ICEBERGS AND ICE-FLOES.

IN the Atlantic, the great oceanic base for by far the larger number of arctic expeditions, icebergs sometimes reach as low as the latitude of Boston. They are to be dreaded mostly in the night, and sometimes in very heavy or foggy weather. This danger, therefore, steadily decreases as the ship nears the pole; and, when she passes the arctic circle far enough to encounter perpetual daylight, it ceases. It is in the lower latitudes, and especially during dark, foggy nights, so common to those regions, that the sharpest lookout must be kept; and here, also, the berg, meeting warmer waters and climate, is, in its disintegration, widely surrounded by a vast *débris* of smaller masses, most of which are equally as dangerous as the parent.

There is one peculiarity of icebergs that is fortunate for those cruising in their vicinity; and that is, their visibility at long distances during dark nights and heavy weather. I remember on the 10th of July, 1878, while making for the eastern entrance of Hudson's Strait, and while off the Labrador coast, our second mate, a keen-eyed Scotchman, caught the faintest glimmer ahead, during a misty morning, about two o'clock, when daylight was just commencing to break. He pronounced it an iceberg, and estimated it to be two or three miles away; and, wearing ship and laying to, we found in the morning that he was not any too far out of the way. This colossus of ice was flanked on either side by its *débris* for three or four miles, some of the pieces standing fully as high as the foremast of our little schooner. With my unseamanlike eyes, even with the aid of a powerful marine glass, I could only make out the slightest break in the inky clouds hugging the horizon; and the mate told me that the navies of the world, a score abreast, could have passed between us and the berg and been invisible. It is a peculiar sheen of their half-polished faces, characteristic of glacier ice, that penetrates so far, and under circumstances where a bank of snow or a ship's sails would not be seen.

So much has been said for and against the thermometric detection of the presence of ice and icebergs, that I dislike to open the subject. Generally, if a ship is approaching ice or icebergs, repeated observations made by plunging a thermometer into the water alongside, or a bucketful from the sea, soon shows the fact by decreasing temperature. These observations are more valuable in the summer than in the winter months, and also the farther south the ice may be encountered, owing to the more rapid change in the observed temperatures under these circumstances; but as nearly all arctic navigation is performed in the brief summer of these regions, and as it is only in the lower latitudes that the nights at this time are sufficiently long to cause apprehension, these observations here become of more value than in true arctic navigation. In the winter season, if the temperature of the water falls as low as 34° F. from a previous higher standard, it may reasonably be inferred that ice is not much farther away than half a mile: 42° F. shows about the same distance in the summer, the thermometer falling rapidly as the vessel approaches. However, the thermometer shows a higher temperature in deep than in the shallow water on banks, shoals, and near the coast-line, often falling from 2° to 6° F. as the latter are approached. But a good chart and a fair degree of accuracy in dead reckoning will avoid confounding this with the decrease due to approaching ice. In the case of an iceberg stranded in a current, it is evident that even this valuable sign will fail on the current-washed side; so that when a vessel is running with an ocean-current where a berg is liable to ground, or where, from its great depth, the berg is subject to some more powerful undercurrent than exists on the surface, the only safeguard is in a vigilant lookout. A sailing-vessel, especially if she be small, should never approach an iceberg too closely, if there is any danger of becoming becalmed, especially in warm waters; as their disintegration, if of a colossal nature, is sufficient to throw quite a large ship on her beam ends, if taken at a disadvantage. Sir John Franklin had the ship's pinnace of the Trent thrown ninety-eight feet by the disruption of an iceberg about half a mile distant, which so completely stove the craft, that they were forced to a very annoying delay to repair it before they could return to the ship. This rupture had been determined by the firing of a musket by one of the party.

Even if there be a good wind, there is some danger in running under the lee of a large berg, the eddying of the wind forcing a ship on the ice, while if too near by, sailer or steamer, it is not impossible that their keel might meet one of the newly 'calved' icebergs that occasionly come boiling up from a great depth; in which case shipwreck would be almost inevitable to a ship taken at such a disadvantage.

