

quarter past two P.M. we effected a landing within the floe-edge, and about five miles from the north-western and extreme Point of this land.

Of this new territory I now took possession for our Gracious Queen, with the customary form,—calling it, in compliment to His Royal Highness the Heir Apparent, “North Cornwall.” Sir Edward Parry having adopted the western counties, Somerset, Devon, etc., the Scilly Isles, when discovered, remain for some more fortunate explorer. I know not whether “Duke of Arctic Cornwall” may be added, but we drank the health of His Royal Highness most sincerely, to that title.

Thick weather succeeded, but knowing how fickle Dame Nature is in these regions, I determined not to be caught napping. Proceeding inland, to the nearest accessible height which would command a northern as well as western range, we advanced about three miles. The view obtained was not indeed satisfactory, but we perhaps were too greedy. I saw enough to satisfy me that our present position was insular, and that no northern or western land was near. I have deemed the distance three miles, to be within bounds; but looking to the angles obtained from Pioneer Peak, I could not be less than five miles from the western point of the island, and our elevation not less than eight hundred feet. The ravines are deeply channelled out of a very friable sandstone, in the bottoms of which I noticed large masses of clay ironstone, septaria, and nodules of iron pyrites. Coal was also found, but disseminated, and impossible to trace *in situ*. Bivalves, apparently of *recent origin*, and having the cartilage hinge perfect, were abundant.

This is matter of grave consideration. When, or did the sea ever invade these heights? Yet' the cartilaginous hinge was perfect, and the epidermis in many instances scarcely removed. Birds may have placed these shells; but with our knowledge of this climate, prevailing ice, and the scarcity of animal life especially, this is scarcely credible. I cannot, will not, at present say more. This friable sandstone and sand, interspersed on the surface with boulders of granite, and almost *garnet* masses, constitutes the principal features of the land on the west of North Cornwall.

## CHAPTER V.

Retreat.—Land's End of North Cornwall —Pell Point.—Table Island.  
 —Chased by a Walrus.—Sledge breaks in.—Danger from the Ice.—  
 Observatory erected.—Second Autumnal Expedition.—Traces of  
 Gold.—Gale and Disruption of Ice.—Oomiak constructed.—Walrus  
 food.—The 'Eider-duck.'—Gain the Land-ice.—Reach Point Re-  
 pose.—Return to the Ship.

ABOUT eight P.M. it commenced snowing heavily, and not feeling very certain about our road back, we beat our retreat for the beach, selecting the apparently best ravine. We followed it up, and fortunately came out about five hundred yards north of the tent. On the floe edge we noticed one very large seal, and on the land a track of fox, but of no other animal, nor any traces of Esquimaux. We estimated the north-western point of the island from our elevated position to be five miles, equidistant from us and the tent.

*August 31.*—On the morning of this last day of August we experienced thick moist snow, temperature 30°, with the sun shining at intervals between the falls of snow and passing clouds, tantalizing us considerably, particularly near noon. Fortunately I succeeded in obtaining the latitude and true bearing of our stations on

Exmouth and Table Islands, but no objects' beyond these —also secured last evening. The result places our observing position in latitude  $77^{\circ} 34' N.$ , and by the true bearing of Exmouth Island in longitude  $96^{\circ} 20' W.$ , exactly coinciding with the tangent obtained from Pioneer Peak, and infinitely preferable to any chronometer longitude. The west extreme therefore will be in latitude  $77^{\circ} 39' N.$ , and longitude  $96^{\circ} 15' W.$ , and the Land's End of North Cornwall, the north-western extreme of the island, seen from the hill, probably in  $77^{\circ} 45' N.$ , and then trending about  $N. 30^{\circ} E.$

September 1.—Our insidious enemy, the floe, had played us a trick, hemmed us in, and left no escape by water. But, supported by the picked men of the 'Assistance,' no trifling difficulties could stop us. We therefore, after a somewhat heavy tug over the land, with the boat also to transport, regained the open water, launched, and were again on our element. Jack Frost we were civil to; he was our insidious enemy, at least in the present degree. In all his vigour we laughed at him, as then we should have *solid ice*, but so long as he maintained the Christian symbol (+) he was to be dreaded.

Here we have reached the exciting 1st of September; and yet, although these regions have been portrayed as teeming with animal life, I much doubt if even the sharpest Esquimaux would find anything worthy to present to his lovely wife and daughters on this evening; even bears and foxes seem to be forgotten, or probably have not volunteered for this service. After we quitted the shore, some few timid seals put their inquisitive heads above water, as if to inquire the cause of



our visit, but were soon satisfied. Indeed the aspect of nature throughout presented that heavy gloom which should accompany this very type of barren solitude. Pulling along the coast for a period of six hours, and estimating the distance traversed to be about seventeen miles, we reached the southern angle of the island, where the first high jutting heads frown upon the coastline, which, in the interval from our late station, presented but a succession of low spits and creeks, probably intersecting this part of the island; and at one opening, about five miles from the western station, a narrow strait appeared to divide that portion into a separate island.

Under a pair of high "double cliffs" we pitched our tent; the snow was deep for the season, and no vegetation to be traced. At sunrise on the 2nd of September, every prospect of a bright, clear day promised, and I succeeded in obtaining the sun, as well as angles to Exmouth and Table Islands, but the snow still continued to fall, baffling further exertions. I ascended the high land commanding the eastern horizon, which at that time was very clear, but no land could be traced easterly of Table Island. The eastern limit of North Cornwall I was enabled to trace about fifteen miles, where it seemed to terminate in a low spit, and then turn abruptly to the north.

I have therefore but little doubt that this great eastern space connects with Jones and Smith Sounds, or the Polar Ocean, on which the search of the next season will doubtless throw more light. Our business, it is true, does not so much concern geographical discovery, as the

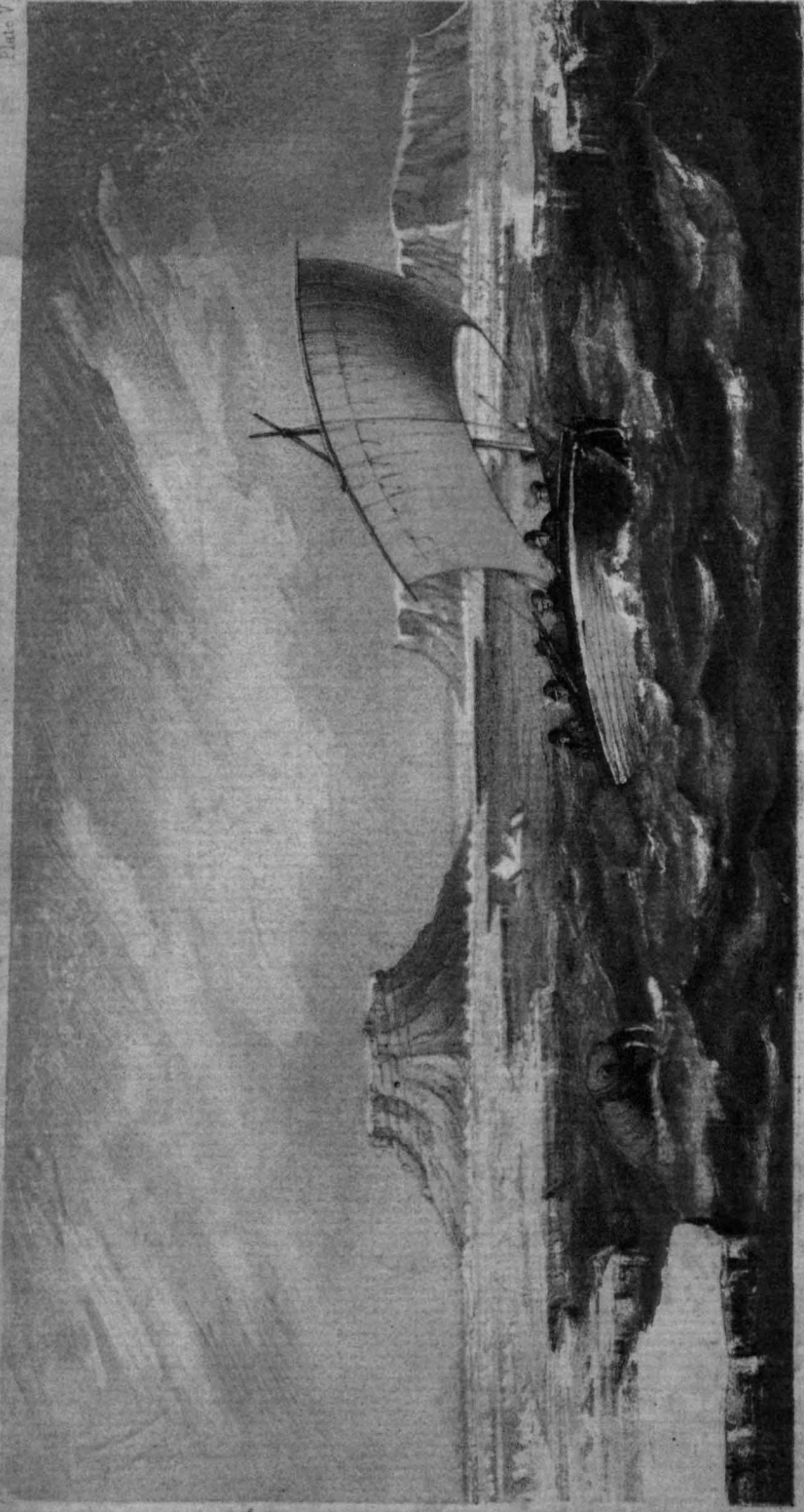
most scrutinizing search, not only for vessels, but for persons or their traces ; and, however confident our opinions may be that they could not exist for such a lengthened period in this vicinity, still no excuse would be satisfactory, if we failed to silence the *conjectures* of those who might even *imagine* that any reasonable spot, to which access to them would perhaps be impossible, had not been rigorously examined. That duty yet remains to be executed, God willing ; and in the prosecution of that duty, it may yet be our lot to determine if Sir John left any record in the so-called "Jones Sound." It is far from impossible that his vessels may have entered this region, and have drifted even thus far. If they reached this open water by Jones or Smith Channels, my impression is that they would endeavour to gain the northern water, and may be anywhere within the parallel of  $80^{\circ}$ , but I doubt it exceedingly. The latitude of this position was determined to be in  $77^{\circ} 29' N.$ , longitude  $95^{\circ} W.$ , variation  $141^{\circ} 18' W.$  It received the name of Pell Point.

In this region, where the tides or currents are scarcely obstructed by islands, and run with some velocity, ripping up the floe like paper, much open water must of necessity prevail, and possibly still more so to the northward. This may offer the means of *drift* to and fro, but not the means of navigation ; nor do these islands afford either sustenance, chance of harbour, or refuge. That they are not washed by any free currents from Asia or America, the total absence of even a particle of drift would seem to infer. The young ice threatened to annoy us ; and a stretch of seventeen miles, under such

circumstances; was not certainly without risk ; but who knows of any other work here—even in our brown-paper boat ! Our safer course was, no doubt, by the floe ; but no floe was at hand to aid us. Cutting the matter very short, we launched, toiled hard, experienced a nasty, toppling sea, but eventually got up to Table Island, fetching about ten miles to leeward of our intended port. Nevertheless we were grateful to reach the shore, and made the most of it ; but heavy “pancake ice” intervened between us and our haven. I required but one glance of the eye from our ice-mate, Bond,—never behind in courage at this work : I knew that he did not object. In we went, and, by dint of labour, spooning, rolling, and eventually getting a line to the ice aground, slept on shore that night ! Very much delighted indeed were all of us, and if the ‘Hamilton’ could blush—but she was painted yellow—she must have felt very uneasy at her praises, so very broadly expressed. One Irishman declared that he would either buy her, or have just such another built, and make his fortune on some lake in Ireland. “Well done, little Hamilton!” often burst from my lips ; and many a good cruise yet do I expect her to bear me through, before she be laid up in Greenwich. Here we are then, *nolens volens*, cast ashore on Table Island. This particular spot attracted my attention from the summit of Exmouth Island, and I had instructed Commander Richards to examine it, and place marks. I fully expected to be able to haul our boat over into a magnificent harbour, formed by the low land encircling nearly the western head ; but the neck, which at ten miles appeared but a thread, was now found to be

nearly a mile, and the whole interior of the harbour one sheet of ice. To this harbour I gave the name of Londesborough, and to its point Grimston.

