mens of Mr. Wilson Saunders's Refugium Botanicum, the Madagascar collection of the Rev. R. Baron—this latter of over 1100 species.

Reference is also made to the "North Gallery," an illustration of which is added to the Report. The collection of separate pictures of plants in the gallery amounts in number to 627, and has since been added to.

It will be seen from this brief sketch of Sir Joseph Hooker's Report that the work done at Kew is as varied as it is important, and that our colonies directly and our mother country indirectly are under lasting obligations to the zeal and energy of all concerned in the management of this great institution.

MR. THORODDSEN'S GEOLOGICAL EXPLORATIONS

ALTHOUGH situated at a comparatively short distance from Europe, and notwithstanding the frequent visits of late years by English tourists, Iceland is yet very far from being a well-known country. The upland is still, for the most part, an unexplored region, and there are whole districts where no man, native or foreign, ever set his foot, owing, chiefly, to the difficulties and dangers which attend travelling through these wildernesses. Foreigners travel mostly along beaten tracks; they come mostly without having acquired any previous knowledge of the peculiar nature of the country, consequently not knowing what parts are most worth visiting or exploring. Yet these regions are eminently interesting for students of natural science, being filled with innumerable glaciers, some of enormous magnitude, with multitudes of volcanoes, eruptive springs, &c., which it is of the greatest importance should be scientifically explored and described. In order to obtain reliable information about these upland wilds of the country, the Government of Iceland have commissioned Mr. Th. Thoroddsen to undertake systematic explorations with a view to establishing the geology of the country on a sound basis, and correcting its geography where necessary; for this purpose he has already undertaken various expeditions. In the course of last summer (1883) he explored the peninsula of Reykjanes and its upland connections. Although this part lies in close proximity to the inhabited parts of the country, it has hitherto remained for the most part a *terra incognita* on account of the innumerable waterless and utterly barren lavas which are crowded into it, and make travelling excessively arduous. Formerly people only knew that within historic times two volcanoes had been active in these parts. Mr. Thoroddsen has now determined the existence and site of no less than *thirty* separate volcanoes with at least *seven hundred* craters. In each case he has made all necessary measurements, and has constructed a geological map of the whole district.¹ The aggregate extent of the lavas covers about 44 square (geographical) miles. Out of the lavas up and down this tract there rise mountains composed of tufa and breccia, and through these the eruptions of the volcanoes proper have found their vent. Cases of individual volcanoes being built up in one spot by repeated eruptions are rare. The craters are in most cases traceable in distinct long rows, like pearls on a string, along terraces of tufa, situated along chasms through which the lava welled out. In some places there are no craters, the lava having boiled out of the chasm over either side of it, in which cases the rift remains open with its brims covered with a glazed crust of lava. In other localities are found volcanoes of colossal size, broad sublevations or convexities of lava, with a large crater at the apex from 800 to 1000 feet in diameter, instances of which are Skjaldbreid, 3400 feet, and Heidinhá, 2000 feet above the level of the sea. Throughout the lava stretches one comes upon enormous fissures all following the same direction as the rows of the craters,

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namely, south-west to north-east. All about this district there are also found numbers of hot springs, solfataras, and boiling clay-pits. This peninsula, Mr. Thoroddsen maintains, must be one of the most thoroughly burnt spots on the globe, and a pre eminently instructive tract for geologists who make volcanic manifestations the speciality of their study.

This summer Mr. Thoroddsen is engaged in exploring the enormous lava wilderness of Odádhraun, covering the central part of Iceland, and, as yet, for the most part entirely unknown. In the glaciers to the south of this wilderness great eruptions have taken place of late years, about which nothing is known, no one having as yet ventured into these wilds, lying 3000 to 4000 feet above the level of the sea. The difficulties of exploration here are enormously aggravated by the utter barrenness of the region, by scarcity of water, and by the frequent snow tempests by which the region is constantly harried even in the midst of summer. Even the compass is not to be relied upon, on account of the mass of iron which enters to such a large extent into the composition of the lava.

Akreyri, June 24, 1884

Grimsey is the name of a small island, situated in the Arctic Ocean, about 22 English miles due north of the promontory which divides the bays of Eyjafjord and Skagafjord in Northern Iceland. It is inhabited by 88 human beings, debarred from all communication with the outer world, and equally ignorant of its motive thought as of its stirring events. Their intercourse with outward surroundings is confined to Arctic ice and ceaselessly recurring storms. Only once or twice a year they manage in their small open boats, at a perilous risk, to effect a landing on the mainland, for the purpose of obtaining by barter their necessities of life at some of the north coast trading stations.

