

Besides, the idea of M. Defflandes, who considers the sea between Africa and America as a great river, the course of which is toward the north-west, agrees perfectly with what I advanced concerning the water's running in greater quantity from the south than from the north pole.

III.

Of the Northern Parts of the Atlantic Ocean.

ON viewing the islands and gulfs, which are very numerous round Greenland, it is difficult, as navigators remark, not to suspect that the sea falls back from the Poles towards the Equator. What favours this conjecture, the tide rises eighteen feet at Cape des Erats, and only eight feet in the bay of Disko, *i. e.* at ten degrees of higher latitude*.

This observation, joined to that of the preceding article, seems still farther to confirm the movement of the waters of the ocean from the southern to the northern regions, where they are forced, by the resistance of the lands, to re-gorge or flow back toward the south.

In Hudson's Bay, vessels have to preserve themselves from mountains of ice, which are

* Hïä. Gen. des Voyages, tom. xix. p. 2.

said

said to be from fifteen to eighteen hundred feet thick, and which, being formed by a succession of long winters, in small gulfs perpetually filled with snow, have been detached by the north-west winds, or by some other powerful cause.

The north-west wind, which prevails perpetually during winter, and often in summer, excites, in the same bay, dreadful tempests. These are still more to be apprehended, because shoals are here very frequent. In the countries which bound this bay, the sun never rises nor sets without a great cone of light. When this phenomenon disappears, it is succeeded by the aurora borealis. Here the heavens are seldom serene. In spring and autumn the air is generally replete with thick fogs; and, during winter, with an infinity of small threads of ice, which are visible to the eye. Though the summer heats are considerable during two months or six weeks, thunder and lightning are rare*.

The sea along the coasts of Norway, which are bordered with rocks, is commonly from a hundred to four hundred fathoms deep, and the water is less salt than in warmer climates. The number of oily fishes with which this sea is filled, renders it so fat that it is almost inflamma-

* Hïä. Philos. et Politique, tom. vi. p. 308, 309.

ble. The tide is here inconsiderable, the highest not rising above eight feet*.

Some observations have lately been made upon the temperature of the land and water in the climates adjacent to the North Pole.

‘ In Greenland, the cold begins with the new year, and becomes so piercing in the months of February and March, that the stones split, and the sea smokes like a furnace, especially in the bays. In the midst of this thick fog, however, the frost is not so intense, as when the sky is unclouded; for, when we pass from the land to that foggy atmosphere which covers the surface and margins of the waters, we feel a milder air, though our hair and clothes are stiffened with hoar-frost. This fog produces more chilblains than a dry cold; and, when it passes from the sea to a colder atmosphere, it instantly freezes, is dispersed through the horizon by the wind, and produces a cold so intense that no person can go into the open air, without running the hazard of having his hands and feet entirely frozen. It is in this season, that we see the water freeze on the fire before it boils. It is then that the winter paves a road of ice between islands, and in the bays and straits.

‘ Autumn is the finest season in Greenland,

* Pontoppidan's Nat. Hist. of Norway; *Journal Ettranger*, *Sept* 1755.

‘ But

‘ But its duration is short, and frequently interrupted by cold frosty nights. It is also about this time, that, in an atmosphere darkened with vapours, we see fogs which freeze and form a tiffue on the sea similar to cobwebs; and, in the fields, the air is impregnated with lucid atoms, or sharp icicles like small needles.

‘ It has often been remarked, that the seasons in Greenland assume a temperature opposite to that which prevails in the rest of Europe. When the winter is rigorous in the temperate climates, it is mild in Greenland, and very severe in this northern region, when it is moderate in our countries. At the end of the year 1739, the winter was so mild in the bay of Disko, that the geese, in the month of January, passed from the temperate to the frozen zone in quest of warmer air; and that, in 1740, no ice was seen at Disko in the month of March; while, in Europe, the ice prevailed, without interruption, from October to May. . . .

‘ In winter 1763, which was extremely cold over all Europe, the cold was so little felt in Greenland, that some summers have been less mild*.