*September 3.*—During the night the current had fortunately swept away the ice from our harbour, and left us free to pursue our journey. The morning was fine, beautifully clear, and the sea westerly open to Exmouth Island. Ascending one of the commanding hills, I obtained a view of the leading features of this island, as well as a station in connection with some of those erected by Captain Richards. The breeze favouring, about eight A.M. we put to sea, and succeeded in reaching Exmouth Island shortly after noon; lunched, took up our *cache* of provision, and, as the wind continued favourable, lost no further time. Winter was now approaching most unmistakably in earnest, and a few hours might render our work either very laborious or very simple. The change which a few days had made here was impressive; I could hardly recognize the features of our late encampment, and the beach was only by dint of great labour accessible. The main floe was in motion, and continued to press easterly; but the breeze increasing with heavy snow, and the tide setting strong to windward (westerly), and driving heavy pieces of ice end on to the floe, forcing the boat also so strongly on it as to damage her, rendered decision necessary. I therefore quitted the floe and made sail, but right glad were we to seek shelter for the night on "Governor Richards' Island." Chased, I believe, by the identical old walrus before alluded to at the commencement of our trip, we felt very queer, and as he muttered some unintelligible warnings, we were excessively civil.



Engraved by J. H. L. L.

The Hamilton under Canvas.

We were fortunate in reaching this island : the sea was getting troublesome, the boat refused to steer by the oar, and she was fast filling ; one dash of spray, and our castles would be demolished ; any impudent wave might have given us a wetting which would have rendered that night comfortless. Every such incident as that before my eyes forcibly brings to my mind the utter helplessness of any of our unfortunate missing friends. One wetting, without the means which we possessed of drying themselves, would have destroyed their energies.

On the morning of the 4th September, the wind having lulled, we launched our boat, and pushed forward to avail ourselves of the yet open water. About noon we succeeded in effecting our disembarkation on the floe, and, after luncheon, recommenced floe-travelling. Shortly after we discovered the other party in-shore of us, under the land. At one of our halting-places, Commander Richards and Dr. Lyall came up with us, and having spared them part of our provisions, we resumed our progress, fully expecting that they would overtake us at our resting-place, for which object we shortened our march. They evidently made heavier work, and pitched one mile short of us.

*September 5.*—Having nothing further to detain us, we made the best of our way to Village Point, expecting to reach it this night ; but the half-frozen lanes, breaking repeatedly, considerably retarded us ; latterly however I contrived, on some occasions where it was very narrow, to bridge the passage by floating pieces of ice cast into the gap, and by a dexterous run over our floating bridge, got safely across before it became immersed. Owing to

such delays, we were compelled to encamp at evening, still distant from Village Point.

On the 6th we experienced a fine, sunny, lovely day, and pushed forward at 8.30; but, still retarded by the difficulties before alluded to, it was not until 8.30 P.M. that our advanced party, with the boat alone, reached the point. Having pitched the tent, a party was sent back to bring up the sledge. Unfortunately they had no officer to lead them,—got on to young ice,—broke in, and very nearly lost one of the crew; providentially it did not prove fatal to all, as, from their account of the matter, they acted very injudiciously, by simultaneously rushing to the edge of the broken ice, to save their ship-mate, instead of forming a connected chain to more solid ice. I almost instantly detected this misfortune, by noticing a single man on the outline of the snow, wringing his hands and throwing off his boots. Mr. Loney and others were despatched in aid, but noticing the remainder of the party showed their heads, I detained the cook, to prepare hot tea, etc., which the man who had been immersed very much needed,—reaching the tent, assisted by two others, in a very exhausted state. He was soon clad in dry clothes, a dose of hot tea and spirits administered, and packed in his bag; and by the time he got warm, a pint of hot chocolate and pemmican were ready, to complete him for his slumbers.

*September 7.*—The morning fine, but temperature 18·5°. Moved up to the crest of the peninsula, crossing recent tracks of bears, foxes, and deer; the latter either very numerous, or a pair had been making very extensive gambols, tearing up the grass, etc.

Commander Richards was noticed making good progress down a lane which had opened, and, by the time we were about to quit the Point, landed to receive his final orders. We then moved on to Pioneer Island, to complete our work, and thence to the ship; but experienced very difficult work in crossing the young ice, which threatened several times to press the boat by a *shear-like* movement, one sheet overlapping the other, but she escaped with one hole only in her bows, which I succeeded in stopping with my silk handkerchief. Unfortunately we did not reach the ship this night, but encamped on the floe, and fired a rocket almost over their heads, to warn them of our being near: this, however, was not seen.

In the morning we pushed forward, and soon joined, or came upon the track of, the other party; which, by not having any off-shore duty to execute, had avoided our difficulties. On opening Mount Beaufort, we noticed parties from the ship advancing to aid our men; but I believe that in the succeeding two hours, until we reached the ship, more damage and wettings were experienced than during our whole cruise. This resulted from the ice being much weaker in this direct line of greatest tidal force: it is the last portion frozen, and the earliest thawed. About 4.30 I re-entered my cabin, quite prepared to enjoy every comfort it might offer.

*Winter Operations.*—The winter had now been completely established, and the ‘Assistance’ and tender firmly frozen in. The customary preparations were made for housing in the ships; but as we considered the vessels too secure to require any extraordinary preparations, the



topgallantmasts were merely housed, and sails securely furled.

The absurd fittings of the Sylvester warming-apparatus, requiring the main hold to be nearly cleared before the fires could be lighted, compelled us to place the provisions, etc. on shore, as well as the greater part of our sails, boats, hawsers, etc. In all this I of course acquiesced, because it was the routine of my predecessors; but I must say that, for many reasons, I doubted the propriety. In the case of provision especially, I do not think that salt meat, subjected to excessively low temperature, is improved, but, on the contrary, vitiated; first, by the freezing process rupturing every vessel which before resisted the pickle; and, secondly, when thaw takes place, permitting that same pickle to take greater effect on the meat. It is very near akin to curing meat or Burnetizing timber by exhaustion.

The Magnetic Observatory, constructed from pieces of wreck saved in Melville Bay, I found well advanced, and near to it, beyond any possible influence of the iron employed, at a distance of twenty yards, one of the cutters was inverted, on supports, to afford a thermometer house. In this it was purposed to submit all the thermometers supplied, to direct exposure on  $180^{\circ}$ , or half the circle, facing the south (true). The Observatory was also fitted for two transits, which could be brought to act together, independently, or on certain stars at fixed altitudes. This was eventually given up, and the instruments removed; first, on account of the cold affecting the clamps, but principally from the breakage of two levels by meddlers, and, finally, some influence which I

fancied their steel fittings might have on the more important movements of the magnetometer.

The walrus, before mentioned at our departure on the north-east journey, floated or was driven by the pack near the ship, and its carcase secured by our sportsmen for the dogs. The body also of one of the others, shot at a later date, was rescued from a bear, who intended to devote it to his own use. Several bears had been shot during my absence, and their carcases also served to increase our supply of dogs' meat.

The winter operations being in formal progress, and not requiring the superintendence of heads of departments, my attention was directed to the conveyance across the channel, to Cape Lady Franklin and Barrow Island, of the necessary depôts for the spring travellers. This service was allotted to Commander Richards. A boat had been stripped of every useless encumbrance, and a sledge fitted to carry her. The depôt was packed in casks, reduced in the stave to the utmost lightness consistent with security, and the day appointed for this duty was the 14th September. Our hill-scouts however reported the ice to be loose, exhibiting suspicious streaks in all directions; in fact, the middle-channel ice was still in motion. I must say that I was not disappointed; there had been a manifest pressure from without that I must follow the motions of my predecessor, without adequate reason, and as he laid out his *caches* in autumn, I must, perforce, follow his example. I certainly was prepared to do so, where common sense pointed it out as practicable or urgent: neither of these were appreciable at present, and the risk to men, stores, and anxiety about

them, rendered its propriety very questionable. This fortunate consideration sealed its fate,—it was postponed. But in order to divert our minds to other more important matters, and to dispel some doubts in my own mind as to the complete search on the islands skirting the shore between this and Cape Becher, for traces of our missing ships, I determined on another small expedition, with the same force as before, intending to leave at Cape Becher a record of our late proceedings, and whereabouts, to guide Commander Pullen in his visit in May.

Having delayed until after the spring-tide of the equinox,—which period I calculated, from the record of temperatures on preceding occasions, that from  $6^{\circ}$  to  $10^{\circ}$  were the best freezing-points for the sea, when we might expect the ice would again be compact enough for travelling,—we left the ship on the morning of the 21st September, in the teeth of a southerly wind and the snow in our faces, with thermometer at  $10^{\circ}$ . I was persuaded to leave the ‘Hamilton’ behind, as the small pack-ice might destroy her; but I had reason to regret it.

The expedition consisted of the same sledges and crews as before, but without the surgeon and Mr. Grove, and we had only fourteen days’ provision. Our journey lay for twelve miles, at least, over the smooth floes of Northumberland Sound, through its neck (or channel whenever thaws permit) into Baring Bay. But as this was also a service of survey, we had frequently to stop, ascend heights, and construct cairns: these matters will not much interest the general reader—I shall therefore skim lightly over the surface. Our first halt for the night

was under the slope of a long tongue from Mount Percy, forming the channel between that island and the main.

The next morning we moved on to Glacier Bluff, and Commander Richards ascended the mountain which caps it (named *Blanche*, after one of the Banner ladies), whilst we were engaged constructing a cairn beneath. One of the crew, noticing a bright streak on one of the stones struck by the pickaxe, exclaimed, "Gold, Sir!" As the rock was a heavy piece of quartz, I stooped to inspect it; but thinking it to be merely a vein of iron pyrites, ordered it to remain undisturbed, as I was then using the instrument, and ultimately a piece was broken off for future examination. The large piece was also inserted in the pile, with a case of pemmican, to await our return. There was little fear of desertion to these diggings! However, I kept the development of our riches for our return. On this expedition I also brought the dog-sledge and three of our Cape York dogs, which carried me and about forty pounds' weight of instruments very cleverly. From the summit of Mount *Blanche*—the highest in this region—Commander Richards had a good view, reporting "the ice close and apparently firm."

This Point received the name of Pemmican Station, and is the commanding jutting tongue of the northern narrows, or the pre-supposed neck of what we had believed to be Percy Peninsula, but now clearly defined as a very narrow boat-channel.

We pitched our tent for the night on the outer head of this entrance or bight of Baring Straits (?), giving it the name of Point Repose. The terraced nature of the land here afforded good shelter, on fine gravel, from

easterly winds ; and beneath, in *warmer times*, a very snug little yacht harbour might be available within a tongue of projecting shingle. But the ice on which we were now to try our chance was most unpromising. The 'Hamilton' could only have been conveyed on her own carriage ; indeed, would have been deposited here *pro tem*.

On the morning of the 23rd we advanced towards the outer island, the western extreme of which forms Point Sophia of the old chart. The travelling was difficult, by reason principally of newly broken young ice, of every imaginable angle, cemented together by the late frosts. Over this, as it jarred my limbs walking, I tried the dog-sledge, which answered admirably on the smooth ice ; but meeting with an awkward lump, I experienced a most unpleasant summerset, inflicting rather a severe concussion to my head and neck, which had been injured on the 1st of October, 1850, by a fall. As this accident occurred to the opposite side, it tended to cure it ; but the remedy would not, I suspect, be prescribed, even in these days of innovation. (I have since perfectly recovered.)

