten. I resolved to go on, and, after I had done what I intended to do, then to go back as nearly as I could to the place where I last saw my natives, and I did not find them at once, not to delay, but to strike straight back to Kilauea at daybreak. I followed up the course of the eruption, keeping along its side. When I was within a mile or two of the lower crater I saw by the glow a very large lake of fire in the centre of the eruption, and determined there to make the attempt to reach it. At that moment, the native who had been on the mountain before, and whom I have called the guide, appeared,

to my great delight. I hailed him, and he rejoined me ; I pointed out to him where I wented to go "to see the fire." He laconically observed, "You go there, you see plenty 'fire,'" and sat down. I went on. The eruption was here about three miles broad. Scrambling with great difficulty, sometimes through hot hollows, where I could hardly breathe, and sometimes jumping or stepping over fissures through which the fire was visible, I reached the object of my aim, the central crag of a huge arch, overhanging a lake of fire ; a place, in fact, where the surface crust had blown up or fallen in, exposing the flood to view for some acres. The crag seemed solid, and I reached it ; I was scorched and almost blinded by the glare ; I was as it were standing on a bridge, under which a river of fire as large as the Thames was slowly and smoothly rolling, that is, visibly as large, for, in reality, it was fully three miles wide in its underground flow as shown by the cooled surface, and I had reached about the middle. I stood so perpendicularly above the stream as to be able to drop a large mass of lava into the fire, and though the glare was too great to enable me to see distinctly, I thus satisfied myself that the flow was moving at the rate of about three knots an hour; in fact, that its rate of speed had sensibly diminished from the time Mr. Coan had estimated it. I was well satisfied when I rejoined my native, and we proceeded upwards to the lower crater together. Leaving on our right several large abysses and pits, we arrived there. The upper crust of the lava having cooled, the discharge from the crater was not visible. Some dark fantastically shaped rocks, some heaps of small stones, one of which, containing a large proportion of sulphur, was burning most furiously with red and blue flames, the whole surrounded by an ocean of partially cooled lava ; such was the lower crater. My native again very sensibly sat down at a little distance ; I scrambled on as best I could, till I reached one of the rocks forming the side of the crater, keeping well to windward on account of the dense smoke. Lying down on the warm stones, I attempted to look over, as it were, down a gigantic chimney, to see into the boiling cauldron, which I heard bubbling and seething. I got my head over the edge, and had just time to see a long, broad, fissure, full of smoke, when I was almost suffocated with smoke and sulphurous acid gas, the effects of which I felt for some time afterwards, and thought myself fortunate to escape in safety.

Still ascending for about a mile or a mile-and-a-half over the same chaotic confusion of loose scoriaceous rocks, torn and burst asunder, and lava warm and steaming, some of it lying in loose, flat dabs or flakes, as if it had been thrown hot into the air and fallen with a splash, we reached the upper crater at a height of about 12,000 ft. from the sea, or somewhat more.

The upper crater was simply an irregular and imperfect basin, of no great size, a hollow between two large mounds or hillocks of small, loose stones, with an infinity of small steam and smoke rents. Thence within it, and on the sides of the mounds, it sent up volumes of red smoke, and partially ignited gases ; in one place, from a small truncated cone, this was most apparent, the exhalation rising like the panting puffs of a steam engine. No

doubt at night the inflamed gases would present the appearance of a column of fire, but in the day-time, to one who had seen what I had that day seen, the upper crater looked rather curious than imposing. The great heat did not allow a nearer approach than about forty yards' distance.

Nothing now remained but to return to the two natives, who, worn out and dispirited, had laid down about a mile and a half away some 500ft. below the level of the craters, and there we slept.

Few living men, perhaps, have looked on such a scene with such surroundings as I did that night. The night was clear with us. Over our heads spread the vault of heaven, starlit and moonlit; and all around, scarred and furrowed like an ancient world destroyed by fire, lay the great grey round face of Mauna Loa; above us its two craters sent up rolling volumes of lurid smoke. To the northward Mauna Kea reared its crest of snow into the moonbeams, looking down nearly 14,000ft. upon the mingled gloom and glare of the intervening valley, along which flowed the eruption, running downwards to the forests, and burning its way through them for miles and miles into the far distance by Hilo. To the east and south, before us, the low dark woodlands fringing the coast, slept in shadow with the sea beyond.

Solemnly grand and impressive it was, but it became sublime when clouds gathered some thousand feet below us; their upper surface as we looked down on them, shining white in moonlight, yet through which the lightning flashes played, and deepest thunders reverberated—still we were in perfect calm—and over and beyond the thunder storm I could look upon the glitter of the moon's rays on the placid sea—like Dante, with whose genius the scene so well accorded—

———"Di lontano
"Conobbi il tremolar della marina."

Such was my last night on Mauna Loa.

In the morning, rising at the first sign of dawn, very great and sustained exertion, not without much suffering from thirst, and with bleeding feet, brought us back long after nightfall to my friend Stuart-Wortley, and to what seemed to us the comforts and luxuries of the old grass hut above Kilauea.