The island having never before been visited by a naturalist, I eagerly embraced the opportunity of joining the governor of the North District on an expedition to it, undertaken at the instance of the commander of the gunboat *Diana*, Capt. O. Irminger, of the Danish navy. In the evening of June 19 we steamed, in calm weather, from Akreyri down the broad bay of Eyjafjord, enjoying the imposing scenery of the mountains on either side, lit up by the subdued vermilion tints of the nocturnal sun glare; when we reached the mouth of the bay, we had a full, unintercepted view of the midnight sun, resting on the oceanic sky-line, like a ball of fire behind a veil of blood. Out of the inert calm of the deep, which looked like polished glass, there rose on either side of us black precipitous rocks that formed, as it were, the advanced basis of the snow-capped mountain-tops, which determined our sky-line in the landward distance.

We reached Grimsey at three o'clock in the morning of the 20th, still, as good luck would have it, favoured by the same calm weather and quiet sea—both being the indispensable condition of effecting a safe landing on the island. We took the shore just below the parsonage in a light formed of precipitous rocks made of basaltic columns, here and there split up by yawning caves; and having succeeded in clambering to the top of the rocks, we set about exploring the island.

The formation of Grimsey is basaltic throughout, and, geologically speaking, resembles, closely on the whole, the stratification of Northern Iceland. From its non-volcanic nature one may therefore fairly assume that, once upon a time, it must have been connected with the mainland. But, though not volcanic itself, it seems that Grimsey is not very far removed from the lines along which the active subterranean fires in Iceland are operating. At various times the inhabitants state they have observed towards the south-east signs of submarine volcanic action, and towards Tjörnes (S.S.E.) a column of fire was distinctly observed breaking through

the surface of the sea in 1868; this, too (one of the northernmost promontories of Iceland), has frequently been visited by violent earthquakes, notably so in 1872. Towards the east the island rises precipitously out of the sea to the height of upwards of 300 feet, but slopes to the westward, where all the habitations of the people are scattered about. The flora is scanty, and the plants stunted in a remarkable degree; as far as I had opportunity to observe, the vegetation seemed to bear a distinct Arctic impress as compared with that of the mainland. The sward is covered with Arctic willow (*Salix herbacea*), resembling the same plant when met with on the mainland at an elevation of 1500 to 2000 feet above the sea-level. The flora of the eastern portion of the island is much more varied, as compared with that of the western, owing to the soil being much more fertile there from the guano deposited by the multitudes of birds which haunt that part of the island. Every ledge of rock is covered with the so-called "Skarfa-kál" (scurvy-kale, scurvy-grass, or spoon-wort, *Cochlearia officinalis*). Altogether I managed to collect here between fifty and sixty species of plants, all of which are also found on the mainland, only these are of a more stunted growth. No heath vegetation occurred, and no ligneous, if I except the above mentioned willow, which only grows to the height of one inch and a half.

The temperature of Grimsey is much milder than might be supposed from the geographical position of the island. Although it is visited every two out of three years by the Arctic ice, the average temperature of the year is $+1^{\circ}4$ Celsius. August is the hottest month in the year, $+7\frac{1}{2}^{\circ}$ C.; March the coldest, $-3\frac{1}{2}^{\circ}$ C. The highest degree of heat in 1876 was $+20^{\circ}$ C.; the greatest cold in 1880, -30° C. The mildness of the temperature is accounted for by the fact, ascertained of late years beyond a doubt, that a small branch of the Gulf Stream splits off from the main current on encountering the resistance of the western submarine spurs of the rocky masses on which Iceland is built up, the flow of which branch, on wheeling round the north-western peninsula of the country, takes an eastward direction along the whole extent of the northern coast. The average temperature of the sea round Grimsey is about 4° C. in January and 3° C. in February. The pastor of the island, M. Pjetur Gudmundsson, has for many years been engaged in exceedingly careful meteorological observations on behalf of the Meteorological Institute of Copenhagen. This most worthy gentleman, living here in conspicuous poverty, like a hermit divorced from the world, though he has the comfort of a good wife to be thankful for, is not only regarded as a father by his primitive congregation, but enjoys moreover the reputation of being in the front rank among sacred poets in modern Iceland.

