

behind, and I see no use (myself), not being in a position to judge, of leaving a crew if the vessel is safely placed. The facility, or otherwise, of Richards's enterprise will guide you better than anything I can advance.

I prefer, if new hands are sent out, that the depôt shall be at Beechey Island and Port Dundas, of which inquire of Richards.

But bear in mind that the lives of all "*the touched*" must be secured by their presence at Beechey Island before the 1st of September. I may send away 'North Star' even before that date with invalids and 'Investigator's.'

Under every advantage I cannot see the prospect of your release past Cape Hotham before the 1st of September; the steamer might (?); but I have some idea that if you abandon it will be at Melville Island, for I can readily imagine the pains and penalties of such a proceeding before reaching a place of security, and where indeed such an act might be more than hazardous.

I have not the slightest conception how many might be induced to remain out in any of the vessels; but as far as I can see into the constitutions of those who have been out before, and talk most, I should not think it safe to leave *any volunteers beyond Beechey Island*, not for want of spirit, but from the chance of *inability to travel* at the required moment. This becomes a matter beyond surgical advice. We who have commanded so many years know full well how suddenly, without disease, men droop and will not recover,—in fact, make up their minds to die.\*

I have many men fit to travel forty miles to the 'North Star,' but it would go hard to make them travel from Northumberland Sound had we been frozen in there all this season. Indeed, it is a matter beyond our feelings; and as I can only read their Lordships' intentions to mean that a crew was to be left, if I thought proper, in September last: if it be their intention, and they will know if it be important by the failure of intelligence from Captain Collinson, fresh volunteers will be sent from England.

*Captain Richards may however inform you of my reasons for moving east to Port Dundas before the season closes, as I have strong suspicions that the fate of Sir John is to be sought southerly of Lancaster Sound, and the assistance of the interpreter of the 'Investigator' is important.*

I do not perceive that you have taken Commander McClure under your command; I therefore, to place this matter beyond any possible doubt, enclose to you the requisite order, and you will bear him and

officers and crew on your books as "Supernumeraries for Victuals and Wages," but not doing duty unless by your order, in which you will be guided by the Admiralty Instructions.

Should Captain Collinson fortunately reach, you will pursue the same course, and not under *any consideration risk the detention of another season.*

*These are the views of Government ; and having so far explained myself, I will not hamper you with any further Instructions, than meet me at Beechey Island, with the crews of all vessels, before the 26th of August.*

Trusting to an All-merciful Providence that you may be able safely to effect this, and that we may all meet in health and cheerfulness at Beechey Island,

Believe me, faithfully and sincerely yours,

EDWARD BELCHER, *Captain,*

*Commanding Arctic Squadron.*

TO CAPTAIN HENRY KELLETT, C.B.,

*H.M.S. Resolute.*

It is unnecessary to trouble my readers with private matters, but my explanatory letter of the 12th of February, which accompanied this, and *demi-official*, runs :—

I foresee their Lordships' next Instructions, and under this conviction have sent you orders *to abandon*. It is impossible to trust to the middle of August ; last year the 'Phoenix' left on the 26th, and I *even doubt* if she got home *safely* ! I know, my good fellow, how troublesome it is to make a resolution when no orders cover it ; therefore I have been *so explicit with you*, and put it beyond the power of those at home to tell me I should have been *decisive* (as they did when Monypenny walked off with the barge). It is clear now that no ship can be of any use westerly of Beechey Island if you secure 'Resolute' in any safe position, for the facility with which Richards will reach you will place such matters beyond doubt. \* \* \*

I have a strong impression that Collinson will either come up Peel Strait towards Leopold Island, or meet Rae and accompany him to the Hudson's Bay Settlements. There too I see a failure : he would not have boats to carry them. But knowing of 'North Star' at Beechey Island, he must naturally be driven to prefer this route, with the certainty of a steamer to take him home in August.

These observations were written under the impression

that M'Clure had tried back and left information for Captain Collinson.

How odd if the steamer had to carry home the Captains of five ships, besides tenders: yet such may be the case! As to poor Sir John and Crozier, that affair must be for ever decided. I firmly believe he was seen in Prince Regent Inlet by the natives, reached Union Bay, there got damaged, and tried to get home. I have never ceased to think about those seams of oakum.

I have a strong presentiment that those natives at Dundas Harbour know something of Franklin, and I shall try hard to get a party down there with the first open water, and hope Mr. Miertsching may arrive in time to join them. They have evidently robbed the depôt at Navy Board Inlet, as Inglefield found the doctors' scales, jars, part of a lime-juice case, etc., among them. They had also robbed the cairns of notices, and who knows, as Ommanney's was purchased last year, that when they return home, finding paper a valuable article of traffic, they may produce some record of Franklin?

Such were the communications forwarded by Commander Richards, and, as I deemed, to a second in command, *decisive*.

## CHAPTER IV

Land reached.—Ice-gauge placed.—Ice Table.—Second Sledges leave.—Observations on Thermometers.—Absence of North and South Winds.—A Clever Wolf.—Wines frozen.—Capture of a Fox.—Undue Cold.—Indications of the Season.—A Hare shot.—Arrival of Lieutenant Hamilton.—Establishment of *Caches*.—Captain Kellett's Proceedings.—Return of M'Clintock.—Abundance of Game.—Position of 'Investigator' and 'Resolute.'—Insecurity.—Communication impracticable.—Allotment of Crews.—Health of Crews.—Deaths.

I SUCCEEDED today in reaching the land, and strolled along the first terraced level, from which I obtained a fair view of the Channel, and am inclined to think that appearances at present are in favour of our getting out of this trap in summer, if not clogged by Admiralty Orders ; I mean, as to imperative return of the steamers sent to our relief. If the open water about Beechey Island permits of the detention of the vessels there, it may be possible that 'Assistance' and 'Pioneer' may be extricated in time to prevent the very great mortification of abandoning our homes and all our valuables ; for having experienced one heavy loss in the 'Samarang,' I have no wish to conclude it more decidedly. Two fires are deemed to be certain ruin.



*February 24.*—In November last I alluded to experiments then commenced, in order to determine the very contradictory assertions made as to the ratio in which salt-water ice, or the floe, freezes. In order to test this question satisfactorily, I caused a wooden tube to be formed, having its two opposite sides partially open; in fact, the two complete and parallel sides were simply retained in their position by battens.

This tube was inserted in a hole cut on the smoothest part of the floe, the surrounding ice being of very even thickness, viz. eighteen inches. A cross batten on the upper surface was placed, not only for the purpose of upper level gauge and suspension, but also to determine if any increment took place on the upper surface by evaporation from beneath, or from consolidation of the superior snow by a similar action of escaping vapour; or, in plain terms, two questions were to be solved:—

1. Does the ice increase solely from the water beneath? Or,
2. Does it owe any part of its increase either to vapour escaping (on freezing) by percolation through the crust, and consolidation above?

On radii, from the gauge as a centre, holes were cut every ten days, and the thickness of the ice strictly gauged. The result on withdrawing the gauge at the end of 110 days affords the following table, which, as the batten still occupied its original position, also proved that the increment has been solely from beneath.

The tube was inserted November 5; the upper level, five feet six inches; ice thickness, eighteen inches; space above gauge, eighteen inches.

Date.	Thick- ness.	Days.	Rate.	Mean.	Max.	Min.
Nov. 5, 1853	18 in.					
„ 25	28	20	0.50 in.	25.756°	+2°	37.00°
Dec. 5*	36	10	0.80	24.128	-12	36.00
„ 15	39.5	10	0.35	31.936	-19	40.00
„ 25	44	10	0.45	28.628	-16	39.00
Jan. 4, 1854	54	10	1.00	17.004	+26	-46.00
„ 14	51	10	0.35	37.228	-24	-45.00
„ 24	54	10	0.35	43.952	-27	54.75
Feb. 3	59	10	0.50	47.362	-28	-59.25
„ 13	63	10	0.40	45.899	-33	-55.75
„ 23	67	10	0.454	35.301	-23	-45.00
†						
Mar. 5	62	10	..	32.733	16.00	45.62
„ 15	65	10	..	34.629	19.00	49.62
„ 25	68	10	..	29.659	12.50	43.00

The table indicates nearly an average increase of ice of half an inch per diem, from which I derive the following inference.

That as the sea is, during the winter, constantly in a condition to freeze upon the slightest decrease of temperature, that Nature kindly interposes her good offices to prevent its freezing *solid to the bottom*, by the compensation derived from the accumulation of heat beneath the frozen crust, resulting from the law of heat and vapour evolved in the act of freezing.

This collection of globules of warm air may be dis-

\* There is some doubt about this measurement.

† This concludes the table, as far as the gauge is concerned.

tinctly traced in spring, on the under surface of what is termed honey-combed ice; indeed its action is as wonderfully correct as the boring of the teredo, leaving clean, smooth-bored holes through seven feet ice, as if it had been the result of some sharp auger or cutting instrument.

*February 28.*—The temperatures remaining high, and the anxiety of some of our sledge parties leading them to prefer braving the cold to inactivity, I despatched two more sledges, under the command of Lieutenant May, to the 'North Star,' the probabilities being in favour of temperate weather for the next six days at least.

This being the conclusion of February, I find that our mean for the month is nearly the coldest on record, certainly the coldest for this month experienced by any of our Arctic Expeditions.

	January.	February.
Hecla . . . . .	—30·00°	—32·19°
Enterprise . . . . .	35·70	35·20
Resolute (Austin) . . .	31·00	32·00
Assistance (Belcher), 1853 .	40·37	29·39
Assistance, 1854 . . . .	40·854	40·247

In the determination of the temperatures here I must again reiterate the observation, that these results are the mean of thirteen thermometers (standard), and registered two-hourly, so that the results are indisputable. During this season the contraction of the mercurial thermometers below the graduation of  $-39\cdot5^{\circ}$  has been most narrowly

watched. From these registries it is evident that the freezing-point does not confine its further retrogression, and that, after contracting to  $41^{\circ}$ , or below, it will still indicate a motion above or below  $41^{\circ}$ , or, in other terms, is not solidly congealed. These observations, noticed in the Appendix, as compared with the action of the spirit thermometers, may afford interesting matter for those inclined to pursue this subject.

Notwithstanding this peculiar disposition of the mercurial thermometers, it cannot but prove a source of great satisfaction to those who have bestowed so much pains on these delicate instruments to learn that, under all changes, both spirit and mercury have been found so closely to coincide.

Another fact, entirely incomprehensible to me, occurs with regard to thermometers used for water purposes, either in the sea or in the wet and dry bulb thermometers; these, although agreeing perfectly before subjection to moisture, disagree completely for many days after depriving them of their covering, or completely drying them. A pair of the most perfect, now before me (belonging to the wet and dry bulb), undergoing cleaning preparatory to fresh clothing, have for three days afforded two degrees of difference! and yet for weeks, during the winter of 1852-53, they coincided at every division!