We reached the island in safety, landed, and erected our cairn. I found the rock to be composed of a dullish dirty brown, sometimes variegated, swinestone, probably susceptible of polish ; it frequently exhibited veins or layers of chert, the sharp fragments of which rendered it very unpleasant to travel over. As this island was one of the dreams of Penny, I retained Point Sophia, and added Cracroft Island, in compliment to his enterprising spirit. On my descent, I found some of the party annoying a few ducks in a pool of water ; but as they could

neither kill, nor get them if killed, I thought we might stand a better chance hereafter by not now coming to hostilities.

Our party was now divided, Commander Richards being directed to seek the outer point of the next large island, and shaping my own course to its inner point, hoping thereby to save time and labour. Our sledge broke in and wetted some articles, but we reached our destination without further accident. The latter part of the journey was attended with considerable anxiety, owing to the rotten state of the ice. Commander Richards had a cold bath; and even when we had reached within a few yards of our destination, landing was doubtful, and only effected under great caution, taking some of the light weights first, over the new bay ice, by the dog-sledge. Having encamped, I ascended the highest hill, which commanded a great range, and obtained my observations. The temperature fell to  $8^{\circ}$ , and our prospects were at present propitious, with every probability of the ice strengthening. It is, perhaps, venturing almost too much upon English ideas of temperature, but it is no more strange than true, that, with this temperature,  $24^{\circ}$  below the freezing-point, some of us were wishing it, at least for a period, lower! Our presumption, possibly, was to be punished.

Before morning on the 24th September we had it at  $20^{\circ}$ , with a strong breeze from east, and much snow-drift. I began to feel great anxiety about Commander Richards and his party, having given him instructions to proceed on to the projecting point of the next island, if his work was executed in time. Mr. Loney was de-

spatched to seek him, and luckily finding him at our opposite point, delivered my instructions to rejoin me with all despatch. This indeed was imperative, as he was on the most exposed part of the island, and was but too glad to reach our more sheltered position. They encamped beside us near noon.

The result of this gale, with temperature increasing, was obvious. The ice gradually broke up, and drifted away piece by piece; and "short commons," if not worse, was to me apparent. I did not hesitate on petty measures, but instantly ordered the reduction to half allowance, and our attention was further directed to the best mode of relief. My own plans had been already formed; I therefore merely dropped the hint that I intended to build a boat,—leaving any brighter intellect to "furnish plans and estimates."

Unless calm prevailed at least for three days, aided by low temperatures, we had no hope of escape, even to the mainland! It is true that the entire ice had not yet broken up, but it would not bear our weight, even across to the southern island.

*September 25, Saturday.*—The wind abated; temperature  $11^{\circ}$  at noon. The sergeant wounded a walrus, but it was beyond our reach; and several eider-ducks were swimming in the pools, but as they could not be obtained, even if killed, orders were issued to reserve the ammunition. In the evening the wind shifted to the northward, and the temperature fell to  $8^{\circ}$ . The slumbers of those who slept were probably pleasanter, but prayers for *lower* temperature, or *intense cold*, possibly had not before been so devoutly offered (?).

*September 26.*—This day was calm and serene, but the sun's bright rays had little charm for us. I strolled to the eastern point, and found the ice strong enough to bear three men, who walked across to the southern island. But on their return, their report proved but a damper to our hopes: the channel between it and the main was "open water." The evening was beautifully clear and serene, but the wind again drew round to east, and the temperature rose to  $13^{\circ}$ ,—sure indication of further bad weather. About sunset I shot a walrus, which remained on the floe-piece probably mortally wounded, but we were unable to reach it. At dark, about eight, and again at nine, rockets were sent up, to indicate to the ship our position and want of assistance. From the hill-summit I thought I could see Mount Beaufort, or the land immediately behind her; but our hopes were vain—our eyes were strained to no purpose—no reply! Once I was mistaken by the sudden unveiling of Venus, just at the spot where I expected to discover the signal or burst of the rocket.

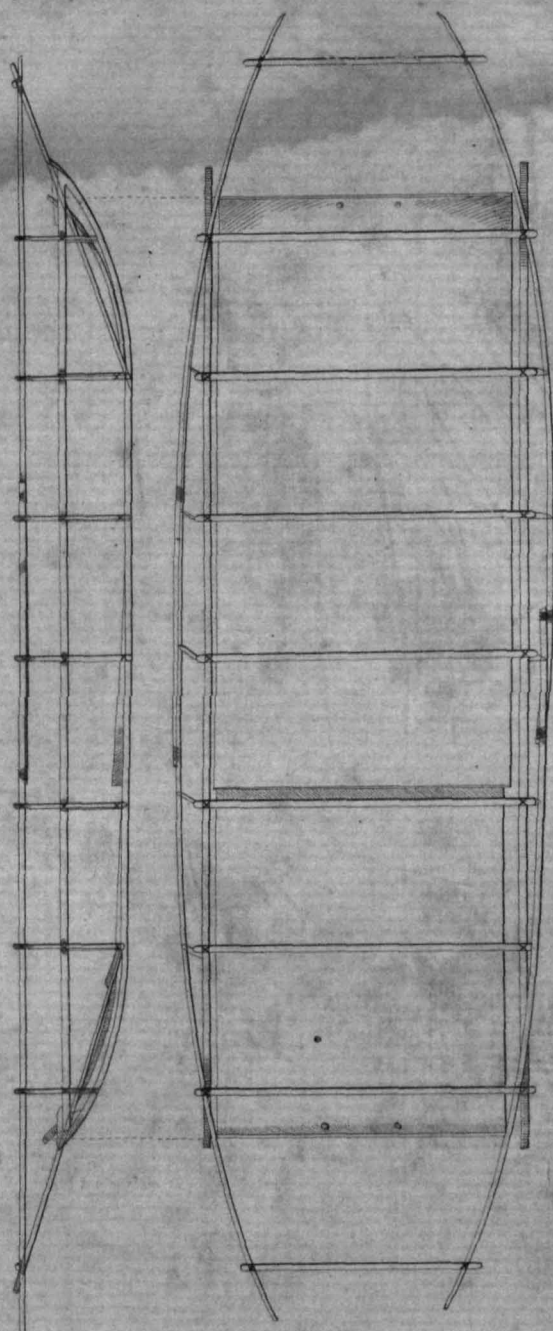
Early on Monday, the 27th, the wind increased, with snow, sleet, etc.; ice breaking up, and sweeping past us. The shout of "A walrus close to, and drifting in-shore," caused no little excitement, particularly amongst my own energetic men. Bond, the ice-quartermaster, aided by another, put off on a piece of *loose ice*, with a line fast to the shore, and succeeded in hooking it with a boat-hook, by which means he drew it to the shore, where it was soon secured. No sooner was this done than some few more oozed out of their bags. But this did not suit. "All hands secure walrus!" brought each



man to his duty, and the agreeable monster was secured, cut up, and deposited at the tents—a most acceptable boon in every way. It not only secured our *existence* until the ice re-formed, but afforded plenty of that next blessing to food, the means of cooking and obtaining water—*fuel*. Now might be heard the discussion of who killed it: of this I cared not,—we caught it, and it was yet warm, and good food. It had been shot in the throat, a wound generally fatal, and causing them to seek the floe to die. Another gratifying feeling was also afforded me—that our dogs would find sustenance; for the loss of them, by starvation or compulsion to kill, would have distressed me considerably, next indeed to personal misfortune.

It continued to blow hard, with sleet, rendering our labours very harassing; but activity and employment for mind as well as body must be found. I had great difficulty to contend with. Snow-walls were ordered to be built round our encampment; and, as it occurred to me that this would prove a convenient moment for practising our men in house-building, I superintended personally, as chief mason, in this practice.

On Tuesday, the 28th, the wind shifting more southerly, and no “plans or estimates” for the boat having been sent in, I proceeded to work in my own way; and I must say, although the others volunteered, when she was constructed, to command her, that Mr. Loney did so before I commenced, in the full confidence of success attending. However, volunteers do not guide me; I select those to whom I intend to entrust the duty, and Commander Richards would have been selected.



Taking one runner-sledge as my framework for an *oomiak*, and two flat sledges for the ends, it will clearly be seen that the rudiments were in a state for completion ; ribs were then brought up at each runner-bearer, rising about one foot above the sledge ; and to this, oomiak-fashion, I formed my gunwale by four light spars, two of tough China mahogany, and two bamboos used for yards, for sledge sails : by a little straining these were brought nearly together at each end, and cross-pieces lashed. It was, indeed, to those versed in Esquimaux boat-building, the *oomiak*, or woman's boat. It only remained to cover this properly ; this was effected by the canvas-bottom cloths and Mackintoshes of the tents, so as to form two layers.

The object was, to convey to the main a party with one day's provision and their sleeping-bags, who would walk on to the ship and forward to us in due time the necessary relief. As the three leading officers of the vessels and twenty-seven persons were thus cut off, I determined to remain alone with my own men and Mr. Loney, sending Commander Richards, Lieutenant Osborn, and any others who could not eat walrus, by the boat.

He was to have started early the next morning, and his orders were already written ; but as the equinoctial spring-tide here would not occur before 2.30 on Thursday, I determined to defer it until that event had passed. To oppose the antipathies of any set of men, is absurd,—is making them of too much importance. I dislike pemmican,—never would touch it if I could avoid it, because I consider that it is, to me, unwholesome food ; many of my crew also refused it for some time : I con-

tinued to eat it for example sake. Others also dislike particular birds. But my principle invariably is, to endeavour to make anything fit for food palatable, and, setting aside my inclinations, to make it suit my purpose. I would not prefer whale or walrus flesh to the *best beefsteak*, but I would most assuredly prefer the best whale or walrus to many meats *termed beef*. Of this walrus I not only partook heartily, but I think that I overcame the objection of many, and that thereby they gained a wholesome and nourishing food, instead of semi-starvation. I had almost forgotten to mention that, in order to prove our boat, I started with four hands in chase of some ducks in the open water, killed four, and a grey doveky, which were divided as four would be by three, the lawyer taking the remainder for his pains; they afforded, with walrus and bacon, a very acceptable meal.

On the 29th we experienced strong gales from east-south-east, which caused the ice to break up rapidly and drift off. The tide at noon today rose beyond its ordinary level, carrying off all the heavy grounded masses of ice, and denuding the shores of the island to the gravel; an occurrence of sea-washed beach not witnessed by us since the 28th of August.

On the 30th, the wind having changed to the south-west during the night, the loose ice packed in upon us, and toward the evening it moderated greatly, leaving a fine, clear night, with a temperature of  $22^{\circ}$ , but much too warm for our excited feelings. At nine I made the preconcerted signal to the ship for assistance, viz. two rockets. Venus showing between the passing clouds at



THE BOSTON MUSEUM

Vincent Brooks Lith.

Duck Shooting in Omiak.

the very spot where our attention was directed, afforded the suggestion that she accepted the compliment. But nothing of this nature from the ship was noticed,—a matter becoming about this moment painfully exciting.

I had omitted, amongst such serious considerations, to notice the launch of our new vessel. It is usual in lower latitudes, or in the regions of the grape (or even of malt), to christen such bantlings with the customary honours; but on the occasion of our launch there was nothing at hand but snowballs, and in sober sulkiness she took the water under the appellation of 'The Eider Duck.'

Commander Richards became very anxious to make the attempt to cross; but with the rough packed ice this was not safe. Indeed I had determined not to risk our all on any ill-considered experiments.

On Sunday, the 3rd of October, was our day of rest. Many solicitations to cross were repeated; but I had no confidence in anything around me, and I felt that when I ceased to command, then the spirits of my best men would flag, and that where difficulty and danger was to be braved it was my duty to lead. Besides, some undefinable feeling prompted me to delay: who shall attempt to unravel this curious or rather mysterious habit which has followed my fortunes? I was firm; providentially, I must add, I deferred until the morrow.

On the 4th the temperatures fell successively from 16° to 4°; but the ice, although frozen in many parts, still exhibited very suspicious cracks. Unaccountably I had now arrived at my determination,—why or wherefore, to myself is inexplicable; moreover, it was still more



incomprehensible that the advocates for crossing yesterday were now *adverse*! But that mattered not; I felt quite assured of the practicability, if I could cross the band of smooth ice intervening between us and the pack, but that would not bear the weight even of one man!