The inhabitants derive their livelihood, for the most part, from bird-catching, nest-robbing, and deep-sea fisheries. The precipices that form the eastern face of the island are crowded with myriads of various kinds of sea-fowl. On every ledge the birds are seen thickly packed together; the rocks are white with guano, or green-tufted with scurvy-grass; here everything is in ceaseless movement, stir, and flutter, accompanied by a myriad-voiced concert from screamers on the wing, from chattering on domestic affairs in the rock-ledges, and from brawlers at the parliament of love out at sea, the surface of which beneath the rocks is literally thatched at this time of the year with the wooing multitudes of this happy commonwealth. If the peace is broken by a stone rolled over the precipice, or by the report of a gunshot, the air is suddenly darkened by the rising clouds of the disturbed birds, which, viewed from the rocks, resemble what might be taken for gigantic swarms of bees or midges.

The method adopted for collecting eggs is the following:—Provided with a strong rope, some nine or ten stal-

wart men go to the precipice, where it is some 300 feet high, and one of the number volunteers or is singled out by the rest for the perilous "*sig*," i.e. "sink," or "drop," over the edge of the rocks. Round his thighs and waist, thickly padded generally with bags stuffed with feathers or hay, the "*sigamadr*," "sinkman," or "dropman," adjusts the rope in such a manner as to hang, when dropped, in a sitting posture. He is also dressed in a wide smock or sack of coarse calico, open at the breast, and tied round the waist with a belt, into the ample folds of which he slips the eggs he gathers, the capacity of the smock affording accommodation to from 100 to 150 eggs at a time. In one hand the "sinkman" holds a pole, 16 feet long, with a ladle tied to one end, and by this means scoops the eggs out of nests which are beyond the reach of his own hands. When the purpose of this "breath-fetching" "sink" is accomplished, on a given sign the "drop-man" is hauled up again by his comrades. This, as may readily be imagined, is a most dangerous undertaking, and many a life has been lost over it in Grimsey from accidents occurring to the rope.¹

For the pursuit of the fishery the island possesses fourteen small open boats, in which the men will venture out as far as four to six miles cod-fishing; but this is a most hazardous industry, owing both to the sudden manner in which the sea will rise, sometimes even a long time in advance of travelling storms, and to the difficulty of effecting a landing on a harbourless island.

Now and then the monotony of the life of the inhabitants is broken by visits from foreigners, mostly Icelandic shark-fishers, or English or French fishermen.

Of domestic animals the islanders now possess only a few sheep. Formerly there were five cows in the island, but the hard winter of 1860 necessitated their extermination, and since that time, for twenty-four years, the people have had to do without a cow! Of horses there are only two at present in the island! Strange to say, the health of the people seems, on the whole, to bear a fair comparison with more favoured localities. Scurvy, which formerly was very prevalent, has now almost disappeared, as has also a disease peculiar to children, which, in the form of spasm, or convulsive fit, used to be very fatal to infant life in former years.

Inexpressibly solitary must be the life of these people in winter, shut out from all communication with the outer world, and having in view, as far as the eye can reach, nothing but Arctic ice. The existence of generation after generation here seems to be spent in one continuous and unavailing Arctic expedition. The only diversion afforded by nature consists in the shifting colours of the flickering aurora borealis, in the twinkling of the stars in the heavens, and the fantastic forms of wandering icebergs. No wonder that such surroundings should serve to produce a quiet, serious, devout, and down-hearted race, in which respect the Grimsey men may perhaps be said to constitute a typical group among their compatriots. However, to dispel the heavy tedium of the long winter days, they seek their amusements in the reading of the Sagas, in chess-playing, and in such mild dissipations at mutual entertainments at Christmas-time as their splendid poverty will allow.

TH. THORODDSEN

SEATS IN RAILWAY CARRIAGES

IN a recent article in *Science et Nature* the writer, after animadverting on the lateness of the day at which shoemakers have at length begun, though still very imperfectly, to take account of the osseous framework of the human foot, proceeds to investigate the relation between

¹ This is a fate that befalls too many of the "sinkmen" of Iceland, for there are numbers of them all round the coast. It would be easy, at a very small cost to the treasury of Iceland, to provide a perfectly safe movable apparatus for every district where life must be sustained at the above-described risk. The authorities would, no doubt, readily meet any reasonable request on the subject.—E. M.