*March 4.*—I have not progressed towards recovery as I had anticipated; in fact, I learn that this is not a climate to trifle with. Undue exertion of the lungs (reading the service on Sunday) has thrown me back and confined me to cabin exercise. The following ideas have lately been

impressed on me:—1. Never to pass over, as unworthy of thought, after the first year particularly, any symptoms similar to rheumatism, affection of chest or voice, discoloration, emaciation, etc., but at once meet the question by full diet, stimulated even by curries, etc. Exercise is important; injudicious exposure to severe cold should not be risked. This probably has been my fault, or possibly not quite my own, for my preaching has ever been, “not to expose the lungs unnecessarily to a lower temperature than can be avoided.” Latterly our upper deck, under the housing, has maintained a higher temperature by nineteen degrees above the external atmosphere, with a complete shelter from the slightest breeze.

*March 5.*—Our last ten-day temperatures afford, min.  $-45\cdot62^{\circ}$ ; max.  $-16^{\circ}$ ; mean,  $-32\cdot733^{\circ}$ . We have not, for a long period, been visited by any strong winds, but it now threatens in squalls from the south-east or off the land. Notwithstanding it has not yet been felt by us, we are still annoyed by the peculiar whistling aloft, with rapid scud, attended by the unmusical beating of the small ropes against the masts. Upon a careful review of the winds I find that no strong wind from south, round by the *west* and thence to *north*, or over the western half-circle, has prevailed for twenty-four hours, or blown with any force since we have been here, now nearly six months. The question naturally arises, Are we to experience it in July and August, with the ice in motion? If so, our position will be one of intense anxiety.

Upon a cursory review of the documents of Mr. Kennedy, published in the papers laid before Parliament relative to his southern journeys, I notice that at the very

periods which he happens to select for his winter excursions are those on which our lowest temperatures were experienced. This is highly important, as confirmatory of the frequently asserted theory of the maintenance of heat, or rather of a milder temperature, in snow-houses. He may therefore be supposed to have endured in his travels at least  $50^{\circ}$  to  $55^{\circ}$  below zero (external atmosphere) in January and February (when we experienced it as low as  $-58^{\circ}$  and  $-63^{\circ}$ ), without, as far as I can learn, complaining!

*March 7.*—Frequent allusion to the visit of a wolf has been made in these pages. In their natural state doubtless wolves possess cunning, but this individual seems to have profited by his repeated visits, and had so far become familiarized with our dogs that they have accompanied him, her, or it, and been wounded in their quarrels. These visits, however, prejudiced our chances of obtaining hares, ptarmigan, or even bears; and the ingenuity of our keenest sportsmen was taxed, either to shoot him from the ship, or induce him to commit an act of *felo de se*, by the interposition of a delicate *morceau* attached to a double-barrelled spring gun. For some nights he has been eagerly watched, and last night the report of the gun announced, as every one thought, his destruction, and to our imagination, from the proximity of the bait to the muzzle of the piece, at least headless; but he proved too cunning. He had abstracted the bait by a *side* motion, and this morning was noticed on the hill astern, narrowly watching the proceedings of those engaged in further schemes for his destruction, exulting possibly in his superior intellect. Jack, with his

customary superstition, has declared him "charmed," and that he is one of the officers of the 'Erebus.' It is a ridiculous feeling; yet who is free from it? Indeed, I have been so far, at times, a victim to some such feeling, as even to attach the name of one of my friends to this cunning visitor!

*March 11.*—Further experiments were made today on the freezing temperatures of port-wine, sherry, and lime-juice: these of course would vary according to their respective ingredients. I shall therefore merely observe that the fluids under experiment froze as follows:—

The Sherry became frozen (soft) at	10°
Port . . . . .	12
Lime-juice . . . . .	10

But the latter had not frozen to the core at  $-10^{\circ}$ , which induces me to *doubt* very many reports of jars found broken in the hold, as being truly attributable to low temperature; other fluids, as vinegar and pickles, did not burst the cask-heads!

*March 15.*—Our ice-gauge having been raised, we content ourselves with the simple measurement of the in-shore ice, principally with the intent of discovering the approximate moment when the sea-water season terminates; or when the ice crystals, constantly pervading the sea beneath the floe, cease to attach themselves to the under surface, and thus increase the homogeneity of the floe. Our thickness today affords sixty-five inches, = five feet five inches, and the last ten-day temperatures as under:—

Max.  $-19.00^{\circ}$ ; min.  $-49.62^{\circ}$ ; mean,  $-34.629^{\circ}$ ; previous,  $-32.733^{\circ}$

Our last Division has been delayed to this preconceived date, in the expectation of a decided change of season; and the temperature having risen to  $-23^{\circ}$ , and the wind lulled, I determined to push forward Messrs. Grove and Pim, with the 'Dauntless' and 'Reward,' on the morrow, should the weather continue propitious.

*March 16.*—With a fine fair wind and light hearts, attended by an auxiliary crew, our friends departed, and, as our sledges are now good sailing vessels, and, I may add, well handled, they soon overran their jog-trot speed, sending back our auxiliaries; and, as the breeze shortly after freshened considerably, I trust they may not only make considerable progress, but also keep themselves comfortable by the exercise necessary to keep up with their "craft." Another inducement caused me to send them off today, and that was the probability that Commander Richards would, for the same opinion which I have stated, make this his starting-day from Beechey Island without waiting for their last sledges. The increase of wind here furnishes no clue to the weather a few miles southerly. There abrupt cliffs, varying from seven hundred to eight hundred feet, afford complete shelter from all winds ranging from north-easterly to south (true); and when we experience a gale here, they may be in perfect calm: at times however they may experience a gale from the opposite quarter! Our return party reported that Grove had captured a fox (in one of our indefatigable Boatswain's traps), "and persuaded him to volunteer to accompany them to Beechey Island."

In all cases where theories are advanced and reasons appended, it is but fair to state when and how they fail.



They are but guesses, founded, it is true, on what Nature has warranted. By the ordinary course of reasoning, this gale, to which it has at length arrived, should have terminated, or blown out, at 1.45 P.M. today, or, by the other law, commenced and continued for fourteen days. In these latitudes, however, no gales blow continuously beyond twenty-four hours, and our sure guide "of its heart being broken" is the diminution of temperature; below  $-40^{\circ}$  it does not blow hard, and at  $-60^{\circ}$  wind is not experienced.

But our winter here must be something akin to Napoleon's estimate of some of the Duke of Wellington's battles—"He ought to have been beaten." So in our case, according to the minimum degree of cold diffused over the same number of days in preceding seasons, the amount due to the year has already been exceeded, and we have every reason to expect milder weather; but stern Winter says, No! and to no human being here incarcerated is that "No" of such importance as myself,—or rather to this service, as regards my intended journey to the 'North Star' before the 1st of May.

*March 19.*—The breeze has failed and the temperature again fallen to  $-40^{\circ}$ . We have not been visited by the old noises termed "bolt-breaking" for some time, but last night the outer ice evinced great uneasiness, and reports of heavy and repeated cracks were heard during the whole night. From the report of those sent to examine the outer ice, I gather that the exterior ice already exhibits large rents, and the fissures generally seem to indicate a probability of off-shore leads whenever the ice is relieved from off-shore pressure. To those accustomed

to view these matters it will of course be apparent; but to the uninitiated it may be necessary to explain, that this dislocated state of the off-lying *pack* affords us better grounds for release than if we had been frozen up in smooth continuous floe of equal thickness, as the pack invariably falls asunder at the first thaw, and may either float off or be compressed into smaller space, and thus afford space for *motion*, the great desideratum in these cases; on the other hand, when the floe is continuous and of equal thickness, it is only disrupted by forces which would entail destruction on our insignificant vessels.

My own conviction is, that no opinion as to ultimate release can be formed on this side of Beechey Island, and then not before July or probably until the 22nd of August, notwithstanding the unprecedented open water found here on the 14th of the latter month in 1852, and that, as it appears by reports of not many hours later, was closed almost to boats.

Last year Commander Pullen, on his first journey to Cape Becher, on the 10th of April, found the ice very treacherous with many pools of water; but then we experienced many warm days during the months of February and March. But the open water *above* our present position and that *below*, or southerly to Beechey Island, are dependent on very different conditions. We know, from actual experience now, that the Polar Sea may be open and in active motion as early as the 18th of May, as noticed on that date from Britannia Cliff, and we also know that the sea was open on the 14th of July, last season, at Northumberland Sound, yet still sealed

near Hamilton Island late in August. But to my mind the cause is very clear—as clear as the North Sea and British Channel flood-tides meeting at high water near Dover. North of our present position, the flood-tide sets in from the Polar Sea and brings its warmer oceanic water; southerly, the flood has to pass up Lancaster Sound, then to be deflected up this channel, and makes high water somewhere between this and Beechey Island; hence the inaction in this particular neighbourhood when the sea may be open both *above* and *below*, and even if open off-shore, may never release this ship from her present prison. But until every matter requisite for her extraction is fairly prepared, and nothing left but taking advantage of the first lead, I do not quit my post here.

*March 22.*—Today my Coxswain, George Stares, one of Sir John Richardson's crew in Canada, asked permission to take the gun to try for some game for me, and before noon returned with a fine young hare of last season, a male, weighing ten pounds, but when his skin and entrails, etc., were taken away, not above four pounds of meat remained; his food had been lichens, grass, etc. The arrival was somewhat opportune, as the very mention of food had become almost unpleasant; but the hare, if not overcooked, I could attempt, and with some degree of *goût*. The evil of all the preserved meats supplied for this service is, their being overdone and unpalatable to a tender stomach.

*March 26.*—Yesterday the ice gauged five feet eight inches, which exhibits but very slight increase during the last thirty days. Indeed it is my intention at the expiration of the next term (on the 4th of April) to lift

a large cube, in order to ascertain if the honeycomb, due to any increase of temperature of the sea, can be detected. The result of the temperatures for the last ten days affords—

Max.  $-12.50^{\circ}$ ; min.  $-43.00^{\circ}$ ; mean,  $-26.659^{\circ}$ .

I was enabled to attend prayers today, but found the lower deck, although warmer than my cabin (as  $46^{\circ}$  to  $50^{\circ}$ ), oppressively cold. The temperature at the main hatchway ventilator was at  $34^{\circ}$ , and probably the air close to the deck proved too cold for my feet, by which extremity I suspect most of our feelings are sensitive. The weather externally at present is calm, cold, and without any cheering heat from the sun's rays.

*March 30.*—It is remarkable that persons boxed up in this climate, and deprived of the ordinary variations of everyday occurrences in the busy world, seem to derive the faculty of "seeing ahead." Nor is it confined to educated beings, for we find it occasionally amongst the Esquimaux and Greenlanders; and since we have been in this region it is remarkable how all our discoveries, orders, and operations have been so perfectly made to dovetail or fit into each other, or our thoughts indicate some peculiar relation to realities at hand, is even wonderful; for myself I must confess that it has a very solemn effect, and causes me to think very seriously.

