but is not indicated by the magnetometer: at noon it is suddenly deflected.

The *bonâ fide* winter does not appear to commence before the 1st of December, and about that period I observe that the walkers are more energetic in their exercise, and take to it more decidedly as essential to health than for amusement. I quite agree in this feeling, but deeming sundry wounds not easily cured, if I should unnecessarily expose myself, or meet with an accident, fit matters to be trifled with, am content to take that which the deck or light trips to the Observatory furnish.

On the 6th of December, being the last of our strolls, I noticed Venus to the south-south-west, refracted with extraordinary splendour; a complete Pharos,—a vertical ray exhibiting most splendid pencils of light. It was so well worth notice, that I called some of the officers out to witness it; but I found that, on ascending the side of the hill to obtain a better view, it dwindled again into simply Venus;—not the first one she has deceived.

A certain set of experiments were now made on freezing water; not simply to satisfy myself on this very beautiful phenomenon,—as all of Nature's works are when scientifically investigated,—but for the purpose of determining the amount of vapour thrown off during the progress of crystallization. For these experiments I used a very delicate balance, substituting gutta-percha vessels of nine square inches' surface for those of brass; they were half an inch in depth. I found it difficult to deal with even one drop, but, by the aid of a very fine capillary dropping (test) tube, and a shred of blotting-paper, soon adjusted my balance. The amount of water sub-

mitted to experiment was six drachms, distilled; and as the perfection of the balance could not be carried on in an atmosphere of $-17{\cdot}5°$, the preparatory measures were conducted below. A kind of screened cabin was erected on deck for experimental purposes; the temperature of the water below $= 56°$.

Time 0h 26m., exposed to $-17°$.
„ 0h. 31m. = 5 minutes, frozen, copious vapour.
„ 0h. 41m. = 15 minutes, hard, opaque, and raised.

The loss of weight = 5·725 grains. Left until noon following: no change. The same on salt water afforded 5·0 grains loss; frozen in 5 minutes, opaque in 7 minutes.

During the crystallization of the fresh water the effect was very beautiful:—first, the smoky lambent vapour, and then the shadows of the first shooting of the crystals, which were exhibited by a very powerful transmitted light, followed by the arborescence, until succeeded by the dull glare of solidity. Even then I could scarcely fancy it frozen, until it commenced the change to milkiness, and eventually, on rising in the centre, became quite opaque. I am afraid I shall not coax any of my fair readers to visit me, to participate in such experiments.

My next experiment was on a silk handkerchief,—I am not ashamed to say, belonging to one of the Banner ladies; it may yet be claimed, and passed as an heirloom. This, being like its owner a delicate piece of workmanship, was well adapted to the purpose, as may be perceived from the weight. Weighed beforehand, it appeared without fault, but it must *go through the fire*. Its first weight was 7 drachms 9 grains, but after severe drying, unfolding, airing, and redrying, it had lost 36·5

grains; re-weighed before exposure on the lower deck—6½ drachms: in three hours it had absorbed 38 grains; in five hours, 36,—given up 2 grains; after hanging in my cabin twelve hours it had lost 8 grains. I fully intended subjecting this precious *morceau* to freezing proofs, but bad weather prevented this cruelty.

I do not think that any of the other processes carried on at this period, except the freezing of water in glass cylinders, are likely to interest others than those for whom they were expressly made, and which may possibly be placed in the Appendix.

Excepting Scoresby, few, I believe, have enjoyed the study of the forms of ice-crystals. I have ever felt deep interest in crystallography, as regards minerals, and mineral and other salts; therefore I could not but feel curious in watching the slow process of freezing. A very clean glass cylinder, about a foot in length and one inch internal diameter, filled with clear water at 50°, was submitted to a temperature of −24°: the vapour continued to flow off for a considerable time after the water was frozen, and the ice had elongated itself out of the tube (which was very strong).

During the process of freezing (as we may often observe in the crystallization of salts), I had the tube placed in the focus of a strong reflecting carriage-lamp, and was thus able to trace, on a white ground behind, the beautiful regularity of its every motion, from the first silvery thread to the total condensation.

I noticed that the crystallization commenced from below, and shooting its feather-like processes, signalizing as it were (with its arms at 60° above or 120° below) to the

surface; it in return replied by similar signal, and interlaced its branches downward at the centre. This was succeeded by a milky infusion, similar to that of water introduced into a solution of camphor in alcohol, and all became chaos. But I was not so easily satisfied; and repeating these experiments with salt water and at higher temperatures, I noticed that, as the point of general congelation approached, peculiar stars were produced, and rose to the surface, where they became attached to and formed the general mass. These stars were, I perceived, perfect detached crystals, similar to those we meet with in the atmosphere, and which belong to bright-weather snow.

At a subsequent date, on sending for sea-water from a depth, so as to be free from ice, I noticed that it appeared impure, and rejected it; but the next bottle was, if possible, worse. This induced me to examine it closely. I then found that it was all composed of these fine crystalline stars, the water being, at the moment it entered my cabin, at the point of congelation. But in very few minutes after, being influenced by a warmer temperature, its countenance changed, and beamed as bright as ever. Such we may observe constantly in port wine. I am afraid that many of us would under similar circumstances look very dull; but I know, from sad experience, that my countenance would undergo many very unseemly contortions under such treatment before it assumed anything like brightness: such would especially result from the pain of recovering from a bite of John Frost, Esq.

On the 6th, 9th, and 10th of December, further exhi-

bitions of aurora occurred, and some slight deflections of the magnetometer were apparent, but generally preceding or following.

About three A.M. on the 12th, the aurora was reported by the officer of the watch as very brilliant. But as I was comfortably in bed, and it was beyond my examination and would vanish before I could possibly be in a proper state to receive such a delicate visitor, I directed Messrs. May and Cheyne to pay every attention. It was Mr. May's guard at the magnetometer, and Mr. Cheyne was excused watch solely to attend to the electrometers, etc. It was asserted that the electric fluid was noticed on the wires *fairly caught; certes* Mr. Cheyne found no disturbance. I am not quite sure that he had his instruments placed in connection with his wires, or that he reached in time, possibly thinking as I did (?). Mr. May repaired to the Observatory, and unfortunately my later orders were not then in force, or we should have had a full history of this visitation. The magnetometer exhibited the most unmistakable signs of disturbance, moving instantaneously from 114° to 128°, and up to 150°, returning at four A.M. to 117·90°.

This, then, I consider as strong proof; and taking into consideration other very decided deflections, when no cause was apparent, I am induced to believe that the affection precedes or follows what may be indistinct, or not at all noticed by simple atmospheric observers, and nothing short of very close watching at the magnetometer will indicate the truth. But it must be borne in mind that this extra duty is a delicate service, and, to maintain even moderate interest, I know full well that the greatest

tact is necessary to keep up the importance of the operators. No "soft sawder" will do here: it is only by making the observer feel his importance, and in this aspect his responsibility to the civilized world, that he can be persuaded to extend his labours. Science will never be driven.

This aurora was reported "to have been duly captured, but broke the wires;" and as we could not find any of *her* (she has become a female) on the wires, and I could obtain no direct testimony (but the reverse) that Mr. Cheyne's electrometers were not influenced, the question remained *in nubibus*.

CHAPTER VIII.

Short Days.—Minimum Temperatures.—Warmth of Vessels.—A She-Bear.—Preparations for Travel.—Theatricals.—Shortest Day.—Christmas Ode.—Christmas Fare.—Depth of Winter.—The New Year.—Comparison of Thermometers.—Freezing Mercury.—Range of Extreme Cold.—Freezing Ale.—Alcohol at a low Temperature.

On the 10th of December our nights had become decidedly dark, and our small portion of day does not fairly dawn on us until near eleven, when it is about as bright as a September morning in England, at fifteen minutes before daylight. At noon a delicate rose-tint pervades the horizon to the south-east and south-west, where the land affords an horizon, permitting a very peculiar marked pencil line on distant objects. The land in our immediate neighbourhood exhibits just such a clear outline as the moon would produce if rising or passing at a slight elevation round the horizon; but notwithstanding the irregularities on the outline are so very distinct, I was surprised that I was unable to detect our substantial cairns on the several points, so prominent but a week since: they did not exceed three or five miles in distance, and doubtless would have been very apparent through the telescope. Such a distinction, then, in tracing objects, I

consider to be the winter's warning. The weather has become steady and settled, and, guided by the records of previous navigators, I have made up my mind, after investigating the comparative tables furnished by them, that about —40°, as a general temperature for winter, may be expected. I notice that the minimum temperatures for December of 'Hecla,' 1819 —43°; 'Enterprise,' —56·5°; 'Hecla' (third voyage), —35°; 'Resolute,' 1850, —39·5°; and as the general seasons in high latitudes may be said to observe some little uniformity, I have little doubt but we shall not differ, except it be by a few degrees lower in the scale, from our predecessors.

My opinion as to the cold dates I have already stated; but I hope to add to this Work tables exhibiting the comparative ranges of temperature experienced during the several voyages of Captains Parry, James Ross, Austin, and the present, affording ten clear important columns, *ranging over thirty-five years.*

We find it very difficult to preserve a medium temperature between decks, the cold air rushing down and condensing the vapour so rapidly on the beams as to wet the hammocks at night. Of this the men complain; but if we increase fuel and raise the temperature, it is even worse. The housing is old, weather-worn, and the same which was supplied to Captain Ommanney, with about forty yards to repair damages!

The fitting in these cases should be as perfect as that of the Houses of Parliament: there, it is matter of convenience, luxury, or personal comfort; here, the lives of many valuable men are at stake. A very simple original fitting, or the prepared materials supplied, would have

rendered these vessels comfortable, at least habitable, even with an external temperature of 40° below zero. It is now too late to commence working with iron tools; and in that temperature I should hesitate to ask, much more command, any out-door work; but I do promise to remedy, if my ability permits, great part of these faults next season. My plans are already formed, and have been hinted at weeks since. Looking simply to the temperature, I feel satisfied, so long as we can ensure a moderate dry air, that icy surfaces, ready to absorb all the flying vapours, are not injurious,—are indeed safety-valves; and my opinions are chiefly derived from actual observation, principally on the habits of the Americans, Dutch, Russians, Danes, and Esquimaux. I cannot recall to mind any well-authenticated case of weakness, injured health, or disease amongst them, and yet they all pursue the hot dry air principle, rushing even into extremes.

The great evil here is the grossly unscientific mode of entering our domiciles by our chimneys,—in other words, by our hatchways; all other people civilized, and especially the uncivilized Esquimaux, enter by the lower levels. Experience has taught them that cold descends, and will not run up an inclined plane if any break or resistance is offered. The only mode of obviating this on shipboard is, unless an entering or timber-port be cut in bow or stern, by producing such a labyrinth to the main entrance on deck, that the intervening atmosphere shall be warmed before it reaches the hatchway, and not permitted to act on the decks; further, that all objects interfering with the radiation of heat from the galley fire

be removed; and finally, that the great escape shall be induced by the column of warm ascending air above and surrounding the galley, or kitchen, of our ships.