The order "Down tents!" was the first indication of my resolve. The ice was broken, and a channel for the 'Eider Duck' cut by spades; it closed, was cut again, and eventually, not without much trouble, all our effects were ferried by our valuable oomiak to the solid ice. The 'Eider Duck' underwent immediate transformation, worthy of any pantomime, her various parts resuming their duties in the sledge equipment. Moving forward in right earnest towards the main, we reached it, and lunched on the "land-floe" at noon. Every one has his peculiar feelings: we had crossed many cracks, escaped many serious difficulties, solely by dint of that activity which results from the innate fear of losing all. We thus quitted "Hungry Island,"—a name which I do not think even Penny will dispute.

I must believe that every individual had his own earnest feelings as each touched the safe shore, or land-ice. For myself, I felt that the meal was more solemn than usual. Such sensations are better left undescribed, for neither the feelings nor the pen can execute their duty.

Our actual difficulties were yet to be encountered, but we knew them not. Several wettings were experienced, and at nightfall, on reaching our most critical position, we had not found safe landing for the sledges, which still lagged behind. Fortunately I was in advance with my dog-sledge, and, trusting to the instinct of the ani-

mals, which refuse unsafe ice, they selected a safe passage; I landed, and, establishing the ferry, sent the dogs back with the driver to convey our equipment by light loads on this sledge. Frequent trips increased confidence; for several had fallen in and got wet, and our sleeping-bags unfortunately shared the same fate, my own, I believe, amongst the number. Eventually all were safely landed, and our tents pitched at *Cape Repose*. Before ten, I think, thanks to an overruling Providence, all were safely landed; for I am convinced that no security could have been found that night on the ice, the temperature having again risen to 23°. Many indeed had wet beds, but with our warm suppers this was now but a trifle.

On the morning of the 5th I despatched Commander Richards with the other sledges to the ship, with two days' provision, reserving the remainder to complete our survey. On examining our old quarters, where we had deposited the dogs' food, we found that it had been robbed by bears; but the dogs having devoured their full travelling allowance of walrus at Hungry Island, this was less important. Our subsequent motions being but matters of survey, I shall pass them rapidly. In our advance to the ship, we called at our North California for our pemmican, and to seek any further specimens of the precious metals which might turn up. In the latter search I was unsuccessful. The temperature, having fallen to 4°, was in itself sufficient to check any ardent pursuit after metals; they bite as severely in cold weather as gold does in California or Australia. About noon we met a relief party from the ship, under



Mr. Herbert, mate, and Mr. Ricards, assistant-surgeon. Moving along the coast, we slept in the Sound; and at eight the following morning, starting for the ship with the dog-sledge, were again met by Messrs. Groves and Pym, who most kindly and charitably shared with us a very acceptable luncheon of sandwiches and sherry. About eleven we reached the ship. Never did I enter my cabin with more unfeigned thankfulness; not for myself alone, but for the safety of the fine set of men who had shared our misfortune, and whom this particular branch of the Expedition could so ill afford to lose.

## CHAPTER VI.

The 'Assistance.'—Winter Fittings.—Moisture between Decks.—Meteorological Investigations.—Tide Gauge.—Anatomical Shrimps.—Washhouse.—Thoughts on Arctic Fittings.—Terraced Levels.—Effects of Tidal Action.—Tidal Fissures.—Experiments on Ice.—Last View of the Sun.—Her Majesty's Arctic Theatre.—A Gale.—The Observatory.—A Snow-storm.

OUR own miseries terminated, turn we now to the good ship 'Assistance.' As I had anticipated, the ship had not been a whit too secure, and the absence of our party might have entailed censure on me, had any serious mischief occurred. I was informed that the ice had broken up to within a hundred yards of her bow; and that, in the expectation of its proceeding further, warps had been carried to the main floe to secure her. Had the ice broken up here, as it did at Hungry Island, there can be no doubt that she would have been driven on shore; but the want of tide prevented this.\* As it was, the ice had cleared out up to the southern point of the Sound, and a sporting party had visited it in one of the boats, but without any view of relieving our necessities.

Any of the above misfortunes, viewed singly, might be deemed trivial; but the loss of the principal petty

officers and myself might have very much\* changed the results of this Expedition.

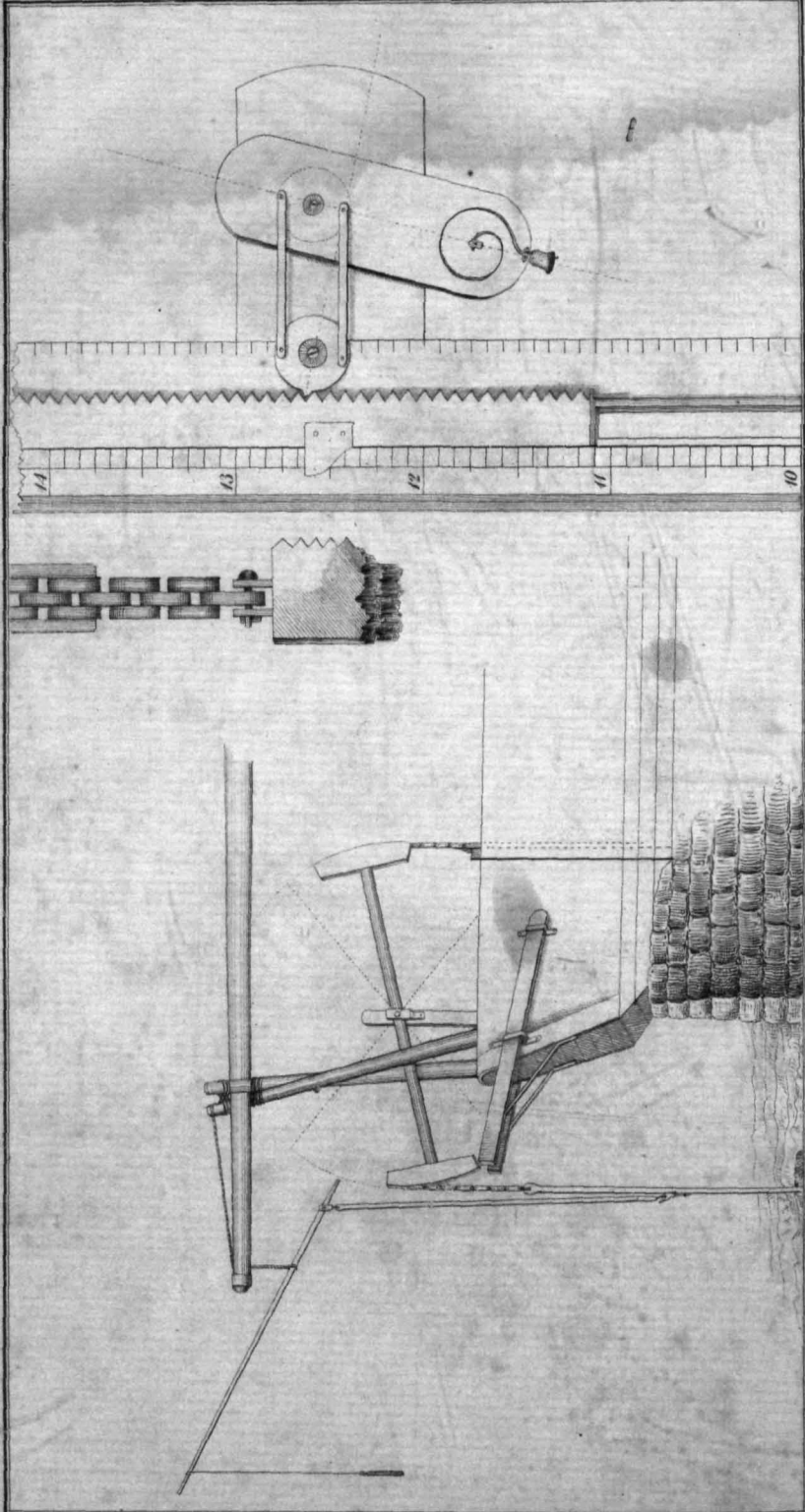
Our attention must now naturally revert to the completion of our winter arrangements. The temperature had not yet afforded sufficient proof of the necessity of covering our decks with snow, or building walls round the ship: of the propriety of both these matters I entertained my doubts, and wished further experience before I committed myself. Of the advantage to be derived from a good snow-wall, distant about a foot from the sides, and suffered to fill in with light snow, I had little doubt; but the plastering on a non-conductor a solid body of fine ice, such as the snow-embankment arrives at eventually, could not prove of much importance. The matters connected with winter fitting have never met with a due amount of deliberation in England, or I feel well satisfied that much better arrangements for securing the health, as well as comfort of the crew, could be attained by more simple as well as efficacious means than those generally adopted. But these matters should have had full consideration in England, and the means for carrying them out provided. Beside this, there is a kind of awkward responsibility attending innovations of this nature, which, unless founded on something stronger than mere authority, would induce restless writers to attribute every mischief and misery, however remote from common sense, to the innovator. Under such reasoning, the only alternative is—"If they were miserable and sickly before, Captain —— found he could not remedy it; and therefore, however comfortable the cabins of the captain and officers may be, matters must be conducted

as they were by their predecessors." Now, I am firmly of opinion that Sir John Ross was right as to his system of ventilation, but carried it on upon such a reduced scale that it could not act sufficiently. And I feel fully satisfied that the evil in these vessels might be remedied by hatching the present decks, and in winter removing the crews six feet lower. Such a disposition would avoid the immediate condensation of breath on the lower deck beams, resulting in a constant dripping on the lower deck, and, at night, soaking the bed of every man sleeping there! Undue wet and pervading moisture, and that too charged with the customary constituents of the breath of men, is but too well known to be the predisposing cause of scurvy; and yet, knowing all this, will it be credited, in the last portion of the nineteenth century, that horse-sponges are supplied to wipe off this moisture?—a thing only to be discovered in October, when these drippings commence, and when the daily doleful report of the surgeon is, "She is so very wet between decks, Sir." And, as if this should not be a sufficient warning, I find that vent-holes, to let down cold air, to increase and keep up this condensation, are actually opened, when the heat below cannot be maintained at  $40^{\circ}$ , and was frequently, even in my cabin with a stove, below  $20^{\circ}$ .

This season may pass, and, I sincerely trust, without any material mischief; but should it be our lot to pass another here, I have fully made up my mind that, having given the plans of my predecessors a fair trial, a very different system will be enforced, for the future comfort of all.

As Lieutenant Chcyne had brought with him—supplied, I understood, chiefly from Kew—some very delicate electrometers, I determined that he should have every assistance the service admitted for attending to the influence which the aurora might exercise. To ensure this, he was excused from other duties, and directed to attend to the registry of thermometers; and as it would be inconvenient to send officers aloft to register thermometers, I adapted a balance-pole of twenty-eight feet in length, so that it could be easily pulled down; to this a minimum thermometer was attached, to be read at eight A.M., at noon, and at four P.M. Another plain thermometer was also fixed at twenty feet, and one of the standards was placed on pikes at four feet above the earth, near the Observatory, independent of the general board, containing fifteen standard thermometers from Kew and Greenwich, under the boat. The pike-thermometer was registered hourly with the magnetometer. A very delicate electrometer was also placed in the Observatory, but was broken not many hours after by the prying curiosity of some meddler.

Before the 8th of October the general observations on the magnetometer were supposed to commence; at all events, the registry dates from noon of that day. The officers who volunteered for that duty were Lieutenant May, Mr. Herbert, Mr. Grove, Mr. Pym, mates, and Messrs. Harwood and Webb, engineers, of the 'Pioneer.' The observations were continued hourly, both night and day, throughout the winter, up to July. Various other observations were carried on by myself, at the instance of Mr. Glaisher, of the Royal Observatory, Greenwich,



Alarm Tide Gauge

Patented by James B. Smith.

who supplied, by authority of the Admiralty, a most valuable suite of thermometers and other instruments, and spared no exertion to afford valuable information and suggestions for their management.