"Coming events cast their shadows before" was never more fully realized. Today I felt so perfectly satisfied that a sledge from Kellett was due (if he existed), that I fully intended, when the Master reported noon, to desire him to send a person to look out on the hill. It escaped me, being then engaged on other matters; but my clerk

coming in from taking the temperature of the Crystal Palace, reported "A dog-sledge nearly alongside, Sir!" My reply, instigated by what was then passing in my mind, was very short, and without emotion, "*I know it,*" which somewhat astonished him; but fortunately I explained my meaning, which perhaps led him to imagine I was dreaming.

At 12.30 Lieutenant Hamilton, attended only by one man and the dog-sledge of the 'Resolute,' reached the Assistance,' being the bearer of letters from Captain Kellett, which informed me that the 'Resolute' was frozen in the pack twenty-eight miles south-west by south from Cape Cockburn, having been blown out of "Winter Quarters" off Dealy Island on the 18th of August last, during the gale which had thus nearly proved fatal to the whole Squadron.

All our sledges had reached the 'North Star' safely, and Commander Richards had started on his expedition before the arrival of the two last sledges under Mr. Grove. He did not meet with Lieutenant Hamilton, but had fallen in with another sledge from the 'Resolute,' about ten miles to the eastward of Cape Hotham; and having obtained from her officer full particulars as to where the 'Resolute' would be found, lightened his sledge of some of her load, and pushed forward. Delighted I was to see Lieutenant Hamilton, and to learn from him that all were in good health and spirits.

It is necessary that I should now refer to the state of our affairs generally; and it will be perceived that in so far as the movement of the 'Resolute' is concerned, it was compulsory, and that the probabilities were, as I ap-

prehended, of his not experiencing a navigable season; indeed, the choke of the Wellington Channel and Barrow Strait, by the quantity of ice forced into Lancaster Sound, rendered any navigation on the western line impossible. I had hoped that the 'Resolute' would have been found secure at Melville Island, that she would have wintered there, and thus have been left in a condition to succour Captain Collinson's party, should they march in that direction. In furtherance of a continued chain of posts, where *caches* would be established, a fleet of sledges were now engaged carrying forward the necessary supplies, so that independent of any aid to Captain Kellett's crews, sufficient would remain for others who might arrive after he had abandoned or withdrawn his crews, to sustain them along the same route.

In addition to these measures Commander Pullen was despatched to examine and make *caches* at Capes Walker and Bunny, at the entrance to Peel's Channel, and to leave notices at the projecting points on the route to Port Leopold, which would acquaint travellers that relief should be sought at Beechey Island. He was further strictly to examine and report upon the stores left at Port Leopold, where he would leave complete documents for the guidance of Captain Collinson, should he adopt the course up the western side of Prince Regent's Inlet, and also inform him that a vessel was expected from England in August at Beechey Island.

This matter therefore, of the present position of the 'Resolute,' as deduced from the correspondence of Captain Kellett, did not at all cause any change in my opinion or determination, for to my comprehension her

rescue this season was a game of *chance* to which I would not become a party, or subject myself to the hazard of disobedience to what I *knew* (and I speak not at random or without *high authority*) was my *duty*.

But supposing I did not possess irrefutable documents in support of my determination, a *determination* for which I was, I may assert, selected for this command, I could only draw the conclusion from the entire correspondence forwarded to me, public as well as private, that *doubt* was involved. Let me calmly ask, who was to decide as to what the duty of the superior was?

The following, being the official letter of Captain Kellett to me, will communicate all that may be required of his operations since Commander Richards left him in June, 1853.

No. I.

" *Her Majesty's Ship Resolute*, February 10, 1854.

" *Lat. 74° 42' N., Long. 101° 2' W.*

"SIR,—My letter of the 8th of June, with the documents accompanying it, will have given you a concise account of my proceedings and intended movements up to that date. I beg now to transmit papers containing information relative to this part of the Expedition, with a report of proceedings since that time.

"Commander Richards left 'Resolute' on the evening of the 8th of June, at four P.M., and Dr. Domville arrived on board here at one A.M. on the 10th, bringing me the information relative to 'Investigator's' crew, contained in the accompanying documents. It will be readily seen from them what would have been the result had their Lordships not determined on detaching a portion of this

Expedition in the direction of Melville Island. I accompanied Commander Richards on his first march from 'Resolute,' so that when I received the information of Dr. Domville's arrival, he was too distant for me to overtake him with any party I had to send.

"Lieutenant Hamilton returned on the 21st of June, after an absence of fifty-four days. He visited our preconcerted rendezvous, and brought me from it your despatch addressed 'Secretary of the Admiralty,' your letter respecting it, and a private letter for myself.

"Lieutenant Hamilton brought his party in, all well.

"Lieutenant Meecham arrived the 6th of July, having been absent ninety-four days. His party all well, with the exception of one man, who has lost, I fear, the sight of one eye.

"Commander M'Clintock returned on the 18th of July, after an absence of 105 days. The ground being clear of snow, and very heavy, the ravines running with impassable torrents, obliged him to abandon all his equipment on the north side of Melville Island, about two miles distant from the shore of Hecla and Griper Bay. He walked in with his crew, carrying their knapsacks and a few provisions. All safe and well.

"The accompanying tracing, with an abstract from my travelling table, will show you the extent of coast that *has been searched* (without finding the slightest trace of man ever having been on it before), and what has been added to our knowledge of the country by the officers and crew of this ship. How ably and zealously they must have done their duty to cover so much ground: 1618 miles *discovered* and walked over!



“The ‘Erebus’ and ‘Terror’ getting through Wellington Channel will (I have every expectation) have been found by you to the eastward of your position; had they got westerly, some of our parties would certainly have found them. I do not think more can be done west and north of Melville than has been done, even if we knew of the existence of land from any position attainable by ships through Lancaster Sound, until we have some other means of travelling.

“I have been most successful in procuring game, and that of some size,—musk-oxen and reindeer, which enabled me to serve  $1\frac{1}{2}$  lb. per man per day for some considerable time.\* This was not obtained without much labour and method. My principal hunting grounds were distant from the ship twelve to fifteen miles. I have had five hunting parties away at one time; besides, every encouragement and facility was given to sportsmen to hunt the country in the neighbourhood of the ship,—*small game*, geese, ducks, ptarmigan, being considered as their property. You cannot conceive how this good living, exercise, change of scene and prospects improved the ‘Investigator’s’ crew and invigorated *my own*, who returned to me healthy, but thin, and voracious as hawks.

“This country, it may be said, teems with animal life from the middle of May to the middle of October; but I *do not* think a large party of *Europeans* could support themselves by *hunting*, even during these months. The animals soon become shy and scarce, fuel for cooking scarce, and hardly to be obtained at all when the ground is covered with snow.

After breaking out, reduced to 1 lb. per man.

" We have had during the summer—June, July, and August—very mild weather ; an unusual quantity of rain, but *little wind*.

" It rained in June on 5 days, 9 hours hard, 24 rain, 6 drizzle.

" " July, 11 " " " 33 " 57 "

" " August, 6 " 6 " " 49 "

" August having arrived, with little appearance of a break-up, I sent Mr. Narcs (Mate), with a boat and crew, to report on the practicability of getting along the land in water. He returned in three days, not being able to cross Beverley Inlet or to get along its shores. Were the land continuous between this and Beechey, the voyage, late in the summer, might, I consider, be easily and rapidly made. Mr. Nares could see no indication of a break-up to seaward. I now began to despair of breaking out at all ; the disposal of a part of the crew, to save provision and to give room, became an object of serious consideration. I had a large sledge for carrying a boat made ; but as it was impossible a party could have got down to Beechey in time for any ship leaving for England, and that the depôt there would be less able to support the party than this ship at Dealy, I abandoned the project, but determined, as soon as all hope was at an end, to send a party of twenty-five officers and men, under either M'Clintock or Meccham, to ' Investigator ' to winter, with orders to visit, by Prince Wales' Strait, the Princess Royal Island and Nelson's Head (south end of Baring Island), to deposit at these places records, and to endeavour to find out from the natives whether ' Enterprise ' had been seen by them. We may get along the American coast, and get into the strait discovered by Sir

James Ross, now called Ommanney Inlet. To show you how suddenly changes take place, the report from the summit of Dealy Island on the morning of the 17th of August was—little change in the ice, a few more cracks, but of no extent. The day commenced with light southerly winds. We had foot-races, wrestling, jumping in bags, etc., on Dealy Island, all hands attending, even my poor invalid Mate, Mr. Sainsbury, who had now greatly improved in health and spirits. Towards evening the wind began to freshen from the south-eastward, and at eight p.m. blew a very strong gale; too much drift to see what was going on outside. A crack that was scarcely observable a day or two before, between us and 'Intrepid,' at midnight opened out to some feet. I tried to moor the piece, to keep us from jostling. At two a.m. (18th) the wind shifted suddenly to the northward, blowing a furious gale. The piece between us and 'Intrepid' went out, the whole floe breaking off *at our sterns*, left us fast by our anchors to a good heavy old floe, and in open water; this soon followed, and away we went driving together until we came up with the ice astern of us, luckily in a hole of water. We held on by this piece as long as we could: it did more for us than we could do for ourselves. Slewing, it carried us round on to its weather edge, where we pounded for a few hours, having only a little broken-up stuff to fence off the lipper that had now got up.

"At six p.m. we managed to get off, and made sail, running along the land to the eastward: slowly water making as we progressed. At four a.m. on the 19th we had 'a block' for an hour off Point Griffiths; passed it,

and stood along the pack edge in the direction of Byam Martin Island. Here we were stopped; lanes into the pack, but nothing that I could attempt to take. We beat about for the day with fresh north-west winds, our water being seven or eight miles south and east of Griffiths, and a good deal of water to the northward, in the Byam Martin Channel. Hoping to get to the northward of the ice driving down this channel and then easterly, I went up it in tow: after getting up some distance the pack approached, and appeared to join it ahead. I made fast on its edge in very thick snowy weather, the wind shifting to the eastward of north, shoaling my water suddenly from seventy to twelve fathoms. I was obliged to run into the pack, so as to have sea between me and the shore. We now remained beset, driving up and down in thick weather, for two days, having very variable soundings. We got into open water again on the 23rd A.M., ran down the pack edge to the southward and eastward, found it all tight, beat about for the day, in the evening made fast to a piece of land floe north of Point Griffith; from that time until the 6th of September the winds were constant, between south and west-south-west, mostly light, the pack closing right up to the ship and opening for a mile alternately, with leads into it easterly for four or five miles. On the 7th the wind returned to the north-westward, a fine fresh breeze. This I conceived would have been the moment of our release; the pack went off rapidly. After freeing myself from the young ice, which now began to make very strong, I ran off to the pack edge and followed it to the south-eastward, until it turned up to the westward;

found it all tight and more compact than it was for several days before I returned to my old position. Sent the Master to get soundings along the floe edge we were fast to, supposing the season so far advanced that this would have been my winter-quarters. There was water along the land to the westward, but at this time last year Skene Bay was closed, and the position under Griffiths I consider as safe as my former under Dealy Island. The increased distance would have been no obstacle to my putting in execution my former determination relative to the disposition of the crew. It blew very hard from the north-west, with heavy drift and very cold, until midnight of the 8th, when it suddenly cleared; no ice in sight; slipped and ran off, but hardly got off more than three miles before we were *brought up* with sludge ice fourteen inches thick, with the pack to the eastward of us, and became perfectly immovable. 'Intrepid' was *just* able to get through it; after three or four hours she got the ship's head round with wind and steam. We just got back to fast ice before the wind increased again to a strong gale with a heavy drift.