December 16.—Any change is cheering, but in the present instance the excitement was beyond reason, and therefore sport was very soon spoiled. A she-bear and her two cubs paid a visit to our dust-heap, on which, however, none of Goldner's preserves were deposited; but they thought probably that they might derive some little advantage from licking the tins of Hogarth. Before any concerted action for the capture of our visitors could be formed, some of our sportsmen, too eager to have their first shot at them, scared them off. As this was on the royal preserves, I issued the requisite orders against poaching, determined that, at their next visit, fair play and no favour should be observed, and that an adequate force of dogs and men should attend the hunt. The poaching for foxes also required looking into, and the several agents for the furriers, not in repute in this division of the Squadron, were warned to observe their respective bounds. Hardly had the first excitement attending the visit of these bears ceased, when I learned that they had arrived from the quarter where our dog-leader was exercising his animals with the sleigh, and as they possibly might have done some mischief there, a party was equipped for the search. Warned by the sound of bugle and muskets, he soon made his appearance, and all again was quiet as a ship-of-war can be!

The cold begins to tell on all old wounds, frost-bites, etc., raising unpleasant sensations; and, possibly from nervous affection, rendering a twinge (at any other pe-

riod unnoticed) importunate; nevertheless no one seems to fail in health, indeed the officers and crew will probably be in much better condition on the 25th December, 1852, than they were on that day last year! Their light hearts, no doubt, will be far away.

In the monotony of winter it is well that we can find employment; all our attention is now directed towards the intended spring travelling, and the arrangement of men, as well as aides, to the several sledge duties. As regards myself, upon this latter point, I shall not decide until the last moment, uncertain whether I may not be placed beyond the pale of such exertion. I do not fear it; but I have many croakers about me, who fancy I ought not to venture. With reference to the duty to be executed, I am aware that it will be a very serious and doubtful service, for I know full well the uncertainty of the ice with which we shall have to deal and the difficulties men and officers will have to encounter, should they be compelled to work with boat and sledge together, which, from a curious habit of "seeing ahead," I am inclined to think will be imperative; or, should they succeed in getting safely across to the southern side of this channel on firm ice, still boats will be requisite for their relief, unless indeed the water makes early and permits the ship or tender to visit the southern coast, which I am inclined to think will not be improbable.* As to the north-eastern search, which I have selected as my own route, I have no fears, because, as I shall have to visit islands where the open sea prevailed last year, at an early period, I shall be provided with one or more boats, duly prepared; and, if caught on the mainland, I am

* These remarks were fully verified.

now sufficiently acquainted with the leading southern features to know where to cut through to regain the ships

The lady bear and her cubs paid another very short visit, but, alarmed by the slamming of a door, made off to the south-west.

On the 21st, our shortest or no day, the seamen of the 'Pioneer' and 'Assistance' performed 'Hamlet' and the 'Scapegrace.' The performance was, as far as we could *hear*, good: but some doubt as to the scenery,—the preponderance of clouds at three feet above the stage, resulting from the condensation of the breath of the audience, rendering the busts of the actors barely visible, and thus, at all events, adding to their confidence, as no blush could be detected.

UNDER THE DISTINGUISHED PATRONAGE OF

CAPTAIN SIR EDWARD BELCHER, C.B.

COMMANDER G. H. RICHARDS, the Manager (*and now Sole Proprietor*) of the Queen's Arctic Theatre, has the satisfaction of acquainting the Nobility and Gentry of North Cornwall and the neighbouring county of Northumberland that he has just arrived from the very POLE itself, accompanied by a CORPS DRAMATIQUE never equalled in this or

any other country. He also brings with him a choice selection of Scenery, only to be procured in that delightful and highly favoured country; and, with a view to the revival of the legitimate Drama, and a desire (he trusts a laudable one) to render, if possible,

THE SHORTEST DAY STILL SHORTER!

has determined to open his house on the Twenty-first of December, for the performance of the first Act of the Tragedy of

HAMLET,

BY THE 'PIONEER' TRAGEDIANS.

HAMLET, OPHELIA	*Mr. W. M'ARTHUR.*
GHOST, LAERTES	*Mr. J. ORGAN.*
KING OF DENMARK	*Mr. G. COUSINS.*
QUEEN	*Mr. FENNING.*
MARCELLUS	*Mr. T. HALL.*
CORNELIUS	*Mr. R. BATCHELOR.*
VOLTIMAND	*Mr. G. HARRIS.*
BERNARDO	*Mr. J. SINNETT.*
HORATIO AND POLONIUS	*Mr. G. EDEY.*

During the Interlude the Audience will be entertained in a variety of ways, including

SONGS BY MESSRS. H. JONES AND C. FIELDER,

and a highly pathetic Story of NEGRO LOVE by Mr. J. REID, in full Negro Costume, as being peculiarly adapted to this climate.

After which will be performed the much-admired Comedy of

THE SCAPEGRACE,

BY THE 'ASSISTANCE' COMPANY.

COLONEL AUBREY	*Mr. J. REID.*
PEROQUET	*Mr. J. BARNES.*
MRS. AUBREY	*Mr. T. BOND.*
CHARLES DARLINGTON	*Mr. A. INGLETON.*
BUSTLE	*Mr. J. MACARTNEY.*
TUCKER	*Mr. H. BRIANT.*

The Manager's Own Band will be in attendance, and he has determined to introduce an entirely new feature into his Theatre on this

occasion. Having, during his recent travels, observed the highly elastic properties of ice, he has, without hesitation, decided to construct his stage entirely of that material, and he trusts that no misconstruction (such as scarcity of deal boards) may arise from an act certainly original) and based on scientific principles.

The Manager and Sole Proprietor also takes this opportunity of offering his acknowledgments to the Public for the very liberal support he has already received at their hands, and ventures at the same time to remind his friends (for such he must always consider the Public) that for the consummation of his fondest hopes, (viz. *the realization of a moderate competency wherewith to retire into private life*,) he still looks to them, and, relying on a discerning people and conscious of his own *deserts*, he will not *desert* the stage while a *plank* of it remains.

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

N.B.—The business of the Printing Office is considerably retarded, in consequence of the ink freezing on the rollers.—Printer's Devil.

BY AUTHORITY.] [H. Briant, Printer.

Commander Richards, the indefatigable Proprietor of Her Majesty's Theatre Royal, supported the establishment and his character with his accustomed spirit and effect, and was most rapturously and warmly applauded, particularly at the customary royal message, but this time varied to home-brewed Allsopp. That name will live for ages in the recollection of all Polars.

Sir Edward Parry mentions that the zeal of his manager produced representations even when the thermometer fell below zero. In the present instance the temperature was —34° outside, but the after-deck thermometer is registered as low as —37°. It was, however, to my feelings, uncomfortably cold, even in Her Majesty's box.

Great dissatisfaction appeared to prevail at some portion of the speech of the now Proprietor, intimating an

intention of going to Melville Island or the 'North Star,' even to Behring's Strait or the Sandwich Islands, from whence *most liberal offers* had been forwarded. Nothing short of the blackest ingratitude and treachery could induce such a step: the curtain fell in vapour!

Thus we passed the Rubicon of this much talked-of polar winter in Northumberland Sound, the evening terminating at a supper given on board the 'Pioneer,' where "bright eyes" as well as "Brother Polars" were *not forgotten*.

Scarcely have we breathing time, at this busy season, to dispel the amusing matters yet floating before our eyes, ere some other equally great, or greater, event demands our attention. Surely our good friends in England must be now pitying the poor unfortunate Polars, deprived of the light of that cheering and health-supporting luminary, which glaringly but too often reminds them of some gap in their circle, as well as dwelling on the horrid cold of that inclement, boisterous north, and dreaming of bears, wolves, and starvation!

Wait a few moments: Christmas approaches, and less noise and confusion perhaps prevails,—all are intent on some great object; mighty preparation is going forward, of which the principal, as at home, is kept in profound ignorance: enough that he knows when he sees the bill of fare, and "pays the piper."

December 25.—At midnight certain sounds of music, not customary, were noticed near my cabin door, and permission to enter having been granted, a demi-official note was presented (from the uniform I should imagine from the Court of Louis Napoleon). This was, I eventually found, a Christmas Ode, followed by the same very

well sung; and, with the best wishes of a merry Christmas, the deputation withdrew.

A CHRISTMAS PIECE.

Awake! awake! the Old Year 's going,
Time flies apace;
Awake! awake! the New Year 's coming,
To take the old one's place.

Arise, arise, good shipmates all,
And do not danger fear;
Arise, arise, good shipmates all,
To welcome the New Year.

God bless our brave old Commodore,
And our good Commander too:
Not forgetting all our Officers,
And our true and gallant crew!

Sleep on again, and on your brows
May soft repose be seen!
Sleep on again, while in our lay
We 'll sing, God bless the Queen!

H.M.S. Assistance.

Wishing Sir Edward Belcher, C.B., a happy and prosperous New Year.

Composed, I believe, by the Printer or his Devil.

Shortly after prayers I was officially informed by the Commander of the 'Pioneer' that the State Sledge, driven by the Queen's coachman, in full uniform (beadle of the parish), was in waiting, the Union flying instead of the footmen at the stern. Although such a pageant, perhaps, to those who know me well, was not quite in accordance with my taste, still I had some part in the Play to perform, and knew too well the chords of Jack's humours to fail in their gratification; they were most graciously appreciated. Mounting the state carriage, twelve of Her Majesty's best breed of Polars conveyed me along-

side the 'Pioneer:' every precaution had been adopted to prevent my wetting my feet; temperature, —36°.

Rather pantomimic the change! Stepping on her decks I was metamorphosed, in less time than Harlequin's wand could effect it, into my proper self, received and returned the salutes, inspected the men, and sent them below. Still adhering to my proper character, I inspected their preparations for their Christmas dinners, fancy decorations, etc., all of which were marked by neatness and extreme comfort, the entire midship division of the vessel being, in winter, appropriated to the crew, more capacious and higher in comparison than the 'Assistance.' I had here an opportunity of witnessing the superiority of Arnott's stove over the Sylvester, with less expenditure of fuel.

On the presentation of wine by the leading petty officer, I addressed a few words to them, expressive of my satisfaction, and reminding them that the roast beef then smoking before them was "Her Majesty's own," requested that due honour should be accorded to the health of "Her Most Gracious Majesty Victoria, God bless her! and all the Royal Family." This over, I gave the health of "The 'Pioneers,' and may their enjoyment never be less than this Christmas!"

I now returned, to preside, at noon, over the opening festival of my own crew. Here too I found all the luxuries, not forgetting roast beef and plum-puddings. The arrangements were all perfect, and in good taste, and our trusty crew were prepared to do justice to their fare, and enjoy themselves. I felt differently here: why, I know not. I felt it a more solemn act. These were my own immediate crew, and I felt a deep interest in

them all. They were yet *without fault*. I could not help telling them so, and expressing my earnest hope that they would return as we came out (a maiden ship?). Accepting the proffered glass, still of the Queen's own good port, I gave them the similar toast of "Our Queen, God bless her!" Never did a more hearty peal, nor from heartier lungs and more loyal hearts, ever try to burst those decks. My next duty to my Sovereign being that to my own family, I gave them "A merry Christmas, and may God bless you all!" Taking advantage of the fog, I retreated to my cabin, possibly not missed, but the cheers probably continued until they discovered that they were alone in their glory. It has never been my lot before to witness more apparent enjoyment than seemed to pervade the Northern Division: nothing followed to shake that good opinion.