Before discussing arctic navigation, as confined to the arctic region, something should be said regarding the variation of season. Nothing is more favorable to ice-navigation than a propi-

tious season; and the history of the polar zones is replete with instances where explorers at different times have found the most startling variations in the state of the ice in the same locality, and at the corresponding time of the year. So well is this fact appreciated by experienced navigators of these waters, that you

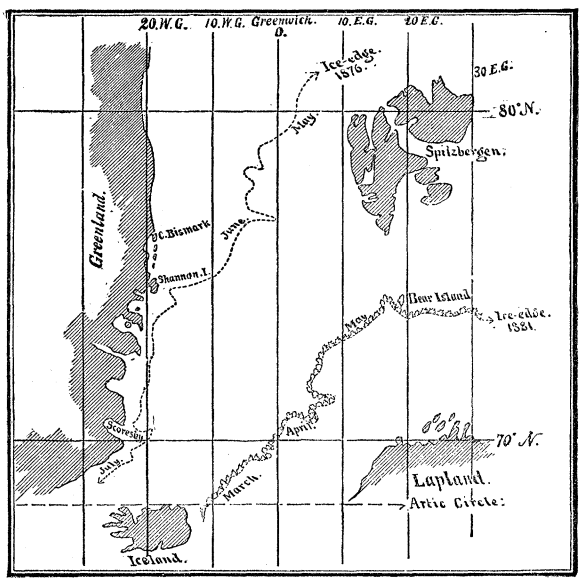

Fig. 1. — Ice-fields in 1876 and 1881.

will seldom find one eager to give that credit to arctic nautical success so often fully accorded by the press and the public. Rightly estimating that it was not altogether superior management over his more unfortunate brethren, but largely due to the fortunate circumstance of a lucky season, which is a problem defying calculation, Lieut. Payer has pointedly said, "The commander of an expedition must possess sufficient self-control to return as soon as he becomes convinced of the existence of conditions unfavorable for navigation. It is better to repeat the same attempt on a second or even a third summer than with conscious impotence to fight against the supremacy of the ice." Splendid as this maxim appears upon the face of it, it nevertheless has the weak point, that it is based on things as they should be, rather than on things as they are; and should any arctic commander, actuated by honorable motives, adopt such a course, he would probably find this maxim, when he returns home, exchanged for, 'Nothing succeeds like success;' and, should the same attempt be repeated on a second or third year, it is more than doubtful if he would find himself retaining his original position. Nothing can show the variable state of the ice at different seasons so well as the accompanying map (fig. 1) of the ice-edge between Greenland and Spitzbergen, upon the authority of the Bremen geographical society's publications for 1876 and 1881. The explorer of 1876 would have been counted as a great success, and his equal brother of 1881, a failure.

The next difficulty encountered by a vessel will be the outlying ice-packs; and much has been said on this, while considering the relative merits of steam and sails (p. 506). The commander has now before him two general routes, one of which is to keep well out to sea, if the breadth of the channel will permit; and the other is to hug the shore-line. This point seems to be pretty well settled at this hour, and in favor of inshore navigation when in the vicinity of ice. Confirmed to a greater or less extent by Barentz, Hudson, Baffin, the two Rosses, and others, including the whalers constantly visiting these climes, it was reserved for Sir Edward Parry to bring the matter in such prominent light before the public as to provoke the most bitter discussion, and revive all previous experience on the subject, with the above result. Returning from his first voyage, he says, "Our experience, I think, has clearly shown, that the navigation of the polar seas can never be performed with any degree of certainty, without a continuity of land. It was only by watching the occasional openings between the ice and the shore, that our late progress to the westward was effected; and, had the land continued in the desired direction, there can be no question that we should have continued to advance, however slowly, toward the completion of our enterprise." In his second voyage he reiterates substantially the same opinion. So necessary was the continuity of land considered by the British admiralty, after Parry's deduction, that several expeditions were by them fitted out to explore the arctic coast-line of the American continent, in order to more intelligently direct a vessel through the northwest passage in conformity with this idea. One of the greatest advantages of coast-water navigation over that more remote, even when the latter is possible, is the assurance of a winter harbor, should the young ice form so rapidly as to prevent farther navigation, — a not unusual circumstance in these regions, where the change of season is short and decisive.