"At three A.M. of the 10th the wind again lulled; the drift fell. Leaving the ship fast, with orders to get up provisions sufficient to complete 'Intrepid' to a year for seventy men, should I find it or consider it practicable for her to get down without 'Resolute,' I left in 'Intrepid,' steering for centre of Byam Martin Island; we soon got into sludge, but found it much lighter than the day before; we got about half-way over, or about eight miles from the ship. Finding that 'Intrepid' could get along well through it without steam, we hauled our wind

at noon and made ship signal to close ; she joined at 4.30 P.M., when all sail was made for south end of Byam Martin; in this direction most water was seen. The direction of the wind our guide ; we were brought up about six ; it was impossible to retrace our steps ; we still struggled on, using every means to get into the numerous patches of water about us, at intervals going two or three knots, and bringing up until eleven P.M., when the stuff packed so heavily on us that both vessels became fixed. At midnight we had a very heavy squall from the northward, which continued to blow furiously until morning. Land was supposed to have been seen on both beams. We now went driving, fixed in this young sludge ice, *nearly* in the direction of every wind that blew ; still I had hopes that a westerly wind would break it up. Innumerable pools of water to be seen all round us, yet, with all the means at my disposal, I could not even slew the ship's head round to the northward ; powder only increased our difficulties, filling up every space we cut with saws, by detaching the young ice doubled under us some feet below our keel. We continued driving in this way until the 12th of November, pretty quietly except at the spring tides, when we had a little crushing up round us, driving over young floe (very unpleasant, certainly), with much row and noise, but little danger ; we were fully prepared for the worst, sledges lashed, parties told off under their officers, with everything on deck ready for fitting.

“ What a disappointment to a man's hopes, after breaking out so well and so easily ! To get down the *Strait* I certainly thought easy, but there is nothing certain in

this navigation from one hour to the next. Between the 10th of September and 12th of November, twice in the floe, we made a *beating* voyage down this Strait; we only made westing on two occasions, showing that there is a permanent easterly current; a good example of the way the Great Polynia may be navigated in the winter.

"Thus ends my spring and summer proceedings.

"Winter had now really commenced. I was anxious to communicate with you, and had a party prepared for the purpose, *but it was impracticable*; the floe was so much broken up that a boat could not have been taken over it, and there was still so much water or light ice that it would not have been safe without one; in addition, there were only seven travelling hours of light.

"On the 14th of November, Mr. Sainsbury (Mate), whose decline became rapid from the moment we lost hopes of getting down, and the cold weather, died. Poor fellow! the prospect of getting home, coupled with the ability and kindness of my Surgeon, was all that sustained him so long.

"It now became a matter of great consideration, the *victualling* so large a number of men in addition to my own crew, after having expended so much in travelling, placing depôts, and feeding increased numbers, so as to sustain them in health and give me the means of saving my ships. The result was, I found that, with a very small decrease of the allowance, I could victual all until the end of April, and have for myself, reducing *my crew* to fifty men and officers (*both vessels*), provision to last me until May, 1855, before which time *I hope to be released, or to be within the reach of succour*. To

have reduced the allowance would, I felt, have been to lose a large portion of the crew their Lordships sent me to assist; therefore I *did not reduce* the allowance: besides, no reduction I could have made would have enabled me to stay by my ships during the winter of 1855-6 without being assisted, which may be done yet, if we are so unfortunate this summer as to fail in getting through.

"My (intended) proceedings, *unless I get contrary instructions from you*, will be as follows:—

"1. To despatch two parties (one men, the other dogs), under Lieutenant Hamilton and Roche (Mate), to Beechey Island as early as practicable in March; the dogs to be employed, with Mr. Roche as their leader, in case *you* have not reached Beechey, in carrying these despatches to you, and the men to return to me with information.

"2. An officer, Mr. Court, of 'Investigator,' accompanies these parties, who I propose shall be sent to *Port Leopold*, with a strong party, to survey and arrange the stores there, to *leave a chart there* of all that has been done, and *all* information relative to the Squadron and depôts of provisions for Collinson. A copy of Mr. Court's survey to be left in the Beechey house. This officer was with Sir James Ross, and will execute this service zealously and well.

"The 'Investigator's' officers and crew, together with the officers of this ship and the men who are the least able to stand a further winter in this climate (all amounting to eighty-three men and officers) will leave in three divisions for the depôt at Beechey Island, in



the month of April, all arriving there by the 1st of May. I will accompany myself the First Division, to communicate and receive instructions from you, or, should you not be *there*, to give Commander Pullen instructions for his guidance; after which I shall return to my ship, to await the break up of the ice. I will not allow myself to consider the possibility of there being *no* ship at Beechey, or no resources. Even under these circumstances, I must endeavour to get the same number away.

“I should like much to send a chosen few home by way of America, or right on to ‘Plover.’ It is practicable now, I think, with the depôts, etc., laid out.\*

“The employment of my crew until the commencement of the thaw, 7th of June, is all I have now to enter on in the way of proceedings. I hope *to be able* to visit Dealy Island, ‘Investigator,’ and Princess Royal Islands, besides getting a little fresh meat from Cape Cockburn in the shape of venison.

“The ‘Investigator’s’ officers and crew are sixty in number,—one Commander, one Lieutenant, one Master, two Surgeons, one Purser, three warrant-officers, and fifty-one seamen and marines.

“I propose to send from ‘Resolute,’ for your disposal, Lieutenant Pim and my three Mates, with twenty-one men. I very reluctantly part with my Mates; they are noble young men. I shall deem it a favour if you, as Commander of the Expedition, will acquaint them with my high appreciation of their conduct whilst with me.

\* If he had made such an attempt, how utterly injudicious would it have proved!

Mr. de Bray leaves with the goodwill and good wishes of *all*, officers and men ; he has done his service much credit, which I shall take an opportunity of stating, in justice to him, in a separate letter.

“The health of the crews during the winter has been better than I could have anticipated ; the good effect of the spring feeding manifest. The very superior quality of our provisions, of *every* sort, with the many comforts supplied us, assisted materially in keeping the men in the same condition nearly as when we commenced the winter. We continued to serve out weekly musk-ox beef until Christmas Day to the whole crew, retaining sufficient for the *sick* and those the Surgeon considered it necessary to place on the diet list. These men, except at the Surgeon’s express wish, have not had a bit of salt the whole winter ; nevertheless, I am sorry to say, we have had some losses.

“Mr. Sainsbury, Mate of ‘Investigator,’ died on the 14th of November, of confirmed disease of the lungs ; he, poor fellow, was brought over to me on a sledge. This is the only ‘Investigator’ I have lost.

“Samuel Hood, R.M. (‘Intrepid’), died 2nd of January, 1854 ; James Wilkie, seaman (‘Intrepid’), died 2nd of February, 1854. These two men’s deaths, no doubt, have been hastened by the severity of the climate and the trying nature of the labour in travelling they had to perform, acting on already diseased organs and shaken constitutions. I have at present two very ill ; one, seaman (‘Investigator’), with scrofula, ill these last two years ; the other a Marine (of my own), improving. These are the only two that will not be able to pull their pound down

to Beechey. Send the dogs back for me, if you want me quickly (I hope to start my First Division on the 1st or 4th of April). The men you will find fine fellows, up to any work you may have for them; only return them to me by the 7th of June.

"I have now given you all information; any that I may have omitted Mr. Hamilton and the papers accompanying this will supply.

"Trusting that you may have reached Beechey Island, and all in possession of health,

"I have the honour to remain, Sir,

"Your obedient servant,

"HENRY KELLETT, *Captain,*

"*H.M.S. Resolute.*

"To CAPTAIN SIR E. BELCHER, Kt., C.B.,

"*Commanding Arctic Expedition.*"

"P.S.—My only wants for the ensuing year are preserved meats and tea, travelling pemmican, and fuel, with some balls of hemp and soles for boots, and physics. (See our return of provisions, and scale of present victualling.)"

## CHAPTER V.

Dangers of Autumn.—Recovery of ‘Investigator’s’ crew.—List of Game.—Food, but not Fuel.—Rain at Melville Island.—M. de Bray.—Mean Monthly Temperatures.—State of the Ice.—Increase of Sea Temperature.—Shock of the Ice.—Arrival of M’Clintock.—Correspondence on Abandonment.—Force devoted to Assistance.—Return of Shooting Party.—Extreme Cold beneath the Snow.—Experiments on Snow Covering.—Establish four Posts for Sledges.

THE following is from the customary correspondence, not private, but demi-official and explanatory: all private matters omitted, as well as those not bearing upon the critical position of the ‘Resolute.’ It is evident no open water was noticed before August 18th, and the 26th, that season, closed even upon Beechey Island! This winter also has been infinitely more severe.

“There must have been a sea of water here, but so late that the sludge which brought us up (sticking like birdlime) must have made as fast as the pack went easterly. There must always be a block amongst the islands *until the season is far advanced*, when the strong winds break the floe up into pack sufficiently small to get through. You will see, by the chart I send you, how I have been driving about these straits, and also that there

is a constant current throughout to the eastward. I am well into the Strait; *still, if it breaks up at all*, I must get through (*unless I get smashed*), and, I think, south of Lowther; *but it will all depend on the wind*, of which we have but *little* this winter, so I hope for a good share this summer. *Should I get smashed* (which, light as I am, I do not *think* will happen), I must seek some of the depôts *east or west* of me." Matter here connected with other parties, but which merely served to strengthen my opinion as to my duty, I must omit. "I hope to be able to visit Princess Royal Island and 'Investigator,' and to bring back from Dealy a few preserved meats; that is, if you think I ought.

"Be sure you write me a long yarn of all you have been doing (privately, as you did before), and be honest in your opinions of my proceedings.

"Send back the dogs for me, and I shall be with you in no time; but do not put yourself out of the way to come this road, for there is nothing to be *seen* or *done*.

"We have had the weather *intensely* cold in February; the mean for the month  $-41^{\circ}$ ."

The tenour of this correspondence is to the effect that all has been done that could be done; that the vessels might be *smashed*, and that notwithstanding my orders to return were *positive*, even to be at Beechey Island in the *summer of 1854*, that such intention of the Government was to be frustrated, and the further dilemma of keeping out one or more ships, to look for the shattered remains of these vessels and crews, incurred.