About six the officers of both vessels, numbering seventeen, dined with me, and I think, by the very kind forethought of several warm-hearted fair friends, who will possibly remember their good deeds with satisfaction, that my table groaned under as goodly a spread of the luxuries usually exhibited at this season as it could have done in Merry England, not omitting the roast beef, plum-pudding, mince-pies, and frosted cake of our national predilections. "Poor Polars, how I pitied them!" Yet they seemed to enjoy themselves, and even to think of those poor people in England who might not enjoy themselves with half the genuine feeling. Our Queen and Consort, our Duke of Cornwall, our relations and friends there, were not forgotten, not even the banner cherubs and their mottoes; nor were our companions here, though for a time severed, yet possibly to be for a

moment reunited in our spring travels, omitted. The toast, "The rendezvous, 77° N., 105° W.," was emphatically given and determined on, as if it was already engraven on the chart. About 1.30 each retired, to dream of home.

Many uninterested persons may doubtless be of opinion that these are not matters for the public journal of the Commander of such an expedition. I am willing to risk the verdict; it is the true index of the habits and customs of the Arctic explorers in 1852–3–4–5–6, etc. Many an anxious eye may be turned to these particular pages, when others of dry matter, or of a controversial complexion, would studiously be avoided. We have but little sun at this season. Let us enjoy all the brightness that warm hearts and innocent amusements can afford, not forgetting those whose feelings are also gratified at learning that in all our enjoyments their presence alone was wanting to complete the cup. Sailors ever had, and will, so long as the good old breed is not extinct, have their feelings deep as the element they swim on, and no disguise.

December 26.—All quiet; great disposition to sleep, in which they were allowed to indulge until the time for prayers, put off today until eleven. To many a Commander this is the most anxious day. Thankful did I feel that all had gone well,—not a whisper of any defect. "What would I not give to wander?"—however, I feel assured that we were not forgotten; so my dreams, at least, assured. Where will our next winter be passed? was more than once started,—a most difficult problem to contemplate: time alone can tell!

December 28.—Spring tide of this moon, and yet we have the thermometer down only to $-40{\cdot}7°$; mercury partially, not entirely, frozen. How one's feelings appear to accommodate themselves to the changes! It is calm, and therefore we feel it less. I have just returned from taking exercise on the floe, but without being sensible of any inconvenience; and it often occurs to me that it is injudicious to make so much parade about temperatures, when, were it not for the thermometers, few would feel the variation. On the other hand, the knowledge gives a man assurance of what he can bear, and furnishes him with a Mentor which prevents his exposure to undue cold without being prepared to meet it. It is curious, to the uninitiated, to view the Esquimaux dogs perfectly satisfied and luxuriating in the snow at this temperature! They have snow-houses, into which they can retire, if cold pinches; but we do not perceive that they do so until the breeze makes it felt, and then the temperature rises with the force of the breeze. When the wind blows strong, with drift, the poor animals howl and move about evidently uncomfortable; hunger and frozen food may in part account for this, but why are they never frost-bitten?

One very curious fact, which I have repeatedly noticed, and to which I never have observed any previous allusion, is the falling of light bodies during intense cold, and, of course, calm weather. Does intense cold produce anything to be compared, directly or indirectly, to a vacuum? Vapour condenses and falls perpendicularly as fine crystalline ice; all objects exposed to this vertical action become covered with rime, but never laterally. The

very curious question results,—from whence does our snow, or *crystalline stars of ice*, come? They must be formed and precipitated from an atmosphere exceeding 32° in temperature: they descend into —42°; no less than 74° variation in temperature. Does the cold medium then compel all warmer bodies (possibly by condensing their vapour on them) to fall as the feather under the receiver of an air-pump? Verily we hourly witness strange things, and but too often how many pass disregarded, unnoticed, because others have preceded! Such will ever be the case where science is at a discount, or the possibly ignorant self-constituted philosopher sneers at the questions which he is unable to answer, or which happen to interfere with a favoured or popular theory.

The New Year of 1853

January 1.—This morning was ushered in by a song, composed by our own bard, and sung by the choral band of 'Assistance:' a copy was delivered to me, but being in bed, much tired, and suffering from a fall on the ice, I could not enjoy its intent. The crew however are enjoying themselves; so far all right.

Today our gun-room officers entertained their friends. It passed off much in the same style as Christmas, Commander Richards presiding. I was of course a guest, and happy to contribute to the general good humour. We only wanted the missing parts of our Squadron, to make all complete. Shall we be able to pass it together next year? My own impression is adverse: if we should meet before, undoubtedly our winter stations must be asunder.

January 6.—Our temperatures seem now inclined to reach their lowest point. It is at present —51·5°, and falling; yet we do not feel the change. In some of the journals we may possibly find a minimum temperature nearly 2° below the standard, but the final results recorded in the Meteorological Journal will alone be correct. The annexed comparison of the seven best will indicate pretty clearly the value of the instruments:—

Standard.	2	6	8	20	3	4	5
— 20°	21·0°	20·0°	20·6°	21·2°	20·4°	20·7°	21·1°
— 30	31·0	30·0	30·0	31·5	30·8	31·2	31·5
— 40	40·5	39·6	39·8	40·5	40·5	39·5	41·3
— 50	50·0	49·0	49·0	51·5	49·0	49·3	51·9

Cold as this is,—and my cabin temperature fell to 22°, freezing everything in it (*malgré* Sylvester),—the cold, as intensity, would not have been noted, unless the officers at the Observatory had given information.

Last night heavy sounds were heard, and some asserted that the reports of guns were distinguished; but I suspect that it was merely the result of a distant floe-crack, as the temperature of the ship causing her to release herself from the ice, or from portions hanging on her, frequently produces similar results. The light is visibly increasing, enabling me, near noon, to note time easily by a watch.

January 7.—The noises were repeated last night, and a large additional crack between the ship and the Observatory was noticed. I understand that the 'Pioneer'

also shifted her bed. The great masses of snow on the ice, hourly consolidating from evaporation from beneath, probably press the floe downwards, and produce these very sharp sounds, very similar to the snapping of heavy bolts of iron. The prevailing impression, I believe, is that it arises from the latter cause. However, this is not satisfactory: no bolt or channel plate, exposed, has been known to part; and if all these sounds proceeded from such causes, I fear there would be none left to trust to, next summer.

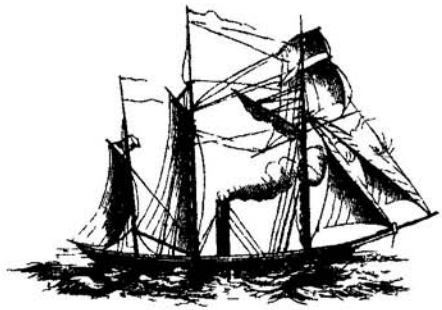
The mercurial thermometers having indicated temperatures much below the freezing-point of mercury, and this affording an opportunity of examining this metal but seldom presented to quiet and careful research, I determined to avail myself of it. 240 grains were weighed in my cabin, contained in a fine porcelain mortar; the mortar and mercury having been previously subjected to a continued heat on my stove, to expel any possible moisture. The mercury was pure, being part of that which escaped from the standard barometer on my cabin sofa, and carefully preserved in a stoppered phial for such experiments. (Temperature 40°.) It was then carefully removed to the thermometer-house, and the balance found correct. Exposed for twenty minutes to a temperature of −47·7° the mercury began to crystallize: the circumference became very convex at its edges of contact with the conical vessel in which it was contained, and the centre raised to a point when it had actually congealed; it lost 1·5 grains. At the first fifteen minutes' exposure, the scale in which the mercury was contained rose very perceptibly as it diminished in

weight; it then recovered itself; and finally, on being re-weighed in my cabin, was deficient 1·75 grains.

In order to determine its effect on water, I turned the frozen mass into a tumbler of water containing six fluid ounces at 47·5°: the mercury simply became encased in ice, and when it at length flowed on the bottom, the temperature indicated 44·5°, a difference only of 3°. I was anxious to determine the form of its crystal: this was a very difficult matter. It was attended with great inconvenience in the open air, and the change was screened by the superficial crust forming before the body became solidified. The transition from the solid to fluid could be better watched: this I tried. It then occurred to me that by using a large open-mouthed jar, containing half a gallon of spirit of wine or alcohol cooled down to —47·5°, that I could leisurely, in my cabin (aided only by candle-light), watch its motions, and freeze or liquefy at pleasure. In this I succeeded,—remarking however that several travelling mercurial and other thermometers presumed to read below 42°! But to the result of my examination: previous to freezing, or at the instant of returning to fluidity, I noticed that the mercury assumed a very active motion, resembling living *polypi*,—parts moving in circles with great velocity. Positive crystallization I could not detect, but the inclination appeared to be nearer to the forms of lead or bismuth on cooling, the surface lines being clearly rectangular, or a beautiful network. This was on the semifluid; in its dense form nothing could be traced. Although much exposed today to low temperature, no change in my ordinary cabin dress was found requisite,

although occasionally I inquired if my nose exhibited any symptoms of the whiteness attending frost-bite. The dogs were more than usually playful, and fond of being caressed; once I thought that they would have been glad of my seal-skin mits by way of luncheon. However generous one might be at another time, the present temperature rendered it inconvenient.

January 6.—This evening the 'Pioneer's' party furnished their quota of amusement, as may be learned from the following programme:—



H.M.S.V. PIONEER,

NORTHUMBERLAND SOUND, POLAR REGIONS

LIEUT. SHERARD OSBORN has the honour to announce to the Polar Public in particular, and the World at large, that

THE QUEEN'S ARCTIC PHILHARMONIC SOCIETY

will hold its General Annual Meeting on Thursday evening, the 6th of January, under the immediate patronage of

CAPTAIN SIR EDWARD BELCHER, C.B.

AND THE OFFICERS AND SHIP'S COMPANY OF

H.M.S. ASSISTANCE.

When the distinguished members of that Society, as well as other local Musical Celebrities, will take prominent parts.

The Evening's Entertainment will commence with the full Band playing, under the leadership of our

Polar Costa—HERR HARWOOD,

A GRAND FANTASIA, altered from Count Hum's Les Adieux à Bœuf et Bière.

PART I.

Sentimental Section, led by the Primo Tenore, SIGNOR ALLARD (Perp. Grand.) will execute various select Solos; and Duets by Mr. W. WOOD, S.C., SIGNORI SINNETT and CUSTANCE, all Members of the Q.A.P.S. Followed by

UN PAS MELÉ—by MONSIEUR C. ALLEN.

The Comic Section, under the able bâton of Professore DON JUAN RICARDO, will consist of an elegant selection of Melodies by DONS JOHN and RICHARD HALES, DON BENJAMIN YOUNG, and DON GEORGE COUSINS, a galaxy of Buffo Singers unequalled in these Regions.

PART II.

La Valse des Baleines and Narwhal Polka! by the Band. Followed by a Grand Terpsichorean Interlude, by Messrs. DICKENS, BATCHELOR, and ALLEN.

The Serio-Comic Section, led by that well-known Basso HERR HORATIO WEBB, and exhibiting such names as

HERR ORGAN, HERR EDEY, AND HERR DICKENS!

will assuredly fulfil the most sanguine expectation of lovers of the Anglo-Saxon School.