We are assured by voyagers, that, in the seas adjacent to Greenland, there are very high mountains of floating ice, and others which resemble

* Hist. Gen. des Voyages, tom. xix. p. 20., &c.

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rafts of two hundred fathoms in length, by sixty or eighty in breadth. But these boards of ice, which form immense plains upon the sea, are seldom above nine or twelve feet thick. They seem to be formed immediately on the surface when the cold is greatest. But the floating and very high masses come from the land, *i. e.* from the environs of mountains and coasts, from which they have been detached and carried down to the sea by the rivers. These masses of ice bring along with them great quantities of wood, which are afterwards thrown by the sea upon the eastern coasts of Greenland. This wood, it appears, neither comes from Labrador nor Norway; because the north-east winds, which are very violent in these countries, would push back the trees, and the currents which run to the south of Davis's Strait, and Hudson's Bay, would stop all that might come from America to the coasts of Greenland.

The sea begins to carry boards of ice to Spitzbergen in the months of April and May. A great number come from Davis's Strait, part of them from Nova Zembla, and the greatest number from the east coast of Greenland, being transported from east to west according to the general movement of the ocean.

The following facts and notices are to be found in the voyage of Captain Phipps: 'The idea of a passage to the East Indies by the
' North

' North Pole was suggested as early as the year
' 1527, by Robert Thorne, merchant of Bristol. . . . ' No voyage, however, appears to have been undertaken to explore the circumpolar seas, till the year 1607, when ' Henry Hudson was set forth, at the charge of certain wor-
' shipful merchants of London, to discover a passage by the North Pole to Japan and China.
' . . And this I can assure at this present, that
' between seventy-eight degrees and a half, and
' eighty-two degrees, by this way there is no
' passage.

' In 1609, a voyage was set forth by the
' Right Worshipful Sir Thomas Smith to the
' south part of Spitzbergen; and, when near
' Foreland, he sent his mate ashore; and speaking of the account he gave at his return, says,
' Moreover, I was certified that all the ponds
' and lakes were unfrozen, they being fresh water; which putteth me in hope of a mild summer here, after so sharp a beginning as I have
' had; and my opinion is such, and I assure
' myself it is so, that a passage may be as soon
' attained this way by the Pole, as any unknown
' way whatsoever, by reason the sun doth give
' a great heat in this climate, and the ice (I
' mean that freezeth here) is nothing so huge as
' I have seen in seventy-three degrees. . . . Several other voyagers have attempted to discover this passage, but without success.'

On

On the fifth of July, Captain Phipps saw great quantities of floating ice about the $79^{\circ} 34'$ of latitude. The weather was foggy. The next day he continued his course as far as the $79^{\circ} 59' 39''$ between Spitzbergen and the ice. On the 7th, he proceeded through the floating masses of ice in quest of an open passage to the north by which he might gain an open sea. But the ice to the north-north-west formed one continued mass; and at $80^{\circ} 36'$ the sea was entirely frozen; so that all the attempts of Captain Phipps to discover a passage proved abortive. 'On the 12th of September, Dr. Irvine tried the temperature of the sea in a state of great agitation, and found it considerably warmer than that of the atmosphere. This observation is the more interesting, as it agrees with a passage in Plutarch's Natural Questions, not (I believe) before taken notice of, or confirmed by experiment, in which he remarks, 'that the sea becomes warmer by being agitated in waves. . . . These gales are as common in the spring as in the autumn; there is every reason to suppose, therefore, that at an early season we should have met with the same bad weather in going out as we did on our return.' And, as Captain Phipps departed from England in the end of May, he certainly took the season most favourable to his expedition. . . . 'There was also most probability, if ever navigation should be practicable to the

' Pole,

' Pole, of finding the sea open to the northward after the solstice; the sun having then exerted the full influence of his rays, though there was enough of the summer still remaining for the purpose of exploring the seas to the northward and westward of Spitzbergen.'