So far, then, from altering my views, I came to the conclusion that before any discussion could arise which

might shake my decision (from any private feeling), it was my duty to pursue measures for relief and immediate abandonment; not without sound reasons, for it was clear to me, after discussing the matter fully with Lieutenant Hamilton, one of the most intelligent and active officers of this Squadron (a Lieutenant of the 'Resolute') and standing high also in the opinion of Captain Kellett, that the 'Resolute' was too far off the northern shore even to *save the crew*, should any sudden "run of the ice" break up the *pack*, which, as before described, invariably tumbles to pieces before the even homogeneous floe, subjecting the vessels to be ground between them, or, as in the case (then unknown to Captain Kellett) of the 'Breadalbane,' annihilating her instantaneously.

But what does the public letter of Captain Kellett indicate, even at the end of the season in winter, in proof of my views?

"Winter had now really commenced. I was anxious to communicate with you, and had a party prepared for the purpose, but it was *impracticable*; the floe was so much broken up *that a boat could not have been taken over it*, and there was *so much water or light ice* that it would not have been *safe* without one."

• If such danger was manifest after *the winter had really commenced*, infinitely greater danger would attend the deserting of "a nipped vessel" over far greater difficulties of loose ice without the chance of becoming solid by frost! Our Division, and myself personally, had practical proof of this difficulty, when cut off at Hungry Island in October of the same season, and the distance intervening between us and the mainland did not exceed *two miles*.

Moreover, excepting where vessels are nipped and destroyed *in contact with sound floe*, the salvation of the boats is problematical, and should such a misfortune occur all hands must perish!

But to return to the 'Resolute,' her tender, and the Investigator.' Early in March last, Captain Kellett had despatched a Lieutenant and his Surgeon to visit the 'Investigator,' and report upon the condition of the crew, etc. Unfortunately the Lieutenant left the Surgeon tented on the ice and proceeded alone, and Commander M'Clure returned with the Lieutenant to the 'Resolute.' Commander M'Clure was still anxious to be afforded another chance of getting through; and Captain Kellett, yielding to his wishes, despatched his Surgeon with him to survey the crew, and should twenty volunteers come forward he might remain until the next season. But they were unfit; they had been reported to me *semi-officially* as in a deplorable state; in the words of Captain Kellett, "they were in a *terrible condition*, disorganized in addition to disease:" more I will not divulge.

What then were my feelings, what my *duty*? As the Commander of such an Expedition, possessing the entire confidence of Government, was I tamely, with such matter in my hands, to betray my trust? Could I lend my approval barely to what I have divulged? and if the matter before me did not warrant my disapproval of *an instant's delay* in conveying the crew of the 'Investigator' to England, had I not ample ground in declining further risk of life, further anxiety to the public, and the additional expense of leaving behind three vessels? for

leaving the 'Resolute' and tender involved another at Beechey Island. Fortunately, all the sick reached the 'Resolute' safely, and by the judicious arrangements of Captain Kellett and Dr. Domville, by employing them detached in tents, killing game and consuming it fresh on the ground, they derived the double advantage of the true unfermented juices of the meat before they were deteriorated by freezing, as well as healthy and exciting exercise for body and mind in an atmosphere rendered more salubrious by the progress of summer vegetation.

Mr. Sainsbury (late Maté, but promoted to Lieutenant) had, from being considered in a hopeless condition, so far rallied and progressed towards convalescence as to be able to take exercise and witness the games in which the crews were enjoying themselves at Dealy Island on the day the vessels were blown from their winter quarters, that eventful 18th of August which afforded us a safe haven at Port Refuge and cut off the ever-to-be-lamented and heroic Bellot.

To Captain Kellett's letter I must refer the reader for further information. Nothing westerly, at all bearing upon the traces of Sir John Franklin, has been discovered, and I think we may safely now assert that these regions eastward, westward, and northwards even to the Polar Sea, contain not a trace; and from my own observation I never have ceased to think, from August, 1852, that he never passed northerly from Beechey Island.

As to the chances of his having passed into the Polar Sea without leaving a record, I have but too frequently expressed my opinion that if such an event occurred, search is beyond that discretion which any sensible man would



exercise. It is easy, perhaps, for courageous chamber theorists to work themselves up to the sticking-point and imagine what their Quixotic spirits would impel them to do. But to such self-sufficient heroes I would offer "*ships, stores, and men*; but if you wantonly lose a life, at your hands I demand the sacrifice." Men who command must feel for the lives entrusted to their keeping; and good men do not follow mad-brained fools.

The distinct increased dimensions of all the floe ice noticed to the westward, as well as northward, of the Queen's Channel, is, to my mind, satisfactory proof that it belongs to another sea and has no connection with Baffin's Bay, Lancaster Sound, or the Wellington Channel; and although it may have considerable *motion* in summer, I yet believe that in the Victoria Archipelago, as in the case between Banks' Land and Melville Island, it remains unbroken for years, even ages. With reference to the evidence given before the Arctic Committee, as to the security of Erebus and Terror Bay, we have too good reason to know to the contrary, and that there is not a more unsafe position in these seas; nor do I believe that the vessels of Sir John Franklin ever cut into that bay sufficiently deep to occupy the position imagined. But upon the matter of being blown out, we have now more facts to argue on, and we feel *assured* that with a northerly gale instead of southerly in 1852 and 1853 the 'North Star' must have been destroyed.

Pursuing however the questions relating to our more fortunate friends of the Western Division, I cannot omit inserting here the report of game captured, and adding that about a dozen hares and the same number of ptar-

migan comprised the total collection of our Northern Division.

H.M.S. RESOLUTE, DEALY ISLAND.

*Game List, from 3rd September, 1852, to 9th September, 1853.*

Musk-oxen	. . . 114	; average weight	. . . 166 lbs.
Reindeer	. . . 95	" "	. . . 60
Hares	. . . 146	" "	. . . 8
Bears	. . . 6		
Wolves	. . . 3		
Foxes	. . . 51		
Ptarmigan	. . . 71½	" "	. . . 1
Geese	. . . 128	" "	. . . 2½
Ducks	. . . 229	" "	. . . 2½
Plover	. . . 16		

*Issues.*

Meat on board	. . . 13·302 lbs.
" travelling	. . . 6·637
Unfit for use	. . . 2·406
Small game	. . . 5·138
	<hr/> 27·483

Captain Kellett remarks, "I have been most successful in procuring game, and that of some size,—musk-oxen and reindeer, which enabled me to serve 1½ lb. per man each day for some considerable time. This was not obtained without labour. My principal hunting grounds were distant from the ship twelve to fifteen miles. I have detached five hunting parties away at one time; besides every encouragement and facility was given to sportsmen to hunt the country in the neighbourhood of the ship." But, notwithstanding our Western parties passed over land where game abounded, their travelling duties and want of fuel to cook the meat procured, de-

barred them from the enjoyment of many fresh meals. To persons reduced to necessity there is every reason to believe that the means of sustaining a miserable existence might be found on the coasts of Cornwallis and Melville Islands; but it is fearful to contemplate the result; for most assuredly scurvy, in its most virulent form, would soon deprive them of the power to travel to a position where effectual aid might be available! But, granting that some more vigorous individuals might have been able to push forward, in the hope of sending back assistance, if encountered, we who have travelled and calculated the powers with sound men and good sledges, know full well that powers to drag the carcasses killed would not avail them beyond short distances, and that the first journey would probably carry them beyond the grounds where game resort! It has been imagined, because game has been found in particular spots, that it must prevail throughout these regions, and moreover that on our particular ground it would yet be more abundant. The fallacy of such arguments is, I trust, now determined.

It was natural enough for the ice-bound crews of the 'Resolute' and 'Investigator' to eat, drink, and be merry; but with our missing friends, if existing, the ship, the home, and the fuel were wanting, to render the meal palatable. Independent however of food, I cannot now believe in the possibility of any party existing without some substantial shelter in a climate which averages over 151 days a mean temperature of  $-30.81^{\circ}$ , and at times as low as  $-63^{\circ}$ ! Again, on comparing our climates, Captain Kellett remarks:—"We have had during the

summer—June, July, and August—very mild weather; an unusual quantity of rain, but little wind.

“It rained in June on 5 days: 9 hours hard, 24 rain, 6 drizzle.

„	July	11	„	„	*	33	„	57	„
„	August	6	„	6	„	49	„		„

Now it is very strange, with so insignificant a difference in latitude, that I cannot call to mind any instance of positive rain. Had any such visitation occurred, our tents would inevitably have been frozen, and therefore I think I may safely assert that we had none. At our hottest period, when the heat within the tent was termed dreadful, the thermometer, in free air, on an elevated cliff, and suspended four feet above the earth, indicated 24°. Under such circumstances, any falling moisture would assume the character of snow. Indeed we did not experience any temperature which would afford a flow of water from the snow until late in June, at which period the floe traversed by Commander Richards, about a degree to the southward, was very sludgy. Rain would have set our valley courses and rivers in motion, but nothing of this nature met our notice during the season of 1853.

A very unfortunate accident occurred to Mr. Roche, the second to Lieutenant Hamilton, shortly after leaving the ‘Resolute.’ He was in the act of withdrawing his fowling-piece from the sledge, when it went off, passing the ball through the thick portion of the thigh, but without injury to the arteries. He was immediately taken back to the ship, and Mr. Court, Master of the ‘Investigator,’ took his place.

Fortunately, I found that arrangements had already been made for the movement of eighty-three officers and men of the 'Investigator' and 'Resolute,' so as to reach Beechey Island by the 1st of May. This Division will probably be in readiness to start by the time Commander Richards reaches the 'Resolute;' they will again be met by our entire Division of nine sledges, instructed to afford them every assistance, or, not being required, to push on supplies for Captain Collinson to Cape Cockburn.

It is with feelings of great satisfaction that Captain Kellett affords me the opportunity of publicly stating his opinion with regard to the second French officer who has so gallantly associated himself with this Expedition. Speaking of him, he observes:—"Monsieur de Bray leaves me with the goodwill and good wishes of all,—officers and men; he has done his service much credit, which I shall take an opportunity of stating in a separate letter."

With regard to the decease of Samuel Hood and James Wilkie, he observes:—"The deaths of these two men, no doubt, have been hastened by the severity of the climate and the trying nature of the labour in travelling they had to perform, acting on already diseased organs and shaken constitutions."

I understand that these two men served in the 'Investigator,' under Captain Bird; in this ship, under Captain Ommanney; and latterly in the 'Intrepid' (four winters). This strengthens my view—that every man who has volunteered afresh, from the last or former Expeditions, is materially injured in constitution, which

manifestly leads to the support of my principle: fresh blood for every department but the Commanders of vessels. The service itself injures the Profession; habits are indulged in which are not easily thrown aside; and the approximation to the freedom of the whaler is too close to prove pleasant to those who endeavour to maintain a service discipline.

"Those are not the boots they came down to ask *our opinion on*," very glibly oozed from the mouth of one of the Arctic seamen of last cruise.