The Curtain will drop to the Glorious Strains of

GOD SAVE  THE QUEEN!

The Proprietor need hardly remind the Public, that having secured them a Musical Feast, in which the whole Talent of the North will be concentrated, that Her Majesty's Theatre and the Italian Opera are entirely done up, and *the Sole Lessee and Manager* is supposed to have absconded with his Scenery and Elastic Stage! to Beechey Island, to divert the Depôt.

The general arrangements of Seats, Lights, and Refreshments, have been placed under the catership of Mr. Jos. Organ, and Mrs. Fenning has engaged to supply Ices gratis.

BY AUTHORITY.] [H. Briant, Printer.

This amusement, remarkably well got up, consisted of a selection of very good songs; and what rendered them to many the more interesting, particularly to the officer part of the audience, was their almost perfect originality.

The lower deck of the 'Pioneer,' warmed by Arnott's stove, dry, and much more comfortable than my cabin, accommodated both crews, mustering about eighty-six. The entertainment closed with the National Anthem. The temperature has not risen above —46° the last four days, exhibiting a mean temperature for the interval of —53·20°, or —55·61° for three days.

January 15.—The following may prove interesting to inquirers after the extreme cold of our position.

I observe, in that excellent work of Sir Henry De la Beche (on Geology), that M. Arago asserts, "that in no part of the earth, and in no season, will a thermometer raised two or three metres above the ground, and protected from all reverberation, attain the 46th Centigrade degree." Secondly, "In the open air, the temperature of the air, whatever be the place or season, never attains the 31st Centigrade degree." Thirdly, "The greatest degree of cold which has been observed upon our globe with the thermometer suspended in air, is 50 Centigrade degrees below zero." Fourthly, "The temperature of the water of the sea, in no latitude and in no season, rises above 30 Centigrade degrees." We have been informed that Sir James Ross registered the air at —60°; of this however I have not at present any direct evidence. As to any question arising to affect the registry of our instruments, there can be no possible

doubt. The observers have been too numerous to allow of mistake: the self-acting index tells its own tale, adverse observers watch every decimal division, and the lowest minimum thermometer, after severe investigation, has been rejected. I copy the following from the Meteorological Journal:—"*January* 12.—About nine this evening, being at dinner with my weekly party of officers, I was informed that the temperature had fallen below −62°. As this was a question not to be casually passed over, I visited the Observatory, and remained walking about in my simple cabin dress for some time; −62·5° was the lowest which I, as well as others, read at the standard. But the minimum thermometer indices, read next day at eight A.M., only gave −62·0°, −61·6°, −66·0°, −63·2°. The night was bright and calm: no sensation of cold. −63·2° is the external exposed thermometer, but was never *read*, excepting by its *index*, at that graduation. This external thermometer, after severe testing under the boat as low as −40°, with the entire range of spirit and mercury thermometers, was selected as the standard Observatory gauge: supported on an open frame, attached to two pikes about one foot asunder, it was subjected, uncovered, to all the winds of heaven. That was *read* at −62·5°, and indicated what I have rejected, −63·2°.

January 15.—I was induced, whilst writing these remarks, to turn to Parry's work, page 145 (first voyage, 1819–20). On the 15th of February he remarks as his coldest, the thermometer standing at −54° for fifteen hours and a half, but his maximum on that day was up to −32°. Looking over the Observatory record, I no-

tice that the following indications of low continuous temperatures prevail:—

—46° and below,	156	continuous	hours.
—50 „	89	„	„
—52 „	88	„	„
—55 „	52	„	„
—58 to 62·5°	14	„	„

As the tabular register may never meet the eye of the casual reader, I will here insert eleven cold days in January, from the 5th to 15th inclusive:—

	Maximum.	Minimum.	Mean, 24 readings.
January 5	42·5°	48·0°	45·08°
„ 6	47·0	51·5	49 02
„ 7	37·0	49·3	38·01
„ 8	39·0	47·5	43·00
„ 9	46 5	50 0	47·97
„ 10	49·5	56 0	54·17
„ 11	50·5	57·0	54·31
„ 12	53·5	59 5	56·25
„ 13	45·0	62·5	54·23
„ 14	46 0	50·0	48·00
„ 15	42 0	52·0	47·65
Mean Temperature for 264 hours, 48·88°.			

If this will not satisfy the appetite of the cold-loving hero, I will gladly invalid in his favour.

Let us now review our proceedings of late. We have all been absolute boys,—some old ones nevertheless.

We leave (I am as bad as the rest) our warm cabins, at say 50°, rush on deck and on to the floe, after science or Bruin, it matters not, at—take the mean, —49°; 49 + 32 = 81° below freezing, and 50 + 49 = 99° change of temperature, without damage!

We have throughout been thinking, or rather talking, of ourselves—we do happen to think more deeply of the crew; but thanks to the unremitting attention of our medical men, and to the general care taken to prevent exposure, I should be disposed to assert, in my proper capacity of the Commander, that no official report of frost-bite has yet reached my ears. To descend perhaps, and allow that once one of my men "took his Captain *by the nose*," under pretence that he thought his Captain's nose was frost-bitten, and his warm (?) hand could restore it, "is not quite true." But I totally and indignantly repel the very low insinuation, and believe that the blood from his heart flowed so rapidly to the end of his arm, that it saved my nose by the application of the *back* of his warm hand, and I thank him: even if it was a deceit, I forgive him. We command here; no bed of roses nevertheless—no absolute command is! Ask the fathers of families, and this is not a small one!

To continue the matter of low temperatures. They made no impression here; the pains of forehead or lungs some might have experienced, but they were never mentioned in my presence. The only projection about which I felt interest was my nose, and upon this point (not a very prominent feature) I felt a sort of monomania, something like, going into action, that I must be wounded in a leg, and nowhere else. I never intended to be killed,

and so I told my surgeon when that idea was realized, but I am constantly asking people to view my nose. But as I have so far wandered into self, and I know that certain professional men who interest themselves about me will expect to know, I will merely say that I expected certain wounds, cuts, frost-bites of youth, etc., to trouble me. I have suffered intensely, more than can be explained, but nothing to disqualify me, in any manner, for this important command, or the liabilities attached thereto. My feelings are my own; so long as I perform all my duties, who cares for them?

Our present temperatures are low enough to satisfy most men, but if, in truth, —90° can be *truly* found in this region, I would almost stop to see it

Mercury.—The freezing-point at which pure mercury (not impure amalgams of spurious mercury at low prices, but volatilized, distilled, adapted for thermometers, etc.) should congeal still continues to haunt me. Unfortunately, I left behind me every work on this subject to which I could, as to late date, refer. That —39·5° is *not* the correct point of congelation our standard mercurial thermometers prove, nor do they always contract to the same division. The congelation of mercury does not appear to form any part of the acknowledged divisions on these thermometric (?) instruments: the mercury thermometers supplied to this Expedition from Greenwich, as well as Kew, were graduated below —40°. I had myself remarked that no notice was taken of them in the record, under the assumption probably that they could not, dare not, act contrary to *print*, but I ventured to differ, why I will state.

On the 17th December I had noted that the mercury thermometers did not cease to act at −40·3°, −40·0°, −40·0°: this excited my attention; weekly I transcribe the register. On the 28th I noticed that the *registry* of all the mercurial thermometers ceased at the *same indication,*—on the 4th January at 42·3°, by standard. Unfortunately I did not notice it earlier, but on the 23rd of January, on my copying the rough register, I inserted the following order:—"The mark *f* to be prefixed to D when the mercury is congealed; *p f*, when partially congealed. The numbers 19, 35, 34, 2, read to −40° and below. The divisions below must be estimated, *i. e.* the point where it congeals, or declines moving further." He (Mercury) had stopped most religiously at −39·3°, −39·2°, −39·0°, −39·0°; but in this case he was under martial law, and he knew he must move. I suppose he made his mind up to it, for I find the following curious register, taking care to satisfy myself frequently by personal inspection.

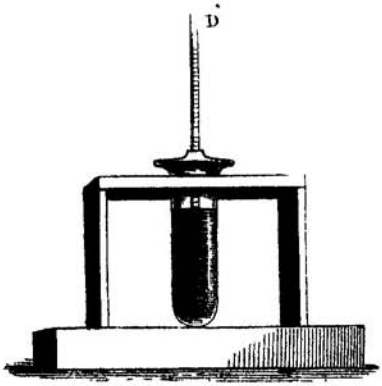
Noon.	Standard Spirit.	19	35	34	2
January 26	43·0°	42·0°	42·0°		41·2°
,, ,,	46·2	Est^{d} 46·0	50·0*		
,, ,,	45·4	46·0	49·0*	BROKEN.	
,, 31	45·7	45·0			
February 3	42 9	42·0	42·0		41·0
,, 10	41·7	41·5	41·5		40·6
,, 21	44·5	42·5	42·5		42·0

How came this change?

Noon.	Standard Spirit.	19	35	34	2
February 21	43 8°	43·0°	43·0°		43 4°*
„ 22	45 1	44·0	44 0		43·2*
„ „	42 2	41·3	41·2		41·2*
„ „	41·6	40·6	40·6	BROKEN.	40 0*
„ 26	42 1	41·0	41 2		41 0*
„ „	42·3	41 2	41·2		41·0*
„ „	42 0	41·0	41 2		40·6*
March 3	43 3	42 2	42 2		41·8
„ 8	44 2	41·2	41·3		41·1

After all this, I ask, who will dispute the power of a Captain of one of Her Majesty's ships-of-war? Noon he has invariably controlled,—eight A.M. and eight P.M. also; but here the thermometers are compelled to condemn themselves or the mercury.

With these matters fresh on my mind, I constructed the mercurio-alcoholic thermometer D, being a glass-stem



* If mercury freezes at −39°, how is it that it continues to rise and fall, in conformity with the spirit, between −39° and −46°?

spirit-thermometer with graduated stem inserted into a test-tube containing four ounces of pure mercury, well corked and covered with four layers of bladder, to protect it from the air; it was self-balanced in a kind of test-rack, and admitted of a pendulum motion to determine its freezing-point.

It happened however, unfortunately, that this thermometer never did its duty satisfactorily, and all its records are in such a state of confusion that they have been rejected. We may not, it is true, be confined to this high latitude, but it is probable that we may have an opportunity of pursuing this investigation more rigidly at stated temperatures next season

Next to mercury, it occurred to me to partially freeze Allsopp's ale, and reserve the unfrozen fluid for future examination: congelation took place at 22·5°. That frozen and drained from one-third of the fluid, when again reduced to a fluid state, was very insipid; the remainder concentrated * This mode of concentrating cider is practised in America, three barrels making one of good quality.

January 24.—Already we begin to feel the increase of daylight, four hours (between ten and two) being now available. The light red tint of the southern horizon also intimates that the prodigal (sun) may shortly be expected to exhibit his cheering and animating rays: we shall probably exhibit a sort of chameleon tinge, inclining to dead tea-green or an incipient case of jaundice!