As the decrease of temperature would soon prevent the accurate registry of the tides by our tide-pole on shore, I made some experiments on the true rise and fall of the ship, now firmly frozen into the floe, so as to guide me in selecting her as the index of floatation, or tidal level. To determine this truly, I placed the theodolite so that the level wire should coincide with a zero mark on a batten nailed on the ship's side. This instrument being fixed, the readings at each inch, above or below, being compared with the tide-pole already established near the shore, and found to be nearly identical—in fact, those indicated by the ship being more decidedly even—I had no further hesitation in adopting her as my intended gauge. The *modus operandi* instantly occurred to me, and I at once determined to make it a plaything or complete piece of machinery. This required a little labour in my cabin, but it was soon constructed, and told its own tale, marking the *inches* of rise or fall by agitating a bell. As it will be better understood by a diagram, I must refer my readers to it for explanation.

All seamen will understand the matter without difficulty, but I fear that I may not be so fortunate with civilians. It must however be apparent to all, that by affixing a large as well as heavy weight to a rope, and sinking it to the bottom, the weight, provided the bottom be firm or gravelly, would gradually acquire a steady position by agitation. This done (at *a*) below water, and

previously well secured, a good spar was lashed to this rope, and a fair strain kept on it for some days. The rope thus became frozen like a solid wire, the upper end of this pole was connected by an iron clasp, with a flat moulding or clock-chain formed of oak and copper. To ensure its being at all times perpendicular, as in pump-work in mines, etc., the radius pieces *b b* were attached with channels for the chain to work in. This balance-beam acted in a metal-formed crutch, with pin, and was attached at the inner end by a similar chain to the gauge-rod, which alone was sufficiently ballasted to preserve a steady and even strain for the descent of the gauge. Externally, to keep the pole steady to its work and at a constant tension, an additional lever-balance was employed, with a strain equal to 56 lbs. It is clear, then, that the bottom weight being too heavy to be moved by any ordinary force, that the rise of the ice, or ship, must draw up the index-bar; and, being of itself considerably heavier than the outer pole, etc., the descent of the ship must cause it to fall. All this being covered by the housing in-board, was protected from snow or any other inconvenience, and the gauge occupied on the quarter-deck the position of the wheel—unshipped for the winter. Beside it, was a temporary table and a lantern, illuminating the graduation, and enabling the person watching to register it. But our mode of registry, by equal altitudes, requiring the time at each inch of rise or fall, a ratchet, or notched edge, was cut on one side of the movable slide, which acting on a one-toothed wheel, caused it to draw from its perpendicular a plane board, at the lower end of which a



spring-bell was attached. At the instant this tooth became released, at the passage of the inch division, the board, ballasted with the bell, in its attempt to recover a vertical position, vibrated over the described arc, and caused the alarum to warn the observer to note time. At one period I contemplated leading it by a fine brass rod into my cabin, but I soon found I had quite enough of other matter to occupy my attention. After this had acted satisfactorily for some days, in comparison with the gauge on shore, the latter was removed, the ice forming too fast about it to be of further use.

The gauge in the diagram is ascending past twelve feet seven inches; at twelve feet eight inches the bell, being drawn up to the side of the gauge-frame, will vibrate, on its release, nearly to the same distance that it was drawn out of the perpendicular, the tooth of the wheel being so calculated as to pass freely at the instant of release at each inch, and is not taken up again until it has moved over a quarter of an inch. • This alarum eventually became troublesome, and, finding the attention of the observer could be ensured, it was latterly muffled.

Our specimen-net was sent down, charged with the heads of bears and other animals, to be cleaned by the shrimps, as they are termed, but a species of *Oniscus* or sea-louse. Two eels\* were taken, which rather discountenances the idea of their not bearing cold; I am not quite sure, however, that they were truly eels. The take of these crustacea was so plentiful, and they were so large, that some of our gourmands attempted to substitute

\* This question not decided.

them for shrimps; and they possibly answered quite as well, if the shells at least are eaten in both cases: *De gustibus*, etc.

The washhouse for the crew was constructed on shore, composed of blocks of snow, now sufficiently frozen to be easily handled, and cut by snow-knives into any required forms, much resembling the working of very soft Gloucestershire oolite. Unfortunately our Surveyor-General of Works had miscalculated his ground; and after the walls were up, the rise and fall of tide caused certain ominous gapings in the gables, which was but partially remedied by disconnecting the land-floe by a ditch. However, this not being deemed satisfactory, a new inner wall was constructed, making another parallel room or double house. This is another feature of Arctic arrangement which does not suit my views of economy of fuel, of comfort, or sound judgment. First, the expenditure of coal is wasted *out of* the ship; next, the men are sent to light a fire with wood, etc., in a cold house, and expend half the fuel before the copper is warmed. The temperature there is too cold, especially when the thermometer falls to 62°, for such operations as washing; and before the clothes can be wrung properly, they are a mass of ice, and the shivering unfortunates are seen, with their clothes half washed and ice-bound, wending their way across the floe to the ship—for what?—to carry *below into the main hold*, beside the Sylvester apparatus, these masses of ice, to be converted into vapour, and diffused between decks. Verily, there are too many ways of inviting sickness without this!—but “it was done before,” is the reply.

I purposely introduce these remarks, not in any manner as a reflection on my predecessors, who, I am convinced, were quite as much alive as myself to every precaution for the preservation of the health and comfort of their men, but to show what a very difficult position a man of common sense is placed in, when he accepts such a command. He can hardly be deemed a free agent; he is pestered by assertions that such was the course Captain H. pursued; and if he either doubts, opposes, or varies from these self-constituted Mentors, he must look for sulkiness, opposition, and the petty mutiny of petty minds. It is this underhand tyranny attempted on the chief, that has made so many officers declare "that no inducement would bring them here again." It is the duty of every man who may command such service to institute a full and complete inquiry into all its workings, and, if able, to afford such information as may be of service to his successors.

But such matters are not merely to be confined to Arctic vessels. The same principles, narrowly watched, are involved in every ship and every private dwelling; it is a sanitary question, and must stand on its philosophical merits alone. I do not, at this late period, begin my reflections on these matters; I carried them out successfully between 1830 and 1833, three years and a half, on the coast of Africa, without the loss of a man, and have been generally successful in other ships. Another season may afford different results; I will then—stubbornly, no doubt some will say—put in practice my own views. Doubtless this work may contain many theories not at all in accordance with the views entertained by

those luxuriating in warm studies in  $52^{\circ}$  N., with a temperature of  $76^{\circ}$ ; but it is my business to present facts, and very stubborn facts too, with the apparent causes in operation to account for them.

The washhouse brings me back to the fact of its rent at the gables, the sides being parallel to the beach-line. One fact is worth a thousand theories, and such a fact, too strongly pressed on my mind, placed me in great doubt as to the fate of my Observatory,—that is, should the ice march up-hill, and imperceptibly slide it over its gravelly foundation, or disturb its level in the smallest degree perceptible.

In order perfectly to understand my fears, I may as well exhibit my view of the causes which, throughout the Arctic seas, in perfectly sheltered as well as exposed beaches, produce the lower terraced levels at, and immediately above, the flow of the sea. In a pool, land-locked, possibly never sea-washed, by reason of a very narrow belt of water showing only in summer at high water between it and the then floating ice, it is evident no such mode of throwing up gravel in complete tidal strata could be effected, nor even in exposed beaches has the sea any such action, for similar reasons, viz. want of water in sufficient volume, or range, to raise these tidal or beach lines. When I first entered these regions, this matter engaged my attention from the summit of Cape Spencer to the beach. The only rational mode then appeared to be the melting of snows,—the formation of successive terraces, confining the water, and its successive similar steps, until it reached the sea. Since then I have thought more, and seen part of the lower operation in action;

and I have rejected all the former conclusions, because these are *not* invariably, even in winter, "snow-clad" regions! The discussion of the causes operating on upper levels must be referred to other authorities and forces, and, as far as I know, must ever remain theoretical; no proof can exist.

The first cause is plainly illustrated by pressing a flat board, having a smooth rectangular edge, against a slight ridge of sand on a table: this will produce the first ridge, or terrace. Possibly the inner edge of the board may rise, and slide up the sand some inches: comparing great things with small, this is Nature's first movement here. The fine bay ice, say six inches thick, forced very slowly by millions of tons weight and impelled by wind or tide, presses on some beach, a noise like that of a rushing wind is instantly heard, and ice is noticed travelling up the beach, forcing before it all the light gravel. This of course *planes* the subjacent matter. It has possibly removed one great shaving, and the upper abutting gravel resists but for an instant,—it buckles, breaks, and turns up, forcing layer after layer, and "piling" the beach until the motive power is arrested, possibly miles distant! This is Act I.; it may be repeated, and the successive forces, possibly with planes of four feet in thickness, do their work with unerring certainty, until arrested by the general freezing of such a mass so accumulated on the shore as will compel the outer ice to buckle, break, and pile, overwhelming the strongest works of man. These are plain, unmistakable facts. The spring thaws reveal these facts—these apparently "tide terraces," and leave new comers to dream of their origin.

Such an operation of Nature at the beach, and particularly in our situation, would inevitably destroy the Observatory, perhaps leave no hope of saving the instruments; but this I did not anticipate now. The bay or land ice had formed, and the planes for this season would not in all probability be disturbed to any extent; but it was to be feared. Another cause in daily operation, and acting to the same end, was in quiet, irresistible action: this was the tide. If the elder Perkins is alive, he may remember explaining to me his earliest invention, the cotton-pressing machine; I think it may still be seen at the Polytechnic Institution. Such is our tidal ice-power, the "taking up wedges" being the snow-drift, etc., which fills in as the tide opens the various fissures following the contour of the coast margin.

Let it be conceded that a great and continuous space at high water is frozen, and that the established winter ice, grounding daily in sixteen feet water, causes gaps varying from one foot to six inches, in contour lines corresponding to the depths surrounding the land. It must be evident that these gaps, if filled up, must at each returning high water (twice daily) force the in-shore ice up the inclined plane equal in amount to the interposed compressed matter. This we found it did, until the heavy ice formed, to guard the in-shore line which it had taken up. Then these gaps presented another feature: they turned up, or rose above their in-shore grounded pieces, causing, wherever resistance offered, unpleasant barriers. The upper crack of the ice-line ceased about six feet from the Observatory steps. I cannot state precisely how many yards it was from high-water line

when I selected the position, but it certainly was six feet above the level of the highest tide.

H W

L W

Supposing the upper line to represent high water ; the second to indicate the thickness of ice ; next, the centre line to indicate low water, and the third its under surface of ice ; the breaks on the shore would indicate the natural causes operating to crack ; the upper dots, the early stealthy movements up-hill, as evident in tidal pools.

The preceding matter may be dry, but I am not aware that any previous navigator has attempted to explain the causes in action ; and if I merely succeed in drawing the attention of enlightened men,—not of those irritated by the truths which demolish their theories,—I am fully repaid. I cannot say, *Ex fumo dare lucem* ; but they may blow the smoke from our eyes by enlarged discussion.

That the floe had moved *in-shore* I had absolute proof before I finally removed the tide-pole ; when it was placed, it had an inclination *seaward*, and the pole was at the back of the hole ; when removed, it had about the same inclination *in-shore*, and we had to cut away the outside part of the floe : this would not afford at that spot, afloat, more than one foot. One very curious fact was the depth to which we had to dig to get out the triangle legs,—three feet perpendicular. The question then arose, where does the increment take place in freezing ? I am inclined to think, in the early season, both

ways,—upwards by evaporation, and below by the customary process of freezing; but here again we have a very stubborn fact to contend with. By all the experiments made, until I became sick of reported breakages of thermometers, I could not detect a well-attested difference between the temperature at the bottom, in seven fathoms, and that at the surface. If heat ascends, and the cold will not descend through ice below  $32^{\circ}$ , the sea preserving  $29^{\circ}$  to  $29.5^{\circ}$ , why does it not freeze to the bottom? and why does it accumulate on ice freezing at  $28^{\circ}$ , but only at  $32^{\circ}$  when frozen? Our experiments have not resolved this difficulty,—every trial has been marred by some mistake.