Another advantage is in the fact, that if the body of water in which the vessel is cruising be of considerable extent, and ploughed by ocean-currents, the ice well out to sea does not become fixed nor solidly frozen during even the severest winters; and a vessel thus embayed is at the mercy of the grinding ice-packs caused by the winds and currents at a time when, even if she were liberated, the intense cold of that season would make it rigidly impossible to manipulate her; and, in fact, a liberation under these circumstances would be the very last thing to be desired. The Tegetthoff and Jeannette, in their drifts, were thus partially fortunate, although suffering from constant dread of liberation; and Franklin's ships had the advantage that Victoria Channel, through made, and many times forced, during heavy gales, to hastily abandon his ship, with a scanty supply of clothing and food, in the arctic winter night, expecting the crushing of his vessel in the whirling, upheaving ice-floes, show plainly the great extent of misery and sufferings which a crew may be called upon to bear when not safely harbored for the winter.

Another consideration on inshore navigation I will give in the words of its author, Lieut. Payer, who says, —

"A strip of open water, which retreats before the growth of the land-ice only in winter, forms itself along coasts, and especially under the lee of those exposed to marine currents running parallel to them; and this coast-water does not arise from the thawing of the ice through the great heat of the land, but from the land's being an immovable barrier against

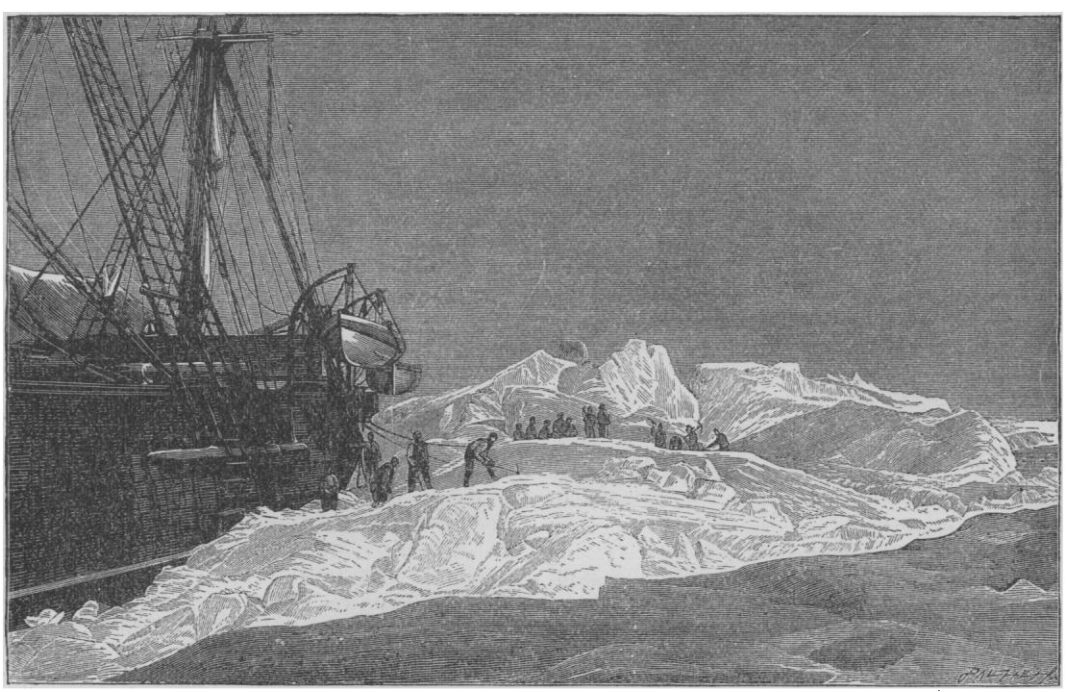

FIG. 2. — REDUCING A FLOE-BERG.

which, it seems, they attempted to take the middle course, is sufficiently narrow to freeze from shore to shore, and prevent the miseries of a winter's drift. Sir George Back, in the Terror, drifting through Fox Channel and Hudson's Strait in the winter of 1836–37, did not fare so well; and his terrible sufferings, unable to house his vessel in snow-banks, which were constantly torn from his ship's sides by the ceaseless disruption of the ice-fields as fast as the wind, and therefore against ice-currents. The inconstancy of the wind, however, may baffle all the calculations of navigation; for coast-water, open as far as the eye can reach, may be filled with ice in a short time by a change of wind. Land-ice often remains on the coast, even during summer; and in this case there is nothing to be done but to find the open navigable water between the extreme edge of the fast-ice and the drift-ice. Should the drift become pack-ice, the moment must be awaited when winds setting in from the land carry off the masses of ice blocking the navigation. and open a passage free from ice, or at least only partially covered with drift-ice."