My return despatches being complete, and a gale, which commenced on the arrival of Lieutenant Hamilton, abated, he quitted us, on his homeward route, on the 3rd of April, attended by a considerable rise of temperature and a fine cheering sun.

The completion of March furnishing a fair comparative range of the cold for this season, I have therefore thrown them into a tabular form, from which I have reason to infer that we have already enjoyed our minimum allowance of cold, as compared with previous voyagers. Some indeed there are who would contend that Arctic seasons are gradually becoming milder, but no such assertion is tenable under the evidence which we have been able to collect.

In a former place I alluded to ranges over the months October to June, both inclusive, as establishing very nearly a mean of  $-10^{\circ}00'$ , but within that period were many  $+$  signs. I have therefore on this season adopted the five coldest months, and classed them in the order of the different Expeditions, commencing with Sir Edward Parry at Winter Harbour, Melville Island.

MEAN MONTHLY TEMPERATURES,  
NOVEMBER TO MARCH, INCLUSIVE.

	Parry. Melville Island, 1819-20.			Parry. Port Bowen, 1823-4.			James Ross. Port Leopold, 1849-50.			Captain Austin. Griffith Island, 1850-51.			'Assistance.' Northumberland Sound, 1852-3.			'Assistance.' Wellington Channel, 1853-4.		
	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.
Nov.	+6	-47	-20.60	+17.0	-26.0	-4.99	+16.0	-37.5	14.50	+13.0	-31.0	-7.50	+21.0	-28.0	-5.53	-7.0	-37.00	18.33
Dec.	+6	-43	21.79	-4.5	-3.5	-19.05	-14.0	-56.5	36.40	-5.0	-39.5	22.90	-6.0	46.3	32.31	+12.0	-46.50	28.08
Jan.	-2	-47	30.00	14.5	42.5	28.91	9.5	50.5	35.70	9.0	45.0	31.00	-12.0	-63.2	40.37	+26.0	-59.25	37.38
Feb.	17	-50	32.90	8.0	45.0	27.32	17.0	60.0	35.20	11.5	46.0	32.50	+2.5	-47.0	29.89	-20.0	-57.25	40.24
Mar.	+6	-40	18.10	9.0	47.5	28.37	+8.0	51.0	22.80	8.0	44.5	25.70	+24.0	-55.5	17.72	-12.5	49.62	30.47
Mean } 5 Mo. }	-24.48			-21.73			-28.92			-23.92			-25.06			-30.90		

These numbers, excluding Port Bowen, which appears to possess a temperature peculiar to itself, resulting probably from its being protected from easterly and open to westerly influences, afford pretty conclusive evidence that if any change is to be inferred, it must be taken for increased cold. And I am very much inclined to suspect, that if our temperatures for the late season had been registered on the land instead of the floe, that a trivial increase of cold, perhaps  $-1.5^{\circ}$ , might have resulted.

*April 9.*—I had fully anticipated a decided increase of temperature, indeed of *plus* signs, before this period; but appearances, as well as past experience, already teach us that cold is yet to prevail, and that we shall have to record the coldest season experienced possibly by human beings. The five-monthly mean of cold has been already given in the previous table, and nine days have elapsed, still exhibiting a temperature of  $-11^{\circ}$ . On the 10th it reached  $-1^{\circ}$ , and another attempt was made on the smooth floe ice to determine the question of freezing beneath: the thickness proved to be five feet six inches, and my former theory as to the under surface was in this instance completely verified. The ice had not only ceased to *form*, but the lower portion, of two inches in depth, was entirely composed of *loosely cohering separate crystals*, yielding easily to the pressure of the finger. The ice in contact with these crystals was also in what we should term a *rotten* state, in a disintegrating condition, and easily penetrated by a knife or piece of wood. I tried further experiments on the water itself at the bottom. This was effected by closing the neck of the



bottle by a plug of loose cotton : the lead (14 lbs.) being attached, carried it too rapidly to the bottom to admit of any ice entering. It is evident that the pressure below would force the cotton, and when the bottle became full the cotton would resume its position in the neck. By reference to page 178, Vol. I., it will be seen that similar experiments determined that the sea during winter is constantly charged with minute crystals of ice ; this had now ceased ; the water, on examination, was found to be perfectly transparent and free from any such crystals ; moreover the temperature, during its very short passage from the floe to my cabin, had risen to  $36^{\circ}$ . These facts satisfy my mind that from this date we may safely calculate on the water penetrating, and, acting on any fissures which may offer, aiding in the destruction of the heavy pack.

An occurrence at this moment forcibly impressed on our minds the effect resulting from any sudden shock communicated to the ice, and the result on the ship. It was found necessary to enlarge the fire-hole alongside the ship ; and to aid in effecting this, the Boatswain employed one of the heavy loggerheats (oblong shot) supplied for breaking the light bay ice (its weight was two hundred-weight). This was allowed to fall from a height of about thirty feet, the ice on which he was acting being four feet in thickness, but previously cut free on three sides by the ice saw.

The concussion to the ship at the stern, where I was seated, sixty feet distant, was fully equal to 20 lbs. of gunpowder, and caused everything on the table to vibrate. Nor could I be brought to believe for some

minutes that it did not proceed from a blast under the counter. Similar in their effects are the sudden fissures, in the early season, of young ice, which, conveyed by the ice to the ship, produce those sounds so frequently mistaken for breaking of bolts, timbers, etc., none of which have been noticed since January.

*April 14.*—This morning we experienced the very uncommon visitation of a westerly wind, succeeded however by one strong from the southward, which will, I trust, on this spring tide, afford us some indication of the break of winter, which has indeed been one of unusual gloominess as well as severity. Last season all were inspirited by the extraordinary excitement caused by the preparation for search; but now all before us is charged with the labour and anxiety of extricating our vessels, terminable perhaps by cramming all the survivors into one ship. At noon the temperature attained  $+3^{\circ}$ ; so far satisfactory, as complying with expected change.

Two sods of peat were brought in today as belonging to some newly discovered cairn; but such matters were now too well known to me to cause a moment's doubt. I knew them to belong to the spot from whence our tree had been dug, and further examination proved I was correct. My reason for noticing this at present is, that had I not despatched a party to report further on this matter, doubtless it might have been magnified into sufficient importance "to regret that more intimate search had not been made," or possibly to be the foundation of a mad-brained volunteer after the spot had been quitted. The operators in the former instance reported the work as their own. I seldom baulk a man in his hobby, and

find it much easier to grant him leave to take exercise in his pursuit and convince himself, than expend reasons, which seldom convince.

But to return to our pieces of peat, for they really solved a matter which as yet to me was an enigma. During a close examination of this peat, after thawing in my cabin, I found it to be composed, to a depth of nine inches, almost entirely of the remains of lemmings. The grass on its upper surface exhibited signs of advanced vegetation, assuming a light green hue, and about the roots I detected a minute glossy maggot in full activity, brought into existence perhaps by the temperature of my cabin (52°). This proof of the progress of vegetation beneath the snow may possibly prove interesting to naturalists. The maggot having been placed in a tin-box with some of the grass tufts, in which I felt as much interest as some would about flowers, shortly after assumed the state of a black chrysalis, identical I believe with those noticed on Grave Mount, the derivation of which was now sufficiently explained.

The history of the lemming is of itself, even in Northern Asia, one of great interest, and the allusion to the "armies" of these field-mice must be extended even to these regions, for nothing short of such myriads could have produced beds of exuviae nine inches in thickness. They are still numerous here; but as their forays, even in warmer climes, do not occur for intervals of many years, they may yet exist on the southern shores, and await for a marvellous summer for their marvellous marches! We have noticed their tracks far out of sight of land; upon what they live we cannot determine, but

that they are the prey of numerous birds and animals we well know.

On the 17th I forwarded a shooting party, with a week's provision, to the north-east; it was placed under the direction of Dr. Lyall, and partly composed of some of our men who have been particularly subject to affection of the gums, induced principally by their peculiar duties and confinement on board. They started about ten A.M., with a temperature of  $7^{\circ}$ , in high spirits, and passed round Cape Eden, taking the direction of the great Eastern Valley, falling in suddenly from thence. Today also, for the first time for some weeks, I made an attempt to bask in the sun's rays on the upper deck, enjoying a temperature of  $14^{\circ}$ .

*April 20.*—My visits on deck perhaps rendered me more expectant, but I could not shake off the impression of something advancing. Today I had become wearied, and had not yet reached the deck, when I was apprised of some extraordinary event by the noise on deck, and, before I had time to make inquiry, the arrival of Commander M'Clintock, with the dog-sledge, was announced. He was the bearer of letters from Captain Kellett, the contents of which certainly surprised me, as I conceived that my letters, independent of the explanations which Commander Richards, as well as Lieutenant Hamilton, could give, left no doubt as to my intentions; indeed Commander Richards had, for this special purpose, been sent instead of Commander Pullen. The question at issue appearing to be, that, as no *imperative* orders had been sent, he would await them, I penned the following:—

*H.M.S. Assistance, Wellington Channel,  
April 21, 1854.*

SIR,

I have to acknowledge the receipt of your communications of 12th April, which, with others, will be formally noticed on my arrival at Beechey Island.

Having maturely considered the contents, I see no reason for altering my original decision in October last,—that the ‘Resolute’ or tender should be abandoned, or both.

The only consideration now arises from the absence of travelling parties. You are therefore hereby directed to withdraw from the ‘Resolute,’ the valuable stores, chronometers and instruments, officers and crew, and repair for further instructions to Beechey Island, leaving Commander M’Clintock to await the return of the absent sledge crews, when he will also abandon that vessel\* and repair to Beechey Island.

It is almost needless for me to add that both vessels are to be well battened down and nothing disturbed, so that they may be *re-occupied*, should I deem it necessary, in July or August next; or that their extrication, should Nature send them to us, off Beechey Island, will be a simple matter of re-occupation in a fit condition for immediate service.

The sledge crews devoted to this service by my last “General Order” cannot now be spared from the duties required here, and must reach this ship by the 15th of May, but those of ‘North Star’ and ‘Investigator’ will be placed at your disposal.

Given under my hand on board H.M.S. Assistance, in Wellington Channel, this 21st day of April, 1854,

EDWARD BELCHER, *Captain,*

*Commanding the Arctic Squadron.*

CAPTAIN H. KELLETT, C.B.,

*H.M.S. Resolute, Barrow’s Strait.*

But these definitive, imperative orders, were not, as may be imagined, the result of arbitrary command; and it is necessary to a just view of the case, to give the following letter, delivered by Commander M’Clintock; it bears date the 12th of April, 1854:—

Intrepid’ tender.

"My dear Sir Edward,—Nothing is further from my intention, in the letters I have addressed to you, than that of irritating you, but you really have given me no orders that I could act on. Had you said to me, That, knowing their Lordships' views, and weighing my altered position from that you expected me to occupy at the time of your writing my orders, it was your direction that I should abandon (my ship) both vessels, all would have been well with me, and you would have had *me* with you."