The late extreme cold induced me to make experiments

* This concentrated has been tried since my arrival in England, and found to be excellent—quite a liqueur.

upon the expansion of alcohol under low temperatures. The instrument for this purpose was furnished by Mr. Glaisher, of the Royal Observatory, as well as a supply of the same spirit from which his thermometers had been filled. Unfortunately those who operate in England seldom dream of the mean temperature under which such observations would be conducted here, and have failed not only to supply gloves adapted to −50° or −60°, but also to warn those who may not have brought their brains with them, that 10° to 20° below the congealing point of mercury is hot work. The raw experimenter might easily lose his hands or life, should he inadvertently take up the bottle containing half a gallon of alcohol at −58° or −60°, without the hands being properly protected.

We find that the unfortunate artilleryman, servant of Colonel Sabine during the voyage of Sir Edward Parry in 1819, in consequence of endeavouring to rescue the dipping-needle from the flaming Observatory, was compelled to undergo amputation of part of four fingers on one hand and three on the other, and it is but natural to suppose, from all the causes then in action, that the instrument itself could not have cooled down below −43°, the prevailing temperature away from the fire: what then would be the effect of a person tumbling and breaking a bottle of alcohol, and shedding it over his hands and person at the temperature of −58°? Even with double gloves, lined with fur, I felt the cold sharply, and my hands generally suffered, but more particularly the nails and points of forefingers and thumbs, throughout the winter, rendering adhesive straps neces-

sary to close the cracked skin; resulting solely, I believe, from constantly handling metal instruments and tools at very low temperatures. The affection was so severe, that I termed it the finger fever; all the nails being more or less affected, and, as they advanced, exhibiting corrugated transverse ridges, with spots occasionally; however, I eventually found that these experiments could be satisfactorily conducted in the Observatory, *after cooling the materials outside, by consenting* to the loss of a few degrees.

Better however that I should suffer, than, by any neglect of mine, some other unfortunate of lower rank should be crippled, and obtain but very inadequate remuneration,—although loss of fingers to me would be very little short of loss of life I think my spirited and talented friend, Mr. Glaisher, might have whispered, "But, my good Sir, when alcohol is reduced to 94° below the freezing-point of water, pray take care of your fingers." True it is that, internally, alcohol is a heating spirit, but we have no name for it under these burning circumstances.

CHAPTER IX.

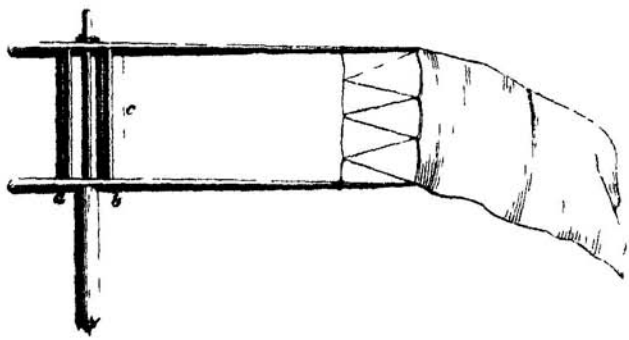
Rise of Temperature —A Bear shot —Termination of Darkness.—Reappearance of the Sun.—Death of a Marine.—Cold Period of March. —Table of Temperatures.—A She-Bear and her Cubs.—Sledges inspected.—Feet Wrappers.—Departure of the Sledges.—Beacons.—Cairns.—Parhelia.—Inland Excursion —Wavy Ice.—Cooking Apparatus.—Lamps.—Return of Depôt Division.

On the 26th of January we experienced the wind strong from the southward, with heavy snow-drift; the temperature rising with the wind and spring-tide from —42° to —31°. From habit we now consider —40° as our scale, —30° being talked of as the comfortable, or not unbearable, travelling temperature: I dissent from any such absurdity. If we should remain many years longer in these regions, I really begin to fancy, provided we could bring our inclinations to agree with Esquimaux food and condition, etc., that we could endure any cold under the moon, for we are now perfectly satisfied that nothing here, under the sun, would be unpleasant. Latterly I have extended my walks to the summit of Mount Beaufort, with a temperature of —44°; but, although the simple exertion of ascent proved unpleasant to the lungs, no sensation of cold equal to that produced by a low

temperature of —20°, with light breeze in the face, was experienced.

January 28.—Early this morning, about two A.M., the dogs gave notice that a stranger was in the grounds, and, by their yelping, probably within a few yards of the Observatory. Lieutenant May and Mr. Pym followed up the "cry," and, led forward by the dogs, came up with a bear, which was brought to bay by the dogs on an elevated ice hummock. Poor Bruin was evidently puzzled, doubtless calculating on being beset by so many wolves; but his fate was soon settled by a rifle ball, when the dogs rushed in, and would, if not kept down, have made a warm meal. Three of the pups, evidently quite unaccustomed to be in such presence, were very daring, but fortunately escaped unscathed. Even at this early hour volunteers were found to flay and bring in the skin;—no accounting for taste!

About this period I constructed a vane, to determine the effect of the direct force of the wind on a thermo-



meter exposed to its full influence, *a*, compared with its opposite, sheltered, *b*. The results were too trifling to

afford any reliable result. The dotted line *c* represents the covering board on the lee side.

This will close the month of January: not much unlike a gloomy English November, but not at all realizing the very cheerless long winter nights which have been so frequently dinned into our ears, that I was almost induced to think of sleeping them away on "eider-down beds;" but, no less strange than true, these were recommended as absolutely indispensable!

February commences our first spring month, and we begin truly to feel that the days perceptibly lengthen. All are looking anxiously forward to the 18th, for the reappearance of our cheering luminary, which will find our travellers in high spirits and with some impatience to try their powers on the floe.

About the 14th and 15th the weather underwent unexpected changes, the temperature rising as high as 2·5° above zero. The magnetometer also has of late exhibited such sudden and incomprehensible disturbances, that I determined on the construction of an independent direct instrument, on the plan of the old portable Declinometer, but in the present case substituting a heavy nine-inch magnet for the magnetic telescope, and introducing, in Y's beneath it, a brass telescope (adapted from my sextant), with the scale engraved on mica and placed in contact with the object-glass. A house was also constructed of snow bricks, affording a distance of twenty-five feet between the two instruments, and a huge block of ice introduced for the pedestal.*

On the 18th our younger men ascended Britannia

* This instrument came into action on the 21st of March.

Mount, about fifteen hundred feet above the sea-level, in order to observe the sun at noon. On Mount Beaufort, about two hundred feet above the floe, they were preparing the base of a very large cairn, or tower, to mark our visit and place of wintering. A cheer from this party afforded me the agreeable tidings that he was seen from thence; and had it been the Houses of Parliament in flames, we could not have hastened up the Mount with greater anxiety. There he was at last! Many and very dry questions were put by some of our humorous tars. He appeared very much distorted, like an oblong grid-iron, and but just showed his golden but intensely bright rays over the outline of the distant southern hills.

The preparations for ice travel are now assuming a more active and decided character. The order to be ready for service on the 15th of March has gone forth, the crews are all told off, and the respective sledge banners assigned, to be formally delivered at the general review My own peculiar ideas of the weather about the 10th of March will prevent any decided motion before that period. Many now are the discussions which take place as to the possible routes which Sir J. Franklin may have taken; but I firmly believe, from what most of us have witnessed, that, if he entered this Polar Sea "to follow the pack," no ship ever constructed could withstand its customary pressure. If he entered the Great Arctic Ocean, or Polar Basin, there he might be drifted for ever; for it never can, in my mind, be at rest. These reflections however belong rather to the end of our cruise. If he passed through Jones's or Smith's Sounds, it is possible we may have the happiness of meeting some of his

party among the Esquimaux, for I never can divest myself of the impression that their parties still continue to visit those lands.

February 27.—On this morning, the anniversary of my own birth, died suddenly, but not unexpectedly, William Cutbush, Marine. From the period of quitting England he had been suffering from pulmonary disease, and I cannot but express my surprise that such a man should have been selected or allowed to embark on such a service. In England he might have lived years: here his death was inevitable. To the public authorities I leave the case, as that also of our Marines generally. He was interred on the summit of Mount Beaufort, and over his remains that huge stone pyramid will be erected: a stone, to which a leaden plate is secured, bears the following, struck with metal punches:—

SACRED TO THE MEMORY OF
WILLIAM CUTBUSH,
Private, Royal Marines, of H.M.S. Assistance,
Native of Northiam, Sussex,
Who died on board on the 27th February, 1853,
after a protracted illness, from disease of the lungs,
AGED 34 YEARS AND 4 MONTHS.

He served with credit in the Royal Marine Corps for a period of 16 years 4 months, earning two badges and the Syrian Medal; twelve months in H.M.S. Assistance, respected by Captain, Officers, and Crew, and beloved by all who knew him; and died deeply lamented by his shipmates.

"HAPPY ARE THEY WHO DIE IN THE LORD."

I was unfortunately (possibly from taking severe cold in examining the excavating of the grave) incapacitated from performing the last ceremony,—the first time in my

life. Commander Richards, attended by the officers and crews of both vessels, officiated.

February 28.—Time flies! here is the last day of February: daylight at eight, temperature still hanging between −37° and −47°, and our "third portion" of the winter fast approaching.

March 6.—The temperature for the last two days has maintained a mean of −52·83° and −52·29°; maximum −47·5°, minimum −57·3°; enough to satisfy the greatest epicure that there is a cold season between February 27 and March 10! Possibly I should be one of the foremost to ridicule any man who asserted that any *laws* guide these matters, but rain is expected at St. Swithin's, summer commences in Canada and Nova Scotia almost to a day, and if any one will take the trouble to consult meteorological journals of cold climates, he will be able to *fear cold*, at all events, at particular dates: many chances at dice are calculated to much greater mischief and with almost unerring precision. But I shall not be satisfied until the 10th, or even the 15th, is past: no travellers will move before the latter date, and my movements depend very much on the matter. My chief object is to push across the depôts to the south side, between the 10th and 25th, for I have my misgivings if the final change, adapted to long journeys, will take place until the 25th. The orders however still stand for the 15th of March, and on that day the crews will be mustered.

March 13.—On the next page will be found a table of temperatures, embracing the last ten days, with the preceding maximum temperature.

1853	Maximum.	Minimum.	Mean.	
March 3	−16 0°	−35·5°	−22·60°	
„ 4	37 0	49·0	46·27	Mean of 10 days, −43 231°.
„ 5	47 5	57 3	52 83	
„ 6	49 5	54 5	52 29	
„ 7	48 0	58 5	51·96	
„ 8	38 5	46 0	41·54	
„ 9	31·5	40 5	36 83	
„ 10	29 5	40 0	35 08	
„ 11	34 0	45 0	39 94	
„ 12	34 5	40 5	38 13	
„ 13	31 0	40 0	37 64	
„ 14	14 0	33 0	26 50	

On the 14th of March the Surgeon inspected the crews, and reported—sound.

The outlines of the land are now becoming very distinct, and I have strong impressions that some of our neighbouring inlets may afford a nearer course to the Northern Sea; but this I cannot venture to look into until I have pushed this depôt across to Cape Lady Franklin. All our sledge crews are now eager for the work; and if any vestige remains, northerly or southerly, our parties this season will, I feel quite satisfied, settle the question most satisfactorily.