*Cubes of Ice.*—Experiments were now commenced on cubes of sea-ice, and, as the thickness increased, they were extended to the mean upper, mean centre, and mean lower masses. Nor did it cease there. These cubes, duly numbered, were exposed to the upper-deck temperature during winter, and weighed at particular seasons to determine their changes by exposure, evaporation, etc. The water resulting from thawing these respective divisions of the ice was bottled, as well as that at the surface, for future examination. The atmospheric air, in well-dried, stoppered bottles, and covered with leather and bladder, was also obtained.

On the 25th of October, a cubic structure was formed with snow bricks, of twelve feet in length, ten wide, and six high, the crevices being sealed with snow and water. In this mass five Six's self-registering thermometers were inserted, equidistant in height as well as lateral distance from the air, as follows:—



No. 1. 5 feet deep and 5 from the side.

2.	4	„	4	„
3.	3	„	3	„
4.	2	„	2	„
5.	1	„	1	„

A hole had also been cut into the rocky soil, in which a wooden tube four feet in length was inserted, in order to determine the maxima and minima during the winter season. But, to my surprise, I found that it had been registered with the other thermometers daily. However, it was finally sealed and secured from further molestation on the 28th of November.

On the 27th of October, the sun should have been in bed; however, I could not resist “one last, fond look,” and as he displayed his countenance for the last time, his altitude was observed, giving about  $31^{\circ} 31' 5''$  refraction.

Our winter had now commenced: the thought brought with it many last expressions on quitting home, connected with the return of that luminary, not easily forgotten! This is not a region to chase away such intrusive reflections; but they only nerve us, perhaps, in remembrance of the many mottoes, to persevere, to do, and possibly, to deserve.

Dates will now pass rapidly, although our time will be completely engrossed by matters too tedious to detail and too heavy for the general reader. I shall therefore go back to the before-mentioned washhouse, where I found that Commander Richards held some mysterious meetings, which seduced from their allegiance several subjects of my Observatory. It was too cold and dreary a spot for me to pry into. At length however the murder came out: he had become the Sole Lessee and Director of Her Majesty's Theatre Royal, and had there

established his *green* (?) room. In due time the clattering of carpenters and other *employés* rushing to and fro was heard; and, near the commencement of November, the following play-bill, printed at the Royal Press, on satin, was placed on my table, ordered to lie there, passed three readings, and received due assent, the Lord Chamberlain having no objections thereto.



COMMANDER G. H. RICHARDS, of the ROYAL ARCTIC NAVY, (*the Sole Lessee and Manager,*) has the honour to acquaint the Nobility and Gentry of North Cornwall that he has, at a considerable personal sacrifice, and with the *almost* sole view of contributing to their entertainment, engaged a highly select and talented *CORPS DRAMATIQUE*, and has entirely rebuilt and re-embellished the Queen's Arctic Theatre,

and that on the *Ninth of November*, being the birthday of

HIS ROYAL HIGHNESS THE PRINCE OF WALES,

DUKE OF CORNWALL AND EARL OF DUBLIN,

will be performed, for the first time in this country, the inimitable  
Comedy of

THE IRISH TUTOR.

FLAIL

Mr GROVE (*of the Argyle Rooms*).

CHARLES

Mr. ALLARD (*of the Royal Pioneer Olympic*).

MR. TILLWELL . . . . Mr. LEWIS.

TERRY O'ROURKE }  
DOCTOR O'TOOLE } Mr. HERBERT (*the Power of the present day*).

ROSA . . . . . Mr. CHEYNE (*an Aurora of the first water  
from Sadlers' Wells, where her performance  
electrified the audience*).

MARY . . . . . Mr. HARWOOD (*her first appearance on any  
Stage*).

Villagers, Peasantesses, etc. . . . . British Seamen.

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To be followed by

A MUSICAL INTERLUDE.

GLEE, See our oars like feathers play { Mr. J. GORE (*celebrated Arctic Vocalist*).  
Mr. HARWOOD (*from the R. P. O.*).  
Mr. J. MACARTNEY.

DUET, The Queen's Coachman, Messrs. R. & I. HALES (*from R. P. O.*).

SOLO, Ireland . . . . Mr. J. MACARTNEY.

NAUTICAL HORNPIPE . . . Mr. A. DICKENS (*from the R. P. O.*).

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After which, at the express desire of the Ladies,

The perfect Farce of

THE SILENT WOMAN.

Mr. SANDFORD . . Dr. RICARDS. ARTHUR . . Mr. GROVE.  
MARIANNE Mr. CHEYNE.

---

 The Queen's Own Band will be in attendance, and a MAGNIFICENT DROP SCENE is being painted by that celebrated Arctic Artist,

MR. WALTER MAY,

for which an overflowing house alone can in any measure remunerate the *Sole Lessee and Manager*, who takes this opportunity of repeating to the Public that he is actuated by no feeling save that of contributing to their amusement, and realizing a competency for himself against increasing years and infirmities.

The House will open at 6.30, the Performance commencing precisely at 7 o'clock.

Tickets may be had of H. BRIANT, at the Arctic Printing Office, Winter Quarters, Northumberland Sound.

BY AUTHORITY.]

[H. Briant, Printer.

One authority however had not been consulted—it was too late—it was the Clerk of the Weather ! I am informed that the very same mistake occurred “last cruise,” on this identical day too ; therefore the “old hands” were to blame. One thing however settled the matter—it could not be put off—it was to open on the occasion of the anniversary of the birth of His Royal Highness the Prince of Wales and Duke of *North Cornwall*. Blow it might, and do its worst, and blow it did.

As the Play-bill intimates, the subjects selected were ‘The Irish Tutor’ and ‘The Silent Woman.’

The theatre was got up with considerable taste, and every character admirably supported, even to a most troublesome one-eyed pie and ginger-beer man, who most pertinaciously chose to present himself at the Royal Box. *He* knew full well Her Majesty and the Prince could not travel this weather ; indeed, he ~~had~~ heard the apology from the Lord Chamberlain read by the Sole Lessee, explaining the cause, and intimating her most gracious pleasure that the men should not forget Mr. Allsopp, which latter sentence ~~was received~~ with thunders of applause. As to ~~hearing anything~~, Boreas had it all his own way : it lay principally between him and a Woolwich waterman ~~politely~~ intimating that “the last boat would start *pos-a-ri-ve-ly* at eleven.”

As we were unable to hear, it is almost needless to add that the excellence of the acting entirely superseded the noise of the tempest ; and between it and the music, of which ‘Cease ~~rude~~ Boreas’ could not be heard, and but imperfectly understood by the tremulous fingers of the musicians, the evening terminated satisfactorily. The manager, being most *loudly* called for, at length appeared,



Snow Wreath, Northumberland Sound.

and, having overcome his modesty, made a very taking speech, not omitting Allsopp in conclusion, and retired, promising to omit no exertion to please at a more propitious day.

The temperature during the performance may be assumed as near  $17^{\circ}$  as possible. This would be warm if calm, but the breeze in the boxes made it cutting: nothing but the most determined loyalty rendered it endurable.

This gale came on with the thermometer at  $20^{\circ}$ . On the 8th it fell to  $10^{\circ}$ , at noon on the 9th to zero, and rose as high at the Observatory, when we had it at  $17^{\circ}$ , in the theatre, to  $20^{\circ}$ , at least so I find it recorded. The tide-gauge rose one foot above its scale, and I have reason to believe that some movement of ice, unperceived by us, shook the Observatory.

On the 10th of November the gale continued with unabated violence, cutting off all communication with the shore, the temperatures ranging from  $9^{\circ}$  to zero, rising according to the strength of the wind. A heavy snow-bank formed on our port side, but the reaction of the wind against our side caused it to maintain a respectable distance, channelling out a nice sheltered walk for our men in future, and raising a most picturesque, ornamental snow-wreath as a permanent overhanging wall, distant about sixty feet from the ship's side, and level with our upper works, or about fourteen feet above the ice. Between us and the 'Pioneer' a huge wave of snow intervened, nearly on the upper level, and extended up to the shore, tapering to nothing. This weight of snow caused the water to flow up, which, when solidly

frozen, formed a level promenade about six inches above the ice. Thus from every evil some benefit results, if we be only disposed to view matters as boons of Providence. The fissures in the ice, both in-shore and off into deep water, were also more numerous.

I have before noticed that this is not a snow-clad region,—that is, the land,—and this morning has verified that observation. The gale has denuded the entire coast, except in the ravines, where it is almost perpetual, bridging over the watercourses, where, during thaws, the water flows with rapidity beneath.

To-day, the 14th of November, the gale abated. Yesterday the Master had been able to extricate the chronometer from the Observatory, and had I been aware of his intention would have prevented it. The opening the door to-day was attended with a kind of mysterious feeling, difficult to describe; but a solemn, unaccountable oppression, similar to entering a long sealed tomb, weighed upon me, and yet there was literally nothing more than the dreariness attending the effect produced by any house overwhelmed by snow. The sensation was similar to the exploration of a cave, the work of ages. The scene before me was however one of Nature's immediate recent acts. I must say that it afforded information, experience, and matter for reflection: what more can I add?

The scene before me was new, and, as connected with my instruments, charged with deep interest. In our external portico the aneroid barometer, the wet and dry bulb thermometers, and some maximum thermometers were placed. Be it remembered that this was a portico,

composed of canvas, and the vibration caused by the gale against the planking which supported the instruments, might be supposed to militate against the formation of any fragile accumulation of impalpable "barber" or snow dust; "barber" meaning truly, the immediate condensation of the vapour arising from water at the point of condensation, and blown upon the beard,—or the natural condensation on the beard of the exudation from "the animal." I do not admit that the term is Arctic. I knew it—as all my old friends who preceded me some fifty years ago—as the well-known "barber" coming down the narrows of the basin at Halifax, Nova Scotia. Entering this portico, instead of the aneroid, a light cone presented itself, having the aneroid as its base, the base and frustum of the cone of snow being about two feet each. This, although of such light material, did not yield easily: but by the repeated application of the snow-brush I gradually cleared away the snow, and rescued the instruments unhurt.



The next was the Observatory, and this I almost feared to enter, for the doorway presented difficulties



which puzzled me. The standard barometer, previously coaxed into the performance of its duty, was evidently damaged, and the snow prevented any force being used to open the door. The mercurial column had fallen below any rational range, and I was therefore prepared for the worst. On brushing off the snow I was satisfied that either the concussion of forcing the door (by Mr. Nobody), or the snow getting between it and the tube, had strained it near the cistern, a portion of the mercury escaped, and it was rendered useless. Brushing the snow off each, I had to congratulate myself, on quitting this chamber of horrors, that I had lost but one instrument, and that was one in which I never had confidence, for it lost mercury before leaving England. But the pressure of the gale had been so heavy, that every possible crevice, by which *air* could enter, was beautifully fringed by deposits of impalpable snow-wreaths. These hints were not lost, and the proper remedies applied.

## CHAPTER VII.

Transit Telescope.—Extremes of Cold.—Effects of the Gale.—Remarks on Equipment.—Sensations of Cold.—Paraselena.—Schools Established.—Society of Loyal Arctic Engineers.—Deflections of the Magnetometer.—Experiments on Freezing.—Ice Crystals.—The Aurora.

I HAD shortly before this constructed a fixed transit telescope, by fitting a good two-feet with the necessary wires, and setting it, by our final observations, in the meridian. The results were dependent on the stability of the house, and of this now I had no further doubt. In few words, intelligible to most astronomers, I selected from Baily's Catalogue one of the principal stars which would, with others of a nearly similar declination, pass the wires throughout the winter, so as conveniently to afford me times for five- or ten-day comparisons, and thus verify my rates. Selecting 13  $\gamma$  Pegasi and 1970  $\alpha$  Herculis as my standard stars, I possessed a range of seventeen hours to work upon until April, with all the intermediate stars, some of which happen to be more numerous than the Catalogue gives any notice of, but which are of equal value, unknown, for the mere purpose of rating chronometers.