And yet Lieutenant Hamilton, *after I did know all*, was the bearer of my letter, containing the following:—

"You will, on your arrival at the 'North Star,' with all the others, be borne as supernumeraries for victuals, etc., but in command. You will treat Pullen as a Commissioner of a Dockyard, and let everything be conducted on paper. Give your orders, hoist your pendant on any boat, and command.

"You have before you all that I know. You know the late orders of the 'Phoenix,' if she got home; and nothing but *decision, at my risk*, must mark the movements of this Squadron.

"The next orders will be imperative; and, after their receipt, there will not, probably, be any opportunity for any ulterior measures, at that late season, for withdrawing crews and reaching Beechey Island.

"This *abandonment* goes mightily against the grain. If we could save even 'Intrepid,' it would be something; but your *distance off-shore* precludes any movement before the 22nd of August, and that is too late for operations at Beechey Island. *No! all must come; no vo-*

lunteering will satisfy me! If new crews are sent from England to hold 'North Star,' then a party could proceed back to extricate one or both. Strike topmasts, and get everything on deck.

"If you had not been so pinched, I think you would have derived some satisfaction by following up the *possible* tracks of Collinson by Cape Walker, Cape Batty, and Port Leopold, and even of conducting him to 'North Star;' I am not without hope that Pullen will."

But let us proceed with the further matter, for it is entirely public, contained in Captain Kellett's letter.

"M'Clintock is a sound and safe man, who will give you any information that I omitted. Are your vessels safe to get out? Even mine in a harbour or on shore, hauled up, would be well; but they are not, and must be sacrificed."

With Commander M'Clintock I fully discussed the matter for *two days* before those definitive Instructions were delivered to him, so that it can hardly be imagined that the case was not thoroughly sifted in all its bearings; indeed Captain Kellett had my further confidential arguments upon the measure by a demi-official of the same date: thus,—

"My actions, my good friend, must stand the public test in England, and he is a *weak Commander* who gives reasons for his conduct before they are demanded by authority.

"All my letters will probably be demanded, and they must all accord in the ~~same~~ determination, understood fully by the two late First Lords, to whom I must leave any defence that may be demanded. I will not deceive

them, nor shall their replies or assurances deceive the country that the trust reposed in me, viz. 'the final issue of all Expeditions to this region, for the end intended, should rest on my decision

"The valuable time for action, *i. e.* for the withdrawal of valuables, has elapsed. My sledges must return here before the 15th of May; for we have infinitely more to do than you have, and the water will impede me before it can you.

"If it should be the pleasure of the Admiralty that the ship should be saved, that intention will be completely met at Beechey Island, and at that date the sea will be open, and reduced crews and new men can be sent before the ice breaks out on the 22nd of August (and not before) in Barrow's Strait. Our vessels must, under any circumstances, be left to chance,—to the workings of Nature,—we cannot help them; and the value of one man's life, in my view, is far above what the hulks will sell for as firewood. Independent of this, double wages, left in danger, the expenses of other ships sent out to search for you, would entail something more, I imagine, than the value of stores abandoned!"

Such then being my feelings, I took leave of Commander M'Clintock, who quitted about nine P.M. on the 21st. But it must not be imagined that the mere question of the safety of the 'Resolute' and tender occupied my thoughts. Every man fancies *his* goods and chattels of the most importance; but let us calmly look to my duties. If *all* could not be saved, then those measures should be adopted which *promised success*. No chance, to my conviction, offered of carrying out the *double duty*



of *adequately* provisioning the 'Resolute' for the requisite period, without the united exertions of the *whole force* at my command, and then merely on a *chance of success!*

But as regards this ship, everything was in favour of *her release* and of saving her most valuable stores. Further, if it should be the will of the Admiralty, sufficient provision could be forwarded to this position, only fifty-two miles from Beechey Island, to admit of a crew staying by the ship until it became prudent to retire for the winter to Beechey Island. In such a case very few men would be required, and those only to live in the tender. My duty therefore, and on *my shoulders alone* would rest all the responsibility, *however advised*, was clearly to save all the stores and valuables that could be conveyed to Beechey Island before travelling became dangerous *or impracticable*, so that the force at the last moment should direct all their energy to extricate the ship.

My readers may imagine that all the summer months are available for *travel*, but they may be sadly in error. As the heat increases the floe becomes so covered with water, even if not disrupted and exhibiting impassable gaps or loose pack, that it is dangerous to attempt travelling *without stores*, and this occurs at the very moment that decision as to the *dernier ressort* is demanded.

The circumstances in themselves left no sensible alternative, for the 'Resolute' and tender were beyond a reasonable distance, or 180 travelling miles *west* of Beechey Island, the post at which we do not anticipate open water before the 22nd of August; and at that moment the sudden arrival of a steamer, with as sudden orders to abandon, and such orders given under the full conviction

that I was *worthy of the trust reposed in me*: certainly those who selected me never contemplated my shifting any responsibility on those whose *opinions* I might ask, but which expressly, by my Instructions, I was only to follow—“*If such likewise should be your opinion.*” Again, “We place every confidence in your zeal and intelligence, that you will act with sound judgment in whatever situation you may be placed.”

Now the degree in which my character for judgment and discretion was to be involved was within my own keeping, and no one but myself positively knew the full intent of every word of my Instructions. If I failed, after the extracts I have given of my confidential explanation, to induce others to coincide in the view I took of the public interests entrusted to my charge, it then became a prudent duty on my part to continue the service without risking further difference of opinion, or of estranging those who still, if I could credit written evidence, professed the most friendly and, as I believed, professional anxiety to further all my views.

Shortly after the departure of Commander M'Clintock our sporting party returned, having killed two hares; they had not noticed the most remote trace of musk-oxen or reindeer—possibly from not having penetrated sufficiently into the country, or from the period of the season being too early for their emergence from their winter concealment. Several of the party seemed to have experienced attacks of snow-blindness, and to be generally rather fatigued by the excursion; but, on the whole, I can detect that it has been beneficial, suffusing the olive complexions of some who have not seen much

daylight or been exposed to the open air for the last six months with a more natural tint of carnation.

*April 23.*—The weather has evidently taken a favourable change; the temperature is now at  $12.5^{\circ}$ , snow thawing on the dark portions of the land, the ship's sides, and awnings directly exposed to the sun's rays, but within the awnings on our quarter-deck the temperature showing  $21^{\circ}$ ; the drippings remind one strongly of some limestone cave, where the icicle and the deposit on the deck represent the stalactite and stalagmite. The temperatures for the last ten days have gained the *plus* sign, affording as follows: maximum  $+16^{\circ}$ ; minimum  $-18.25^{\circ}$ ; mean  $+17.14^{\circ}$ . Notwithstanding the low temperature, even in my very weak condition, I really can pronounce the air, under the full influence of a bright sun and cloudless sky, to be balmy and delicious.

Trifles, at any other period to be classed light as air, here assume an importance intensely interesting. Doubtless most of us have experienced the delight, as boys, in rearing mustard and cress; but a proficiency in every employment does not fall to the lot of every experimenter; and so we find even the rearing of mustard and cress in close cabins, and without daylight, is a subject for competition; here, however, it becomes a matter of vital importance. The experiments to which I now allude were conducted in my cabin, in three boxes filled with the sifted dust from pounded peat: No. 1 was simply the peat; No. 2 the same covered with a fine ~~filmy~~ sheet of cotton wool; No. 3 the same, but with a sheet of "wadding." Today that in No. 3 had reached a length of five inches, close, strong in stem, and of a light green, which

has been improved in colour lately by exposure to a very faint ray of light down the companion skylight. The interval in which this fine crop has been produced is 168 hours. I find, from my notes, the following :—"The light in forty-eight hours produced a vivid green instead of a sickly pea-green." The amount raised in the holds alongside the Sylvester furnace, under a temperature of  $54^{\circ}$ , has reached eight pounds, and has been distributed principally to those of scorbutic diathesis.

*May 1.*—On this day I had hoped to start for Beechey Island, but that event now appears to be postponed for some time, or at least until the season permits of floating the ship, an operation demanding more than the present force of our debilitated and absent crew will afford. The temperature last night fell as low as  $-15^{\circ}$ , but the means of the concluding days of April afford as under :—

April 28, max.  $+21^{\circ}$ ; min.  $+15^{\circ}$ ; mean,  $17.875^{\circ}$ .

April 29, „  $+23^{\circ}$ ; „  $+16^{\circ}$ ; „  $19.666^{\circ}$ .

April 30, „  $+20^{\circ}$ ; „  $-3^{\circ}$ ; „  $9.500^{\circ}$ .

The monthly result affords :—

Max.  $+23.00^{\circ}$ ; min.  $-37.50^{\circ}$ ; mean,  $-5.197^{\circ}$ ;

the mean for the corresponding term last year being  $-8.127^{\circ}$ . The thermometers buried in the snow-bank, although most critically and carefully managed by Mr. Loney, do not appear to be trustworthy as instruments for reliable results; still they afford certain proof of the warmer temperature of the snow, as may be seen from the annexed Plate. The thermometer inserted in the wooden tube at four feet below the earth's surface coincides nearly with No. 6 in the snow. The indices, when

exposed to temperatures below  $-20^{\circ}$  in the air, do not act satisfactorily; indeed I can only repeat here my entire want of confidence in any Six's thermometer which has passed through my hands on this service.

As the term approaches for the return of our relief sledges, our trusty Sergeant of Marines and a selected companion were despatched, with orders to encamp on the brow of a commanding hill about three miles to the southward, to watch for and signalize any approach of sledges, as well as to scour the heights southerly for game. Today they were visited by some of our excursionists, who brought back one hare, which was allotted to the sick. It is strange how some men will recoil at being termed invalids, or even subjects for attention; instead of any gratitude for the addition, they preferred the preserved meats. Such is human nature!

On the morning of the 3rd the signal from the Sergeant's station announced the sight of sledges advancing, and about eleven A.M. the 'Sir Edward' and 'Success' sledges, with Commander Richards and Mr. Herbert, returned, bringing intelligence of the arrival of Commander M'Clure and his crew (excepting ~~one~~ invalid, to follow with the 'Resolute's') at Beechey Island.

*May 4.*—This, being our ten-day interval, exhibits but little advance in the mean temperature; maximum  $+23^{\circ}$ , minimum  $-16.5^{\circ}$ , mean  $-4.798^{\circ}$ .

The water beneath the ice, although it still maintains the standard of  $29.5^{\circ}$ , nevertheless exhibits decided thawing influence wherever it can find its way up, percolating the solid floe and thawing the partial joints formed by the overlapping of "the run" of October last.

This sponginess of the ice is clearly manifested by the rising of the water where we commenced a cutting over our anchor, as well as at a crack near the sternpost, where the ebb and flow of tide is clearly indicated, notwithstanding temperatures as low as  $-19^{\circ}$ .