The morning of the 16th of March discovered the same old lady and her impudent cubs again on their way hither. This time it was determined that order and method should prevail, affording general amusement. All hands were summoned, and the sportsmen

par excellence were to be seen carefully loading their guns. No one was permitted to slam a door, or quit the ship; the utmost caution was observed. Our leading sportsmen were passed to the 'Pioneer,' one division in readiness to push to the south-west, another party to the south-east, the seven dogs and sportsmen about south. I did not join the hunt. However, some men there are who will spoil sport: who he was I know not, but before the enemy was within shot, he fired. The dogs however, on this occasion, did the business. Keeping the old lady in constant alarm and worry for her cubs, which the dogs dashed at, the sportsmen soon got within sensible firing distance; she fought nobly for her cubs, but it was useless to contend with musket-balls. All three were killed!—not however before the mother had given our principal, but worthless dog, a scratch which sent him away yelping, sickening him of such work for the future: a Dane, not an Esquimaux: he afterwards committed thefts and other improprieties, and ended his troublesome life by an act of suicide, with a spring-gun set for a wolf.

On the 17th of March a most decided change took place in the weather, the temperature rising, at noon, to +5·5°, on the 18th to +21·5°, and on the 19th to +14·6°. I consider the 17th, therefore, as the break of the season.

We now cleared away the hole for the tide-gauge under the stern, cutting through seven feet of ice. Owing to the daily increasing weight of the surrounding snow, the ice began to give under the pressure, and around the ship in particular the snow became uncomfortably wet. Taking the height of snow above the solid ice at fifteen

feet, and the mean thickness of ice at six feet, we should obtain twenty-one feet as the apparent thickness of the floe within twenty yards of our sides. All the ice between us and the 'Pioneer' is much thicker, and that between us and the shore grounds, where we had our tide-pole in sixteen feet! The *bonâ fide* off-shore floe of a season does not, I believe, exceed six feet in thickness, and should you come into collision with it, will find any increase quite immaterial: it does its work as surely as an iceberg of six hundred feet.

To return to our tide-pole: no sooner had this hole been completed, than the water rushed up similar to an Artesian spring, covering our promenades with about ten inches' depth of water, and causing some fears for the sinking of the snow wreath before alluded to, now representing, very prettily, a heavy white roller about to overwhelm the ship.

At times I did not feel quite satisfied that mischief might not occur. Our fire-hole, abreast of the ship, had been kept open all winter, and no such overflow as this had occurred. Taking also into consideration that the enormous weight firmly attached to both sides might, by some sudden movement, be released on either; the strain which any such sudden action must produce would materially injure the ship. We had no remedy but to "let well alone,"—and all would probably in due time work its own course, irrespective of any feeble efforts that we could make; independent of which, it was not a time to weary our crew with any unnecessary exertion. With the low temperature which must yet prevail for some time, and probably below zero, this must

soon freeze into a still more solid mass. I began now to repent having altered my determination, of weeks past, to start the depôt on the 16th: but we live in glass houses. If any accident resulted, and the party had started before the 21st, blame would have been heaped on me. "Success is wisdom;" but to keep up success, leave no hole in your jacket unmended. I was persuaded easily (for this reason) to await the 22nd.

On the 17th of March it was calm, with the thermometer at +1°. I inspected eight sledges,—officers and crews,—in travelling order, and complete as in tables in Appendix. The first division, now about to start, under Commander Richards, numbered six sledges.

Commander Richards	8 men.
Lieutenant Osborn	8
Lieutenant May	11
Mr. Pym, Matc.	11
Mr. Allard, Master (additional).	11
Mr. Ricard, Assistant-Surgeon (additional)	8

57 Men. 1770 Rations.

On the 19th, blanket wrappers, travelling-boots, mits, etc., were completed. I am not aware that these subjects have been discussed, but they are matters which to the landsman require explanation; and where success attends any particular mode of dress, any habit of travel, etc., it becomes of importance to the general interests of this service that it should be recorded, for good or evil, to be followed or avoided. Hitherto all our attention has been most intensely directed to the foot equipment. I have throughout disliked the carpet boots: for travelling they are useless. The last Expedition, I believe,

established the canvas boots,—the Hudson Bay custom, the blanket wrapper. This latter is formed of a piece of good thick blanket, of at least fifteen inches square.

It is very important that these feet wrappers should be well put on, and elastic socks should have been provided to keep them in their places: the stoppage, to replace them, will seldom be permitted; and exposure to cold in doing so may inflict frost-bite. The boot must not be tight, and no pressure should be allowed at any part: I fear the canvas straps on the instep of those now made may prove injurious.

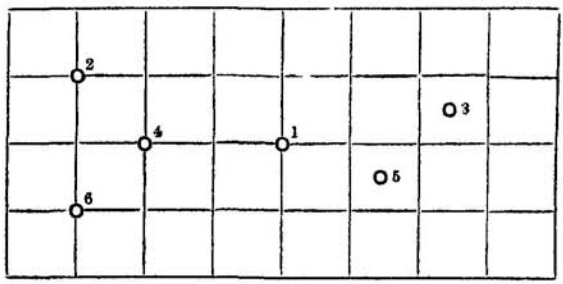
March 22.—At 7.30, temp. +22°.—The depôt-sledges, charged with fifty days' depôt for twenty-four men, or twelve hundred rations, independent of ten days' for the party, consisting of sixty-seven men, took their departure, under the command of Commander Richards, the remainder of the crews accompanying them to the point where they all made sail; each sledge being fitted either with sheers or masts, according to their separate idea of sledgemanship, and using the tent bottom, about nine feet by twelve, as a sail. They carried also with them a whale-boat and light ice-boat, on sledges prepared to support them. These, with the depôt, were to be se-

cured at Cape Lady Franklin, about twenty-five miles distant from our outer island, the party returning to prepare for their extended trip. The morning was fresh and gloomy, with the breeze freshening from south-east, temp. +22°; but as all were equipped and eager for a move, and I had not the least doubt as to the weather improving, I was glad to start them, and accompanied the little fleet to the outer point of the bay, where we parted, giving God-speed. As they receded and gained sufficient distance to be grouped, they resembled very much a small pirate fleet, no two preserving the same appearance of rig, and, as might naturally be expected at their onset, many failures and loss of spars resulted before they finally cleared the rough ice.

About ten, Mr. Allard's sledge, having broken down, with the whale-boat, returned: another was immediately equipped, and he was packed off again at 11.50. As I strongly suspected, Mr. Allard reported the ice to be soft in the cracks and very difficult for travelling; however, our scouts from the hill saw him moving on cheerily towards the outer island before nightfall.

On the 23rd the morning proved dull, but the day turning out fine, with a temperature varying from 5° to 10°, I took advantage of this lull to rescue our thermometers, buried in the snow-heap since October 25, but now sinking very perceptibly, owing to the general diffusion of water over the surface. The object in view was to prove the question, as to what distance or thickness of snow cold will penetrate vertically, or horizontally. Six's thermometers, if properly constructed, will register maxima as well as minima temperatures; but I must

candidly say, that I never saw but two that stood their work, and they belonged to a water-bottle, constructed for me for obtaining water and determining the temperature at extreme depths (twelve hundred fathoms or more), that could be relied on. The block of snow in question measured sixteen feet by eight on the surface, was eight feet in height above the ice of the floe, and constructed of large blocks of solid snow, cemented at the joints, or "pointed," with wet snow, which in a few minutes formed into ice. The interior was filled in and well trodden with loose snow, spars being placed where the thermometers were to be inserted: their withdrawal left firm cylindrical holes. Next to the more perfect operations of Dame Nature, this, I believe, comprehended all that was desirable. The diagram will exhibit the disposition of the thermometers, inserted when the temperature was at zero and their indices set.



No. 1, centre, 4 feet from N.E. and S.W. sides, 8 from N.W., 6 feet deep.
No. 2, 2 feet deep, 2 feet from sides.
No. 3, 3 „ „ 3 „ „
No. 4, 4 „ „ 4 „ „
No. 5, 5 „ „ 5 from S. and E., 3 from N.
No. 6, 6 „ „ 2 from sides.

But great confusion in withdrawing them occurred, by which all confidence was destroyed. The results I have; and they convey to my mind merely the fact that this bank of snow did withstand a much greater amount of cold than I had contemplated, but they were not spirit, nor reliable, instruments. About this period also, and whilst Commander Richards was absent to the southward, I tried several experiments on illuminating beacon poles by sheets of tin; a cask was also covered with tin-foil, etc.; but unfortunately the point where he landed was not in sight from the Observatory hill, where these marks were erected, nor did his track permit his noticing them. A variable or revolving heliotropic vane was constructed, but the cold, acting on the metal spindle and collars, did not permit it to traverse freely; it may be described in the Appendix.

The customary labour, and wear and tear of clothing generally, in the construction of cairns, is overlooked by our superiors when they issue orders on these heads: one half-hour injures boots, mits, and clothing. more than can be conceived. Nor can the officer look idly on: he therefore feels, as well as sees, the necessity of providing special gloves or hedgers' mits for this duty. I directed extra boots and mits, faced with seal-skin, to be issued to the cairn builders of my own division, where these duties entailed on them especially, this laborious species of work, and for which no provision had been suggested.

In our present occupation of adding to the building on the summit of Mount Beaufort, day after day, using carts to bring up the stones, the wear and tear of clothes

was also found to be very tedious.* Independent of our instructions, the would-be monitors, who write to see themselves in print in the public journals, insist on our building cairns in even *impossible* localities. If any of these should be honourable (right or wrong) Members of Parliament, I would advise them to amend the next vote for Arctic Service by the increase of the supply for the purchase of gloves, etc., as well as of some simple succedaneum for the cairns themselves. It is not often that stones can be found, and when found, that they can be detached from their ice-bound beds. Many shovels and picks† are destroyed, which break easily in cold weather. Our predecessors omitted to hint at this; indeed many here have kept their secrets most religiously, to our discomfort. But it is really grating to my feelings to hear the oft-repeated tale amongst my crew of "how many pairs of mits they bought, how many were supplied by Government, and that they are now reduced to take up Purser's." In this manner the Commander often hears very unpleasant truths, beyond his power to remedy!

March 25.—The depôt division having departed, and left me free, I determined to avail myself of the interval by exploring one of the creeks at the southern end of this Sound, which seemed to promise some chance of connection with the Northern Sea. I was under the impression that it might possibly, by slight portage, enable

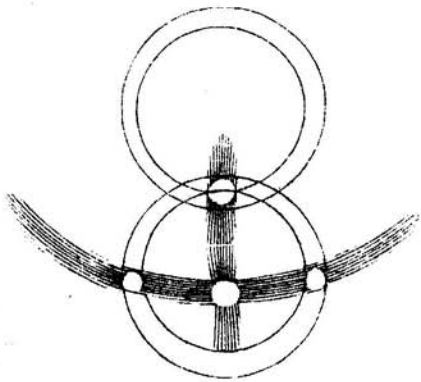
* In England pay might enable a man to devote part of the sum given for the endurance of such a climate: but no money here could buy a serviceable pair of gloves or clothing!