On a decided change of temperature between the 5th and 10th of November, I had firmly relied and expressed my opinion. On the 11th I did expect that gale, and I further expected a cessation of intense cold from that period until the 22nd December. This is not the result of a mere guess, but of a long course of observations in North America, and wherever cold predominates, that there are three periods of cold,—one in November, ranging between the 5th and 10th; a second in December, 22nd to 30th; and the third in March, near the 10th. These periods generally exhibit the extremes of temperature. Of gales I take no special notice, but here they inevitably accompany any undue *rise* of temperature. These remarks led me to institute an inquiry, or constructing a table of comparison of the temperatures experienced by Parry, Ross, and Austin, to which will be added our own, and possibly those of the other ships composing this Expedition. I think that the scales will bear out my observation.

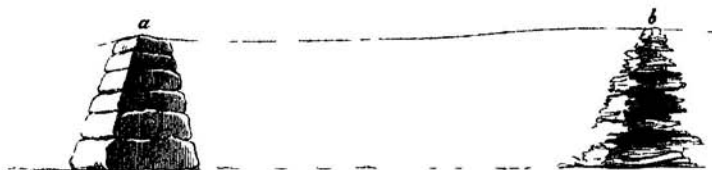
I notice in Parry's Second Voyage, that he relates, "that the first week in the month of November the weather was mild; the temperature then fell to  $-30^{\circ}$ , which change we felt sensibly." This extreme is not much exceeded by this month. His severity of mid-winter commences about the 26th of December, continuing to the 9th of January, and reaching about  $-45^{\circ}$ , on the 10th it is  $+4^{\circ}$ , and continues —. Towards the end of February cold increases, and up to the 11th of March it is  $-36.75^{\circ}$ : from this period (as elsewhere) intense cold ceases.

We have yet to record the result in this *terra incog-*

*nita*, but I feel confident in the average result that the law will hold good, tides, winds, etc., taken fairly into account. To-day, 15th November, after inspecting the drift banks which seem to have their points of concentration between the stern of the 'Assistance' and the bow of the 'Pioneer,' I ascended the hill commanding the anchorage (Mount Beaufort) to examine the effects of the late gale. It was now denuded, not a place on which to impress a footmark. And yet, some few days since, on this very ground, I had watched the operation of cutting "bricks" for building from this same spot, then a bank of solid snow preserving an average clear depth of one foot, and capable of bearing my weight; the entire depth was about three feet. Some estimate therefore may be formed of the unceasing force and scour of the wind and drift snow, from the perfect denudation of this peninsula, and indeed of all the visible outlines of the land. It required but one bright return of that absent sun to shed his rays on the landscape, and ideal spring would gladden our eyes. As I reached the summit I was yet more surprised: there the denudation was complete; every opposing obstacle had been overcome, and I at least imagined that on the slope of the opposite declivity the common laws of Nature would be observed,—that a deposit would be found. Not a vestige of snow remained, and if any difference existed, it was more denuded on that side, even to its very base.

It was amusing to observe its effects on all the line of supports, or snow pedestals, of the electrical wires. They originally stood complete, as at *a*, but were now reduced

to the skeleton shown by *b* in the diagram ; others were mere remnants.



About this period I gave way—to the snow and gravel covering on the decks ; not from conviction, but for peace and quietness. To Commander Richards I do not ascribe any such feeling of pressure ; but he was evidently worked upon by constant dinning, elsewhere, into the belief that it was his duty to urge me to satisfy this “former cruise mania ;” and if any *fancied* themselves warmer, the object was gained. The Sylvester would not act, and I very much regretted the absence of Perkins’ hot-water tubes, for those I knew how to control—they were fitted in my own house, in the ‘Terror,’ and I could *command* their services up to any temperature. Knowledge is power ; but no knowledge here could make Sylvester’s apparatus work without an enormous consumption of fuel ; and let it be remembered, that in both these vessels it failed on the late Expedition. On the other hand, I know that with Perkins the difficulty consists in moderating the *heat*. It is a matter beyond controversy, that if the initial heat is generated in Perkins, it must pursue its course throughout its coil, and distribute its heat before it returns to the furnace ; but Sylvester dis-

dains the cabin, or of reaching many feet of it, nevertheless carefully conveying all offensive effluvia, tobacco smoke, etc. Not that I disagree with his principle, but that he cannot carry it out; he cannot, more than ourselves, demand that we should sail by the *head*, to give his *current ascent*. But the matter will be more thoroughly sifted (under very different arrangements) next winter.

*November 28.*—The increased thickness of the ice, and consequent gradual rise of the ship, prevents the tide-gauge from acting correctly, unless indeed the entire frozen surface does not permit the due flow of tide. The difficulty, and incessant labour also, of breaking away the constantly-forming ice, is too much for the men; I have therefore put it out of gear until spring. Our attention is now principally directed towards the general equipment of the spring travelling parties, and we begin to find that these matters should have been cautiously considered in England, and not left simply to the mind of one, but of a board of officers. Indeed, I do not think that any part of the equipment comes properly within the province of a seaman; it is much more that of a ship-broker and the higher classes of tradesmen. The delay in appointing the officer who is to command—until too late to make much more than his own equipment, and barely time to complete his ordinary duties, independent of any preparation of scientific instruments—militates sadly against the interests of such an expedition. I can safely say that very few of the leading officers, including myself, were properly equipped, nor could we learn, from any reliable channel, what was

required. Every one had his opinion, and kept it for his own use, we now *know*, and *feel too*, what is requisite. If time had permitted, I could have had the opinions of the best practical men—lighter, better, and cheaper clothing would have been prepared for every individual, and submitted for approval; the tents would have been adequate to preserve life, if wrecked, and yet lighter for travelling; the stoves would have been serviceable now and hereafter; the sledges would not have been constructed of soft Canada elm in the dockyards, but of lance-wood, by some intelligent carriage-builder, and shod with steel instead of soft iron: they would have cost Government less money, and any North American knows well the value of his polished runner. Steel will pass over stone easily, and not be bitten; iron is worse, copper worse still, and lead, to the meanest capacity, a dead drag. As regards the boots—these are now really so much matter of general supply, from the days of Parry to the present, that it would be almost mutiny to disagree upon such a subject; yet they are far from waterproof, and for wet work, if properly made, they are indispensable.

But the “travelling boot” is of more importance—everything is at stake here. We are totally unprovided, simply because we trusted. “Who from faults is free?” We might, had the travellers of last cruise made known all that has now leaked out, and given us the result of their experience, have been ready for the field; we are at present totally unprepared, and with one shoemaker and some sailmakers closely engaged making canvas boots with leather soles: some have been made of the

seal-skins\* obtained at Greenland, but that they will not last we can plainly see. They are like our seal-skin dresses provided in England, offensive even to talk about. Those purchased at Lievely have turned out better: necessity there has taught them the proper mode of curing the skins, and they are thin, light, and flexible. A preparation of Mackintosh and linen or silk externally, and fine, close, light cloth within, would have been infinitely preferable. Further, every article of clothing has been mis-supplied: nothing to fit, and therefore nothing comfortable: and not a tailor on board to alter! Of this the Government has always been kept in ignorance, and the routine has been perpetuated under the several commanders of these expeditions. The old principle, established in well-regulated ships about the year 1821, of allowing a certain number of contractors to fit the men, muster them before pay-day, and deposit their ticketed clothes until the First Lieutenant saw they were paid for, and the duplicate taken for later distribution, could easily have been pursued here, and would have afforded great satisfaction. I was measured, it is true, but my clothes never were intended for a man under six feet, and plenty of room in arms and chest for very extensive smuggling. Fortunately, I did not reckon on the gratuitous supply, and obtained one warm ship suit; that for travelling I was lucky enough to obtain from the Governor at Lievely.

To myself all the blame is due, or rather to my want of opportunity or time to look after other even more im-

\* These seal-skins were specially obtained for this purpose at Greenland, but were totally useless for such service.



portant matters. Many expenditures of the public money, I now perceive, might have been avoided, and space saved for much more important stores. From the proper departments at the Admiralty every facility was afforded, but many supplies would, if I again controlled a fitting-out, be entirely expunged.

How habit changes the feelings!—not clothing, for I have not changed the ordinary suit which I donned on reaching the Orkneys, and even in travelling have merely added the Lively seal-skin trousers. Not many weeks since,  $20^{\circ}$  was considered very cold in our tents; and we were reduced to melt snow to drink, about the 1st of September. Another month,—about the 1st of October. I well recollect, being then in jeopardy, and the leaders of this Expedition cut off for a time,—our anxious prayers were offered for a temperature of zero, or even  $-10^{\circ}$ , in order to freeze the sea intervening between us and the mainland, and enable us to travel. Even then we did not feel the cold. About the 16th of November I noticed apparent disappointment that the mercury had risen to  $15^{\circ}$ , and on the 17th to  $20.5^{\circ}$ . One hero, in my mind's eye, appeared to repent of his coming to a climate where he was not to have “constant exercise and training” to aid him in his preparation for his contemplated march in the spring, with a temperature at  $-50^{\circ}$ ! but I very strongly suspect that my hero, if unfolded, as the clown's baby was, would be found prepared for the worst,—sundry rolls of flannel to make the man.

For my own part, I feel the cold, at times acutely; it varies according to the state of health; but I fear it not, and must candidly express my wish to experience, in

my own person, provided as we are with such a perfect set of instruments, the lowest temperature yet registered by reliable instruments and observers. I shall then be able to afford my humble opinion as to its effects. This is not foolhardiness, it is solely the pursuit of science; but I have no wish or intention to brave it by any unnecessary exposure. I merely hope that the minimum temperature may not occur when I am in bed: I should be strongly inclined to defer its registry until I saw the minimum gauge in the morning.