From all the above, it is evident that navigation in coast-waters must be slow and gradual, although it has always been attended with the greatest advantages. Inshore navigation is not without its hinderances, however, and especially is this the case where the water near the coast is very shallow; and this could be remedied only by a light-draught vessel, which has the disadvantage that such a vessel cannot conform to the build already indicated. This is especially the case on the polar shores of the mainland of America, Asia, and most of Europe, while in the channels and waters north of them the land rises higher, the navigable waters approach more closely to the shore, and progress forward becomes more easily assured. Also in coast-water cruising, a vessel forced upon the shore by the incoming pack, backed by a heavy gale, is in a more precarious state than one simply grounded or lifted upon an ice-field.

A ship once fairly beset, and strongly held during a gale, is completely beyond control; and no real good can be accomplished by the severe tasks of warping and continual shifting of ice-anchors, which only exhaust the crew, and render them more or less unable to take a thorough advantage of a favorable situation, should one occur. Parry, however, under these circumstances, did not hesitate to employ his crews to their utmost at the hawsers and sails, plainly acknowledging that "the exertions made by heaving at hawsers, or otherwise, are of little more service than in the occupation they furnished to the men's minds under such circumstances of difficulty; for, when the ice is fairly acting against the ship, ten times the strength and ingenuity could in reality avail nothing." But the greater majority of ice-navigators are now decidedly of the opinion that it is best to yield to fate, and reserve the men's strength for palpable efforts. Still, in these besetments the mind of the commander must be ever active; for new events follow each other so rapidly, that a favorable chance for rescue is passed, before it can be fairly weighed in all its aspects.

Frederick Schwatka.

NOTES ON HIBERNATING MAMMALS.

A very prevalent impression exists, that hibernation among mammals is so fixed a habit that it may be defined in a few words, that it occurs with all the regularity of sleep, and is as necessary to the creature's welfare as food or drink. So far as these hard and fast lines are drawn, so far is our understanding of the subject warped and imperfect.

In the ninth edition of the Encyclopaedia Britannica, hibernation is defined as that "peculiar state of torpor in which many animals which inhabit cold or temperate climates pass the winter." Here we have the characteristic feature of the habit clearly expressed; but, when we come to consider the minor details, we do not find that any two animals, however closely allied, hibernate in precisely the same manner, nor do individuals of the same species always hibernate alike. Further, we do not find that it is so common an occurrence as usually supposed; and no animal appears to hibernate merely because winter has 'set in,' regardless of the temperature then prevailing. My own studies of the animal life in this neighborhood (central New Jersey) lead me to conclude, rather, that it is a happy faculty, which certain animals possess, but do not willingly exercise. If the prevailing temperature forces them, in self-defence, to hibernate, they can; but so long as they are able to withstand a low temperature, and food is accessible, they resist. Other causes than cold may induce an animal to hibernate; as when deprived of the supply of food gathered during the preceding autumn. In such a case, squirrels will pass the winter in a state of torpor, however mild the weather; while, with an abundant food-supply, they will simply sleep through the colder days, and awake to feast whenever the sun shines brightly.

Of the thirty or more mammals found here, thirteen species are supposed to be hibernating animals. These are four species of bats, two of moles, three squirrels, one ground squirrel, one marmot, one jumping-mouse, and one Hesperomys. Of these, probably the bats are the most sensitive to cold, and avoid exposure to it with the greatest care; and yet I find that the little red bat (Atalapha novaeboracensis) is very late in retiring for the season, and reappears with great regularity early in February. Their actions at this time indicate that considerable food is to be had, — that flying insects are abundant. While this bat's ordinary habits do not differ noticeably from those of the other species, it is apparently less sensitive to low temperature, and needs but the least encouragement to arouse from its hibernating sleep. It is also less crepuscular in habit than the others; but I do not know that this fact has any bearing upon the irregularity of its hibernation.

Bats disappear in November or December, immediately after the formation of ice, but do