† All these tools were wretched, very inferior *even for ice*, and kept our blacksmith constantly employed.

us to throw across our depôts, avoiding some days' troublesome and circuitous travelling. Accompanied by Mr. Loney, and a sledge crew of six, with four days' provision, and the Cape York dogs, we started this morning about eight A.M., under the "Blanche" banner—"Bright eyes for brave hearts." The bright eyes prevailed: temperature —5°, wind in our teeth! We reached the entrance of this creek about noon, where we lunched, and I ascended the peninsula, to make sure which of two openings I would select. The south-eastern appearing to offer greater advantages, I decided on it. As we advanced, the deep ravines and steep beetling cliffs seemed to invite a more distant lead of inlet easterly. The wind was now not only sharp, but strong from the south-east. rendering it difficult, over polished ice, denuded by the wind at every swell, from keeping our feet or making progress. This was more particularly experienced under the glacier of Mount Blanche, and its high cape within, which reminded me of the gales off Cape Sicie of old (do they blow since the Peace?), and this appellation I bestowed upon it. It resulted clearly from the configuration of the land, as the breeze altogether ceased as we passed into the depth beyond. Recent deer-marks,* or those of musk-oxen, were noticed on the snow patches of the peninsula, but *side by side*, as if four animals had walked *abreast*. But these snow indentations are so very deceptive, that I do not place great reliance on them: one head is worth a thousand feet. Our journey ended

* They were not deer-marks, and the late appearances in this country induce me to think that this form is frequently produced by *snow-drift*.

about four P.M., at the further (south-east) end of the creek; but the valleys evidently connected, north as well as south, with the other interior openings, particularly towards Hungry Island. During the time the men were occupied in pitching the tent and preparing supper, etc., I strolled up the mountain until I almost "found myself" on a commanding eminence, about eight hundred feet above the level. A cursory glance around satisfied me that all my anticipations, either of advance or retreat by any of these ravines, must be entirely quashed. Still, as several heights easterly might serve to tie the work of this season (in prospect), I determined on the morrow to make an inland excursion, and place a beacon where any eminence to the north-east offered, likely to afford such a desirable connection.

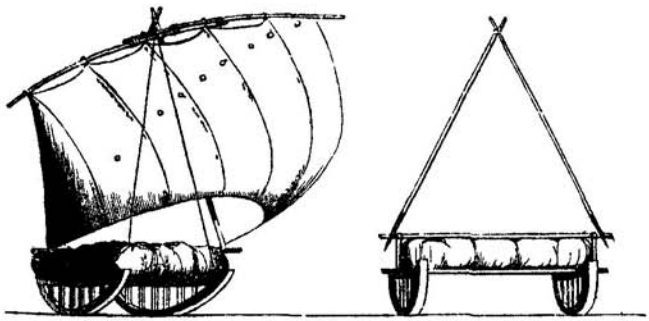


The fine drift-snow blown off Cape Sicie, and continuing suspended about that level, produced some very beautiful parhelia, dividing the arc contained between the zenith and horizon into three spaces, and forming four illuminated spots, the prismatic colours varying mo-

mentarily in intensity. The distance we had travelled on ice was estimated at ten miles: I notice by the plan that it was fourteen.

March 26.—Temperature —7°. Our night in the tent, being the first of the season, notwithstanding the temperature did not fall below —7°, and calm, was much complained of by all; and when a bright morning afforded hopes of comfortable exercise at this temperature "over the hills and far away," it was unfortunately accompanied by a troublesome fresh breeze from south-east. It is not to be understood that temperature here is concerned, because —10° is the approved degree for travelling—is pleasant, to our feelings balmy; but a cutting south-east wind, charged with fine drift, on the mountain-top, breathing heavily, is no pleasant "barber." As we surmounted the hill-difficulties we were surprised to find around us gently undulating surfaces, at times so perplexing in the distance as to confuse the senses, and cause one to deem them floe (or what would be level sea). Frequently did I observe, "Well, there at least is good floe to travel on;" but very shortly this vision was dispelled by the intrusion of some headland presenting a very much lower level. Upwards of four hours we continued to advance to the north-east, gradually ascending in the hope of catching some glimpse of the North Sea. Glimpses of the horizon I certainly obtained at times, through long lines of distant ravines; but the northern mountains, added to the great haze, put an end to all hopes of any proximity to the northern water. Selecting therefore the nearest eminence, with regard also to building materials, a conspicuous cairn was constructed,

seven feet high by nine feet in diameter at base, and of such substantial stones as will last more than a season. My own impression was that I saw some point or island through the valley. Time did not admit of further progress, and that securing return before dark now became important. The cairn which we had constructed afforded some little shelter from the cutting breeze, and under this we lunched. Cold meat, of course, and a cutting cold atmosphere,—for the temperature had fallen, and our men were *feeling it aloud*. Between the snow-dust clouds I could now and then distinguish certain objects, which satisfied me that I had reached the hill which I had contemplated from the Observatory. Our packing up, and forward, or return movement, was rapid;—so much so, that when I found myself at the tent, I resolved on seeking a more convenient shelter for the night.



We therefore packed up, and started under canvas. Our craft was rigged in the most approved Sooloo pirate style: sheer masts stepped into a specially fitted batten, forming an isosceles triangle, with the means of support

by shrouds from its extremity, greater by two feet than the width of the sledge, which had also been increased for carrying the ice-boat, and our tent bottom was now formed into a well made sail. We were therefore "ship-shape," and might easily be mistaken for a gig under her customary lug; or, in case of very reduced canvas, it could readily, by elongating the yard, constructed of one bamboo and one tough mahogany flag-staff, be converted into a latteen (in the line of holes from tack to yard-arm).

I have before alluded to the floe we came over, head to wind. Our progress now was somewhat swifter; but of this very uneven and extraordinary floe I would now speak. Whence arises this wavy, glassy ice, undulating at such a very sharp pitch, viz. about two feet rise from the level hollow to the vertex or crown of the succeeding arch, or on a chord of thirty-two feet, about two feet difference of level?

The age of this ice—and it pervaded all the portion subject to this windy part of the strait—appeared great. The only rational cause to which I could assign its formation was the channelling by summer thaws and the forcing the water thus produced by the prevailing gusts over the irregular ridges, on which the sun did not act: this is the more probable, inasmuch as some of the intervening spaces, covered by the snow, presented smooth, clear blue, level ice, in long spaces, evidently where the water had been quiescent, whereas all these abrupt swells were composed of grey ice, rough, and abounding in air-cells of the size of hemp-seed or peas. As I before noticed, within and without this strait it was not met with; there the ordinary level snow-clad floe prevailed.

We left with a gentle breeze, under all sail, going at a very pleasant trot beside the sledge, until we came upon this rough sea. The velocity of the sledge, caused by the sudden increase of wind under Cape Sicie, tripped all hands up and dragged them astern, face downwards. I was on the sledge, and dropped myself in time to avoid the consequences of the capsize which one of these waves caused. We escaped with one damaged spar; replaced it, and moved forward more cautiously. This time our engine ran away; again all hands let go. I was perched, for ballast, on the weather-quarter, across which a long gun-case, three feet six inches, was lashed; but, as if my neck was destined to be continually in jeopardy, I experienced a gentle summerset, driven at a radius of four feet, with sufficient impetus to derange it;

however, I escaped with slight damage, and the sledge upsetting on a lee shore, enabled our crew to regain it. We now reduced our sail to a latteen until we cleared this frozen ocean, and eventually pitched our tent for the night on a fine gravel beach. This I well know, by experience, to be bad; but as the majority seemed to think they had bettered themselves, I was determined to let them learn, and not have to thank me for my inter-

posed authority. *Experientia docet*, when men can be made to understand it; however, stone will, like metal, take a lower temperature than snow, and will of course abstract heat in a similar proportion. Each complained of greater cold. I was silent; some smiled, few slept, but all were very glad when chocolate was ready, and it required no second call to rouse the slumberers. Dry gravel, under summer sun, is however very warm, and to be then preferred.

Striking our tent, we now moved on for the ship, but I soon found that such antics do not suit my present constitution, and that severe spasms of my right leg compelled me to use a compress. We reached the ship at eleven A.M. on the 27th.

On this short excursion we fortunately discovered the inadequacy of our cooking-lamps either for stearine or spirits-of-wine. Instead of brazing, they had been simply soldered, and the first time the spirit was used, the supply-tube fell off, the spirit (the entire day's allowance) was lost, and the tent endangered; and yet these things are put into the hands of the proverbially "careless and inexperienced seamen!" What mechanic could dream of burning stearine or alcohol in soldered vessels! even the nozzles of the tea-kettles were so secured! Doubtless the Government paid very handsomely for these inefficient claptraps, but our blacksmith had enough to do to keep them in repair; indeed we were lucky to obtain him, for the steam department did not aid us in such matters, beyond helping the blacksmith in tin-work and at the bellows. These matters at first sight do not occur to the uninitiated, but they are pregnant with danger,

as well as inconvenience. Let us suppose that we had started with spirits only, as intended; but in this case we had a small supply of stearine.

First act: spirit-lamp defective—feeding-pipe falls off (soldered to the side and bottom, instead of top). The alcohol flowing round and below took fire, and destroyed the lamp for use. If I had not been present and made a substitute, all the fuel would have been expended. But let us imagine that the tent did take fire, what would be the condition of the party? First, loss of shelter, and, from the attempt to extinguish the fire, inevitable frost-bites; the result, loss of members bitten, or life! But there are other miseries; without fuel, neither water, tea, nor chocolate to drink, could have been procured; and thirst at this season, particularly at the commencement, is intensely felt; but had such an accident occurred at the outward limit of a journey, the result is fearful to contemplate! What then, I may ask, would be the chances in this region for our missing countrymen, if they escaped from their vessels? Fuel, even in savage life, is requisite.

Truly these preparatory journeys are valuable; they point out our wants, and direct us to supply the deficiencies. Already each Government stearine-lamp has been replaced by our own ship-made, and a composition formed with two parts of whale oil and one stearine, cast into plates, with wicks included to fit them, supersedes the lamp, so that lighting the fire is simply lighting the candle of some eight inches' diameter. Some for my own sledge were formed from bees-wax and oil. The spirit-lamp for my own sledge was superseded by a cop-

per vessel, hammered out of the solid, with six lips for wicks, affording the facility of adding oil, or walrus, bear, or bacon fat. These two light and simple articles are available for any purpose. Our copper vessels have been riveted and brazed, but the kitchen itself, the outer casing of tinned iron, is already asunder! How many years have they been warranted to last? Gone before one season! Very stringent orders will be given to preserve their remains for future service. The test which I would prescribe for all such articles, in copper (to be tinned after), would be boiling oil: if they stood this they might be received, not otherwise.

Our appearance, short as our absence had been, brought officers and crew out to help us: to that comfort we were anxious to reach, for our cruise had somewhat shaken me, and the constant talking of cold which the men experienced, made me far from comfortable.

March 29.—Our anxiety for the return of our party kept me very often on the hill, and today, turning my telescope towards the outer points, where I intended to place some beacons, I noticed dark objects in motion: ducks they could not be, but, deceitful as the atmosphere is on the ice, I was soon able to discover that they were the heads of our sledge crews, rounding the spit of ice off the outer island, when they all, strange to my mind, pitched their tents on the spit. I was not long in sweeping the island crest and discerning that this motion was connected with parties cairn-building; and after constructing two, they rejoined the tents and advanced. Affording them time to make their march, I took the direct path to cut them off, and joined them about two

miles from the ship. I was glad to find them all in health, high spirits, and free from casualty; but I could read clearly that this trip and return had proved of great importance, and rejoiced I was that they were prevented from proceeding until they had refreshed themselves and remedied deficiencies discovered on this first brush. It had proved a work of labour, but the difficulty was now diminished.