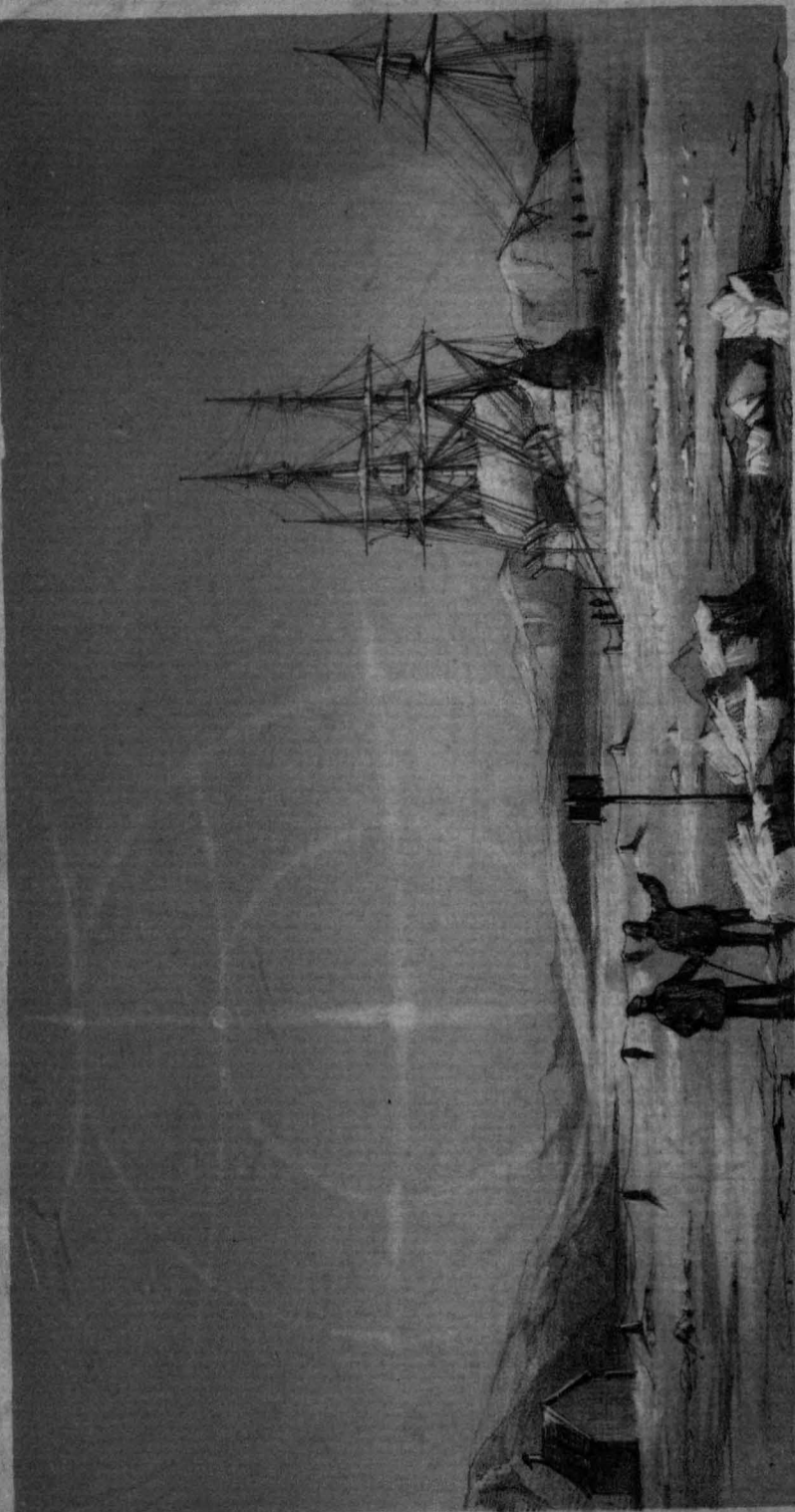
*November 30.*—About this period the season becomes extremely monotonous, and one is reduced to all kinds of imaginary reasons to account for the absence of expected phenomena, more especially the aurora, for which every kind of solicitation had been adopted; from mast-head to mast-head of ship, as well as ‘Pioneer;’ thence to the shore; up the hill; along the hill, on elevated poles; indeed, wherever it could be supposed to pass, there a trap was in readiness. Possibly we had overdone the business, exhausted the atmosphere, and it had not wherewithal to support itself, or held aloof at least from combination with our protected neighbourhood.

The Crystal Palace, constructed as the *sanctum sanctorum* of the electric operations, had shared the fate of such castles,—had proved too heavy for the floe, subsided, water flowed in, and the gale of the 9th November had almost obliterated the site!

This evening a beautifully defined paraselena was observed about north-north-east true. By measurement with sextant the interior circle was found to have a radius of  $22^{\circ} 10'$ , vertical as well as horizontal; the ex-

terior  $44^{\circ}$ ; the moon's altitude at the time about  $30^{\circ}$ . This beautiful phenomenon was represented by two concentric halos, incomplete near the horizon, accompanied by two strong crucial rays, vertical and horizontal, having the moon for their centre, the moon at this moment being four days past the full. It was also accompanied by arcs of other eccentric circles, having their common centre at a point within the zenith. The greater of these intersected the moon and outer halos, forming, at their contacts, luminous spots. So nearly did this represent the rectangular crucial form at the moon, that it was only by following the lower rays of the greater eccentric halo that they could be traced to be really a segment of a great circle. (See Plate.)

At the points of intersection of these halos, bright paraselenæ, forming five on the lower and two on the upper arcs, presented themselves; the moon and the intersections by the vertical ray, exhibiting the most luminous. The second eccentric circle did not intersect, at any visible point, the outer halo; but where the outer eccentric and vertical cut through the greater concentric, a sort of luminous nebula appeared to vibrate, affording an impression of the effect of an aurora. I did not, at the time, consider that it could in any manner have any connection with the aurora or electric influence; but, on examining the magnetometer register, I found that between nine and midnight the instrument had been deflected from  $124^{\circ}$  to  $134^{\circ}$ ,  $110^{\circ}$  to  $125^{\circ}$  being the customary range when nothing is noticed likely to be of interest. In consequence of the visits of very faint aurora, and other disturbances of the magnetometer, fresh



Paint. May 30.

Parasetena, Nov. 30<sup>th</sup> Northumberland Sound.

Wm. H. B. B. 14th

instructions were issued, "to note every deviation above or below  $125^{\circ}$ ." A similar phenomenon, but on a much reduced scale, and not nearly so brilliant, occurred the night following. The magnetometer exhibited symptoms of undue disturbance between the hours of eight P.M. and thirteen (or one A.M.).

To the pencil of Lieutenant May I am indebted for the very interesting sketch of the subject under notice, as well as of the ship and tender at our winter quarters.

On the forenoon of the 1st of December the southern arch of the horizon became considerably illuminated,—equal indeed to our tints in lower latitudes before sunrise in March, and exhibited a very beautiful illustration of the effect of intense cold arresting the upper currents of air. This representation was so perfectly defined as to produce hard lines on the edges of the clouds, on which the fancy would frequently trace ideal figures. In one particular instance they seemed to be a collection of



the various outlines of the summits of the land, and to be forced into rounded forms, as if impelled by a furious gale.

Under this dark-coloured sky the distant land on the

southern shore, near Cape Lady Franklin,\* was peculiarly refracted, and appeared to be considerably nearer than our positive knowledge would warrant, displaying very beautifully its particular features. A delicate salmon tint pervaded the horizon, affording the pleasing idea of a March sunrise in England. Our climate here, as far as we can judge from the journals of our predecessors, differs considerably from that further south. It is drier, clearer,—I would almost add, superior,—to that we read of; but this, I imagine, results from a freer scope of air. On board I find the 'tween-decks very wet and uncomfortable, extending from the after-gunroom bulkhead to the bows. My cabin is particularly dry, the ice in all the inaccessible crevices of the after-storeroom, abaft it, absorbing greedily the little moisture which may arise; all the bulkheads and furniture cracking and splitting with loud noise, at the same time attended with some difficulty in maintaining an even temperature. The wet between decks, resulting from cooking, breath, and drying clothes in the main hold, cannot by any present arrangement be remedied.

*December 1.*—Our first amusement was the theatre, this was followed by a newspaper; but something more useful and solid was required. We therefore established the evening schools, and not having sufficiently, or at all, prepared for this important matter by the customary Government supplies, the requisite paper of which to form writing-books dipped deeply into our supplies. Three classes were formed:—first, those who could read, write, and calculate; second, those who could read and write

\* The new Cape Lady Franklin.

only; third, those who knew nothing; and very satisfactory progress was made, thanks to the supervision of Commander Richards, Mr. Loney, and Mr. Lewis, who handsomely offered their services.

As there seemed yet to be a vacuum, I proposed the incorporation of the Loyal Circle of Arctic Engineers, to meet on Monday evenings, read some interesting matter from standard works, or produce a paper upon particular matters immediately connected with our operations, present or intended. My object was to enable the diffident seamen to stir themselves by a course of study which would enable them to enter the 'Excellent' with certain acquirements. It is not the province of the Captain to take the lead in such matters beyond the suggestion, and I expected, if the direction could once be brought to move in the right road, it might induce those to think who never thought before, and perhaps seek to solve the meaning of expressions to which they were not accustomed. It was a rational exercise of the mind, and unless some one set the machine in action, the wheels might become so much clogged (by sleep) as to be inert when required.

There was another great object which I confess I had in view, and that was the discussion, at the moment and on the spot, of many particular subjects of great interest, and to stamp them by some mark of authority now, so as to prevent, at any later date, any theoretical fireside discussions in England, where they might not be properly refuted. Opposition and discussion *here* would secure proper tests, would induce each party interested to collect facts; and thus our records would become valuable,

and the minds of all better adapted to register, in fit terms, the forthcoming adventures of travel in a manner befitting the importance of this Expedition.

Finally, as regarded our little community, it afforded amusement, occupation, and instruction to the crew, all of whom were invited to produce papers upon any matters they pleased. In order to facilitate this object, I drew up a set of subjects, on which papers would be invited, and endeavoured to include every capacity, even to humorous matters, for which certain medals, "when engraved and struck," would be awarded. Having been elected President,—indeed fearing that it might altogether fail if I did not start the vessel, I commenced proceedings by delivering my address, and we contrived to continue our meetings during the winter, or truly to drag its lazy coil along, until superseded by the preparations for sledge travel in spring.

"Notice is hereby given, that a Meeting of the Royal Society of Arctic Engineers will take place on *Monday Evening next*, the 29th of November, 1852, in MAIN HATCHWAY SQUARE, when an Original Paper, '*On the Construction of a Lamp for the Cooking Apparatus of the Travelling Parties, to burn the fat of Animals slain in the Chase*,' will be read by Mr. HARWOOD, of the 'Pioneer.' The President in the Chair. The doors will open at 6.30 P.M. precisely.

"G. H. RICHARDS, Secretary.

"The Temperature to be preserved at 42°."

At the period of the spring tide in the early part of this month, a very extensive crack, following the contour line of the peninsula beach, opened about half-way between the ship and the shore, computed to be in about three fathoms, caused probably by the very great incre-



ment of drift snow preventing the floating or curvature of the ice at the crack, where it appeared to be very thick ; it gaped about eighteen inches above, but it was too close below to admit of measurement.

On the evening of the 2nd of December, about nine P.M., the first well authenticated aurora was observed. All our instruments being then available, I was anxious to ascertain its effect on them. Mr. Cheyne was directed to report on the electrometers, and I add his remarks, as I believe he was called in time to see it in part.

"SIR,—Last night, at 9.20, I observed an Aurora: a light narrow streak extended from the summit of the Observatory Hill, passing immediately through the zenith, in a direction south-by-east true, terminating in a feather about  $25^{\circ}$  north of the zenith (?). Four cumulus-shaped masses appeared as though only about a couple of hundred feet from the mast-heads; these masses lasted about three minutes, and then suddenly disappeared, having apparently shifted their position about twenty feet during that time; the long streak gradually vanished in about eight minutes.

"The magnetometer read  $116^{\circ}50'$ , was perfectly steady, nor was the electrometer in the least affected. The sky was perfectly clear.

"(Signed) J. P. CHEYNE, Lieutenant.

"December 3, 1852."

Mr. Cheyne was not an observer: he probably took this  $116^{\circ}50'$  from the register for nine hours,\* which is there so recorded, but he could not judge of the steadiness of the magnetometer: at eight it was  $117^{\circ}30'$ ; at ten,  $120^{\circ}60'$ . But it is not clear to my mind that it was not affected, and that the causes which produced this aurora had not been in action the last eight hours, viz. from four P.M. until midnight, when it reached

\* All terms of time refer to astronomical periods from noon to noon.

137°80', equal to 27°60' of deflection, a disturbance not before recorded; even between nine and midnight we have a deflection of 21°30'!

The barometer, during the interval between eight and midnight, suddenly changed from 29·860 to 29·650, regaining its height, and rising to 29·900, when the magnetometer at sixteen hours showed 107°90'.

I had almost begun to conjecture that we were in too cold a medium, or that it might not extend to so high a latitude. Considering, too, that its first appearance generally occurs with the first shades of winter, I could hardly understand its prolonged absence. I had observed it, to the north of Behring's Strait, on the 25th August and continuously up to the 5th October, in its greatest brilliancy; and in Wales, at Swansea, in August. But I notice that Parry, in his first voyage, and nearest to us, did not record it until the 8th of January; on his third, which follows in order of latitude, in October and November; and in his second, in October. I did not witness it myself,—indeed it was not reported: I casually heard of it next day, and issued orders "invariably to call me." It was only on perusing the official report called for from Lieutenant Cheyne, that I was induced to search the magnetometer records for its motions.

*December 5.*—Another aurora, noticed this evening, presented vertical shoots or broom-like fasciæ, shooting towards the zenith (from behind the hill north-north-west), in pale flame-tinted rays, to an altitude of 20°. No disturbance was recorded, but it is highly probable that the variations registered at nine and ten P.M. are attributable to this influence. It recurred about midnight,