Yesterday two holes were driven horizontally into the snow-bank near the ship; one at the denuded floe edge, the other three feet above and immediately over; into these holes two spirit minimum thermometers were carefully inserted, and the holes well closed with snow. The temperatures were raised to  $32^{\circ}$  before insertion, and that night the external register indicated  $-12.5^{\circ}$ . At first sight these experiments may be supposed to be simply connected with meteorology; but my object had further reference—disregarding empirical assertion—to the most advantageous position for pitching tents, on ice, snow, or gravel. I have, upon my own impression, as before observed, preferred snow, and the Esquimaux do not, I believe, clear it off to the ground when they construct their snow-houses; I find it, moreover, pleasanter to projecting bones than irregular ice or gravel.

*May 6.*—Today we commenced lining out the cuttings for our dock to lead the ship ahead and off-shore, before we lose the substantial floating power of the ice should the depth prove scant; for it is evident to my senses, that whilst thus cradled and uplifted it would prove a very easy matter to transport the entire floating mass to seaward, when the weight of the ship freed from ice might defy our exertions.

On the evening of the 7th our first sledge of the mail line, intended to be maintained, conveying instruments,

etc. to Beechey Island, departed. I had fully contemplated the necessity of some such proceeding before quitting England, and the propriety of establishing resting-places or houses of call, should necessity reduce us to the abandonment of the vessels. This I now determined to carry out, establishing four journey positions in the fifty-two intervening miles, where tents, and all the necessities for cooking, sleeping, etc., would be provided, and thus relieve each sledge of that weight, amounting, as under, to 335 lbs.

Tent and gear for ditto . . . . .	62 lbs.
Sleeping bags . . . . .	74
Buffalo robe and cover . . . . .	73
Waterproof and canvas bottoms . . . . .	48
Cooking apparatus . . . . .	32
Axe, pick, spade, boat-hook . . . . .	26
Boarding pikes . . . . .	29
	<hr/>
	335

This arrangement ensures the dry tent, ready pitched with due preparation on arrival, by the party in possession, and further, relief from the trouble of packing on resuming the march. The stations at present contemplated are Cape Osborn, Cape Grinnell, Cape Bowden, or Baring Rendezvous (commanded by Sergeant Jefferies), and Cape Spencer.

The consumption of fuel, and other reasons, rendered it expedient to withdraw all the tent-keepers but the Sergeant and his assistant at Baring Rendezvous, where a supply of provisions would be accumulated to aid the travellers, as well as meet any emergency, should a sudden disruption of the ice or other event compel the crew to seek refuge at Beechey Island.

## CHAPTER VI.

Lifting of the Ship.—Lateral Compression.—Freezing in Bottles.—Snow Thermometers.—Rise and Fall of Water.—Blasting.—Flight of Birds.—Letter to Captain Kellett.—Proceedings of Lieutenant Meham.—Captain Collinson's Records.—Dealy Island.—Beechey Island.—Proceedings of Lieutenant Hamilton.—Irregularity of Tides.—Land Springs.—Remuneration of Crews.—Orders.

My attention during the last few days has been much engaged outside of the ship; indeed, superintending the duties on the dock cutting; and I cannot but observe that the peculiar lifting of the ship, added to the gaping of the ice at the old floe level, induces me to offer the following facts and reasons, which I leave to those whom it may concern to combat.

In October last I contemplated this lifting, and, as then noticed, directed a gauge batten to be securely nailed to the sternpost, so as to indicate any upheaving. I now notice that this batten indicates a rise, or lift of the ship, fourteen inches above the floe level of that period.

Upon mature reflection, and viewing the undoubted strain evident at the last third of her length, or the stern portion, I am inclined to consider that up to midwinter or beyond, as the ice gradually consolidated, its expan-



sive force was exerted on the opposite sides of the segments of our cradle dock, which, as it formed under the counter, presented a nearer approach to the wedge influence, and thus imperceptibly tended to lift the vessel. If the fluid water would effect this, surely it will not be contended that solid ice could not.

This wedge power, having no yielding surfaces laterally, I assume to be one, if not the grand, cause of the heavy cracks, or reports, before alluded to, and termed "cracking of bolts," and which ceased entirely about January, as before stated.

Now, reverting to the action of freezing on different fluids in slight glass cylindrical jars, they would, if confined at the orifice, under common reasoning, be broken at the moment of complete congelation, by the sudden expansion. But my experience teaches me that this is not a law, and that under the course of freezing, we have first, the coating of fine crystals on the outer exposed surfaces; next, the accumulation of the floating separate crystals into a sludgy, creamy snow or ice; and finally, consolidation and expansion. This latter is an enormous power; but its action, I find, depends very much on the vessel in which it is contained. I never, freezing at temperatures at  $-51^{\circ}$ , found it break or crack any glass vessel; but I noticed that where it froze in the long tube (nine inches by five-eighths bore), it elongated the ice, and forced it vertically out of the tube to the extent required by Nature. In bottled fluids, which being corked offered resistance, I found they were burst at the shoulder near the neck when of the wine-bottle form; but where beer or ale was exposed in champagne-

bottles, affording no abrupt opposition, that the ice first forming in the long narrow neck simply displaced the cork, and forcing the icy cone into the neck, saved the fluid by Nature's own cork !

In the case of the formation of the *floe*, careful experiment teaches us that the daily rate of freezing does not exceed 0·45 inch per diem : that the lower stratum of ice is, so to speak, rotten until it assumes an accumulated thickness of eight or ten inches ; then it becomes homogeneous with the upper *floe* ice ; and if it does not buckle and break by lateral pressure, its expansive force is likely to act on the ship and gradually lift her, until she becomes eventually perfectly imbedded and secured from further pressure by the great solidity of the ice itself. This motion *upwards* appears to be indicated by the surface line of cradling *gaping* at the presumed water-line, just in such a degree as would naturally be noticed in replacing any vessel sitting in a mould of wax, where some extraneous matter prevented it from falling into its proper position. Another curious fact has just been determined, viz. that at the stern, where but twelve feet water could be found in October last, we have now sixteen feet : consequently the ship cannot be aground. This is matter beyond my comprehension, without calling in the aid of the same expansion acting between the position occupied by the ship and the land.

*May 13.*—Yesterday three sledges, commanded by Lieutenant May, Messrs. Grove and Pim, Mates, returned, but brought no news of importance from Beechey Island. The tent depôts already alluded to on this route were established.

At noon today the thermometers placed in the snow-bank on the 3rd were withdrawn: that at the floe surface in contact with the ice indicated  $+14^{\circ}$ ; the other, having three feet snow beneath and one foot above,  $= +2^{\circ}$ : both rose immediately  $2^{\circ}$ . The external thermometer was  $18^{\circ}$  at the same moment. These thermometers therefore represent the minima gauges; the external indicating, during this ten-day interval, on the three consecutive days, the low temperatures of  $-19^{\circ}$ ,  $-15^{\circ}$ ,  $-10^{\circ}$ ; the ice therefore, protected by a covering of snow three feet in depth, was warmer by  $-19^{\circ} + 14^{\circ} = 33^{\circ}$ ; and one foot, probably the thickness of a rapidly constructed snow-house, would afford by this experiment  $+19^{\circ} + 2^{\circ}$ , or  $21^{\circ}$  warmer than the external air, and free from the searching power of the breeze, which, after all, is the most important consideration in such calculations. The thermometers were of deep tints of ruby when first embarked; but long exposure to light had so much affected one, that it now presented a pale amber hue. These were now exposed on a brown spar, to test the sun's direct rays: the amber rose to  $17^{\circ}$ , the ruby to  $18^{\circ}$ . Further exposure on the black sides of the ship afforded amber  $40^{\circ}$ , ruby  $42^{\circ}$ . They were then at this mark replaced in the snow.

*May 14.*—Our temperatures during the last ten days afford max.  $+18^{\circ}$ , min.  $-19^{\circ}$ , mean  $+2.529^{\circ}$ : not much warmth to boast of. Having noticed several indications of more determined tidal influence, experiments were tried today by inserting a tide-pole through the fire-hole (a hole about six feet square, abreast the gangway, kept open for obtaining salt water in case of fire). This in-

licated no less than twenty-one feet eight inches amid-ships. The tide fell one foot within the hour; fully proving, as the ship fell with it, that she is ice- as well as water-borne.

This remark requires further comment. The rise and fall of tide is apparent, not only on the tide-pole, but also on the ice; proving that until the floe becomes entirely free from the shore, it does not rise and fall to the *extent* to which the water indicates it *should*. Thus, in addition to the rise and fall as exhibited by the true index (the tide gauge secured to the bottom), we notice a rise and fall between shelf cakes of ice deposited at high and low water, a distance of eighteen inches, fully proving a resistance in rising due to floatation if free. This is specially evident at the in-shore cracks, where the communication is impeded at high water by thin sludgy ice and water. Although the ice immediately about the after parts of the ship does not gauge above seven feet in thickness, we find that it increases rapidly towards the bows, being fourteen feet at the stem and twenty-four feet at twelve feet ahead. The water now begins to incommode our labourers at the dock, flowing up by every crevice of the disjointed pack. The crew have been transferred to the 'Pioneer,' in order ~~to~~ to purify and paint the ship between decks.

May 15.—The accumulation of medical officers and invalids at Beechey Island rendering it prudent to place the senior medical officer there, I despatched Dr. Lyall by the mail sledge (Lieutenant May) today, with the necessary powers to take charge of the hospital, returning Mr. Ricards to do duty here.

*May 22.*—The ‘Enterprise’ (Lieutenant Cheyne) returned on the 17th: no news of Captain Kellett’s arrival. Prayers were read yesterday on board the ‘Pioneer;’ the weather still cold and raw. Wolf hovering, but infinitely too cunning for our most expert sportsmen. This evening Mr. Taylor (the Boatswain) and my Coxswain returned from an excursion, having met with Mr. Herbert at Cape Grinnell, and brought on the letters. One ptarmigan had been shot by the Sergeant. They saw a large bear, but he proved equally cunning as the wolf, having dodged them, as well as the dogs, amongst the hummocks on the coast-line. Punch, however, never behind in enduring energy, seems to have remained behind alone, watching the enemy, returning late and very much fatigued: half crippled, and all his best teeth useless, his courage is astonishing!

Late this evening Mr. Herbert reached; the intelligence brought by him is unfortunate. Lieutenant Pim, who had superseded Lieutenant Cheyne at the depôt at Cape Hotham, and appointed to watch the final sledge parties from the ‘Resolute,’ had shattered his hand by the bursting of his fowling-piece when firing at a bear. Fortunately Dr. Domville, in charge of a sick man, travelling full speed with the dogs, arrived in time to render assistance; he had reached the ‘North Star,’ and the wound was merely flesh, not immediately serious. What influence has the climate of this cruise in destroying so many fowling-pieces?

The seaman mentioned by Captain Kellett as not expected to survive had, by the aid of dogs and the great care of Dr. Domville, reached the ‘North Star’ alive; but