In condensing the able report of Commander Richards I shall use his own words, omitting only passages of detail, which will probably be printed in another form. The date of starting, etc., has been already stated as the 22nd of March, at seven A.M., temperature 22°; the sledges being commanded as under:—

The 'Sir Edward'—"Loyal au Mort" . .	*Commr Richards.*
The 'John Barrow'	*Lieutenant Osborn.*
The 'Reliance'	*Lieutenant May.*
The 'Enterprise'	*Mr. Allard.*
The 'Sir F. Baring'	*Mr. Ricards.*
The 'Perseverance'	*Mr. Pym, Mate.*

57 men and officers; depôt, 1200 rations; provision, 570.

"The wind fresh from south-east, and weather hazy, we started under sail, steering for Spit Island west extreme, and accompanied for a short distance by the Captain, officers, and remainder of the crew. At ten A.M. we got amongst hummocky ice, and the sledge 'Enterprise' capsized with the boat, damaging herself so much that she was sent back to the ship to refit.

"About two we encamped on the low western extreme of Spit Island, to await the return of the 'Enterprise.' At five the 'Enterprise' rejoined with her boat: George

Youngson, of the 'Perseverance,' fainted at his sledge, but a little brandy, and his dinner, recovered him.

"*March* 23.—Calm and foggy, + 8°. Started at seven A.M., and came almost immediately to heavy ice, which we dragged through all day, with severe labour to the men and damage to the sledges. It was a perfect frozen pack, which we were obliged to cut our way through with pickaxes. The snow-drift very deep between the hummocks, which we found of use in making the road with. Two walrus, an old and young one, were wounded today in a hole of water, but were not captured. Encamped at 4.30, and patched up the 'Enterprise,' which sledge had suffered severely among the hummocks.

"*March* 24.—Light wind westerly, with thick weather We started at 6.45; at 7.35 came to better ice; at 11 lunched: nothing important.

"*March* 25.—At seven A.M. started: wind south-east, fresh, and hazy. Cut a road through a confused heavy pack with picks and shovels, and after five hours' labour succeeded in accomplishing little more than a mile, when we reached an old floe, halting at noon for luncheon. A bamboo and flag was left to mark this, 'The Queen's Causeway.' Encamped at 4.30. Wind strong from the south-east during the night, and the tent very cold.

"*March* 26.—Wind south-east, strong; weather thick. Started at eight A.M.; scarcely able to see thirty yards ahead for snow-drift. Many slight frost-bites* occurred amongst the men. At 11.30 halted for luncheon; although close to it, no land in sight; moved forward, being too cold for undue delay. At 11.50 saw Cape Lady

* Frost-bites temporary, removed by snow or warm hand.

Franklin close to us. Ice very uneven in-shore, and the stupendous hummocks which line the coast, and which must have been pressed up by a succession of north-west gales, are between seventy and eighty feet high: I should say that they have stood the thaw of many summers, and seem little affected thereby. The old floe which we picked up yesterday did not carry us to the south shore, but a narrow belt of new ice intervenes. At 12.30 we landed on the south shore of the Queen's Channel, and planted the Union. The depôt was placed on a sloping point, about eighty feet above the sea-level, and one mile from the summit of Cape Lady Franklin, east of it. The point is projecting, and is computed to be the nearest land to Spit Island; the heaviest hummocks of ice are grounded on it. The depôt consists of the boat turned bottom up, with the other stores placed under it. Over the boat a flag was hoisted, and the customary record in a tin cylinder left."

The vegetation on that shore appeared to be more abundant as well as forward; traces of deer noticed; formation similar. Ascended the higher land; noticed eight or ten deer feeding in pairs in the valley westward: two passed within fifty yards, the doe and fawn. The return to the ship is but the outward journey reversed. Canvas boots approved, as well as blanket wrappers. Carpet boots decried for travelling, causing sore heels to those who used them. Commander Richards is satisfied with the allowance of provision, but objects reasonably to mixture of pemmican and preserved meats.

The sledges have been much strained by rough ice: that belonging to Commander Richards so much shaken

that it must be replaced. One missing, either buried in the floe, or in the snow on shore: the latter might be recovered. But the peculiarity of losing anything on the floe may be readily understood by the fact, that a snow-house and block for thermometers, constructed on the floe *level* in October last, are now just even with the surface snow, or the level of that of the snow-bank of our port-beam, fourteen feet above the solid ice. As the season advances, and the *sea* increases in temperature by the great amount of thaw beneath, the ice is removed from the *lower* surface, water percolates, and the upper mass freezes; and, as a matter of course, things which occupied the upper icy surface in October, must be sought for beneath it in May. Those which float may be recovered, but it may be possible that a pile of bottles, owner unknown, may yet be extricated at the mouth of Wellington Channel. In November I heard rumours of such losses, and directed all tins and bottles to be removed to the land, that no such accident should mislead parties as to our fate. The hills have not been, so to speak, snow-clad during this season: any strong breeze denudes them, and the earth is in places ever visible.

I cannot take leave of the month of March without some remarks on its peculiar character. Of the early part of the month, or first half, I have already made my extracts. From the 16th, the + sign prevails as high as 24°, the minimum being −18°. This, by referring to the comparative table of the two 'Hecla,' 'Enterprise,' and 'Resolute' voyages, is contrary to precedent, no *plus* sign occurring at all! The following comparisons will show the great peculiarity in this month:—

	Maximum.	Minimum.	Mean.
Assistance (1853)	+24°	−55 5°	−17 75°
Hecla (1820) . .	+6	40 0	18·10
Enterprise (1849)	+8	51·0	22 80
Hecla	−9	47·5	28·37
Resolute . . .	−8	44·5	25·70

We have experienced the month nearly divided between intense cold and (*to us*) intense heat! Between the 16th and 26th we experienced a change to a mean on ten consecutive days of +5·593°, and on seven consecutive days +10·627°, the maximum being +24°, minimum 17°.

I take leave of it, and bequeath it as a legacy to the speculative theorist at home.

CHAPTER X.

The Cairn.—Anticipations.—South-west Expedition.—Tidal Motions.—Return of Mr. Loney.—Dog Killed.—Letters from Pullen.—North-east Expedition.—Tent Arrangements.—A Cold Bath.—The First Depôt.—A Wolf.—Princess Royal Island.—Tidal Rents.—Snow Blindness.—Mount Parker.—A Whale.—Hamilton Depôt.

April 1.—The summer heat has already informed us that our pile must be rebuilt, and that snow or *frozen stones* are not fit materials for any weighty structures. The basement, constructed of substantial stones, is firm, but the sun acting on the surface has thawed all the loose ice-bound matter, and now compels us to reconstruct the upper part, which has fallen: a practical lesson on all cairns built before summer.

On the 2nd the weather proved fine; a party was despatched to rebuild Mount Britannia beacon afresh, and to look around on the ice. This beacon was surmounted by a blue and yellow flag, and adorned with many preserved meat tins, flattened out, and hung in such positions (with their tinned surfaces outwards) as might afford a glimmering ray from these heliotropes, to the southern travellers.

A specimen of the stone brought to me today from Spit

Island appears to be a bituminous shale. It might serve, with coal, to keep up the heat, but I do not find it to be capable of burning or maintaining heat, unless so aided.

When I look back to my order, issued in February, "that the sledges were to be ready to depart on the 15th March," I confess that I am somewhat astonished; possibly other matters before this cruise is ended (?) may be as satisfactory! But with the summer this habit seems to decline. To my own mind I think I could have found very plausible reasons for anticipating the preceding events; but beyond my conception of the direction of my intended route to the north-east, I have nothing now beyond guess to help me through the summer. Hope I will, nevertheless: that can never be denied. Indeed, without some preconceived opinion on such a service, how am I to frame my orders? Surely not on the snail principle: "nothing risk, nothing gain."

I notice the following amongst my rough notes:—"I like calculations ahead, and shall divert myself with another pet theory. I have noted generally that a warm or forward spring in cold climates, even in England, is seldom checked by any return of cold. In April, 1852, we retained a cold spring, and carried it to Greenland, not experiencing a greater maximum temperature from 1st May, at and after quitting Stromness, than 50°. Summer we did not experience, 45° being our maximum summer temperature in August. On the 8th, at noon, the moon changes; and about midnight, on the 9th, we may expect a decided change. If a gale ensues from south-east we may expect high temperatures, but no travelling. I shall direct the south-western expedition to be ready to

move on the 10th. In arriving at this determination, I think I am even late. The minimum temperatures generally occur when the travellers are in their blanket bags, and the cold is not so much perceived. To have been present, and watched our changes, might have furnished food for ridicule.

April 10.—This morning, at two A.M., our attention was intensely on the alert.

At Midnight	−21°
2 A.M.	−16
4	−14
6	−8·5
8	−4
10	−2
Noon	−5

It had been arranged that Sunday, 10th of April, should be the starting day. The sledges were laden and inspected on Saturday evening. After special prayers on Sunday, the crew were allowed to sleep until four P.M I took an early dinner with the officers, and shortly before four the sledge banners were presented, and their commanders and crews severally addressed. An address was also made to the crew generally, and the entire banners being displayed, fluttering in a north-west breeze then springing up, and adding a fresh spur to our eager hands, we took leave of Richards and his gallant band of six sledges and fifty-seven men, gliding forth from our remaining banners, with feelings which I am unable to commit to paper. The division comprised the same sledges as before, Mr. Herbert now taking the 'Success' and Mr. Grove *pro tem.* the 'Enterprise;' Dr. Lyall the 'Lady Franklin.'

E.B. del.

Vincent Brooks, Lith.

Departure of South West Division

Each sledge was stored with forty days' rations for the number of men (fifty-seven), making the average draught per man about two hundred pounds. Commander Richards was the bearer of despatches for the Admiralty, *viâ* Melville Island, as well as others for Captain Kellett, to be left at the previously ordered rendezvous in 77° N. and 105° W. The arrangements contemplated the Commissariat sledges to aid Commander Richards until he had reached the meridian of 110°, when he would have forty days remaining, and adequate depôts secured for his return to Cape Lady Franklin, where the whale-boat, with sufficient provision, was already deposited; he was also provided with one of the light ice-boats.

The little fleet, having at this time their masts better secured, sails reefed, and their Commanders having in every way gained experience from their former trip, now sailed away more "ship-shape," and were soon lost to our view.

One great feat complete, I had now to revert to my own course. I had heavy difficulties to contend with, but go I must: I could not leave such an important trust to any one I had here. The first step was the completion of my official correspondence for the Admiralty, to be deposited at Cape Becher, where I fully relied on my emissary being met by one from Commander Pullen, if he himself did not come.

April 11.—The weather continuing to hold out the prospect of moderate temperatures, our mean being above zero, I determined on despatching two sledges, under the command of Mr. Loney, aided by Mr. Allard, to lay out our first north-east depôt. This was also in-