I agree entirely with this able navigator; and I suspect that the expedition to the Pole cannot be renewed with success, and that we can never reach beyond the 82d or 83d degree. We are assured that a vessel from Whitby, in the year 1774, penetrated as far as the 80th degree, without seeing ice sufficient to prevent sailing still farther. A Captain Robinson is likewise quoted, from whose journal it appears that, in 1773, he arrived at the $81^{\circ} 30'$. Lastly, a Dutch ship of war, sent to protect the whalefishers, is said to have advanced, about fifty years ago, as far as the 88th degree. Dr. Campbell, it is added, received this intelligence from a Dr. *Dailie*, who was in the vessel, and practised physic in London in the year 1745 *. This is probably the same navigator whom I formerly quoted under the name of Captain Mouton. But I am extremely suspicious of the fact; and I am persuaded, that we shall in vain attempt to reach beyond the 82d or 83d degree; and that, if a passage by the north is practicable, it can only be by the way of Hudson's Bay.

* Gazette de Literature, Août 9, 1774, No. 61.

On this subject, the following passage of the learned and ingenious author of the History of the Two Indies merits attention: 'Hudson's Bay always has been, and is still looked upon as the nearest road from Europe to the East Indies, and to the richest parts of Asia.

'Cabot was the first who entertained an idea of a north-west passage to the South-seas; but his discoveries ended at Newfoundland. After him followed a crowd of English navigators, many of whom had the honour of giving their names to savage coasts which no mortal had ever visited before. These bold and memorable expeditions were more striking than really useful. The most fortunate of them did not furnish a single idea relative to the object of pursuit. The Dutch, less frequent in their attempts, and who pursued them with less ardour, were of course not more successful, and the whole began to be treated as a chimera, when the discovery of Hudson's Bay rekindled all the hopes that were nearly extinguished.

'From this time the attempts were renewed with fresh ardour. Those that had been made before in vain by the mother-country, whose attention was engrossed by her own intestine commotions, were pursued by New England, whose situation was favourable to the enterprise. Still, however, for some time there were more voyages undertaken than discove-

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'ries made. The nation was a long time kept in suspense by the contradictory accounts received from the adventurers. While some maintained the possibility, some the probability, and others asserted the certainty of the passage; the accounts they gave, instead of clearing up the point, involved it in still greater darkness. Indeed, these accounts are so full of obscurity and confusion, they are silent upon so many important circumstances, and they display such visible marks of ignorance and want of veracity, that, however impatient we may be of determining the question, it is impossible to build any thing like a solid judgment upon testimonies so suspicious. At length, the famous expedition of 1746 threw some kind of light upon a point which had remained enveloped in darkness for two centuries past. But upon what grounds have the later navigators entertained better hopes? What are the experiments on which they found their conjectures?

'Let us proceed to give an account of their arguments. There are three facts in natural history, which henceforward must be taken for granted. The first is, that the tides come from the ocean, and that they extend more or less into the other seas, in proportion as their channels communicate with the great reservoir by larger or smaller openings; from whence it follows that this periodical motion

is

‘ is scarcely perceptible in the Mediterranean, in the Baltic, and other gulfs of the same nature. A second matter of fact is, that the tides are much later and much weaker in places more remote from the ocean, than in those which are nearer to it. The third fact is, that violent winds, which blow in a direction with the tides, make them rise above their ordinary boundaries, and that those which blow in a contrary direction retard their motion, at the same time that they diminish their swell.

‘ From these principles, it is most certain that, if Hudson’s Bay were no more than a gulf inclosed between two continents, and had no communication but with the Atlantic, the tides in it would be very inconsiderable; they would be weaker in proportion as they were further removed from the source, and would be less strong wherever they ran in a contrary direction to the wind. But it is proved by observations made with the greatest skill and precision, that the tides are very high throughout the whole bay. It is certain that they are higher towards the bottom of the bay than even in the strait itself, or at least in the neighbourhood of it. It is proved that even this height increases whenever the wind blows from a corner opposite to the strait; it is, therefore, certain, that Hudson’s Bay has a communication

‘ with the ocean, beside that which has been already found out.

‘ Those who have endeavoured to explain these very striking facts, by supposing a communication of Hudson’s with Baffin’s Bay, or with Davis’s Straits, are evidently mistaken. They would not scruple to reject this opinion, for which indeed there is no real foundation, if they only considered that the tides are much lower in Davis’s Straits, and in Baffin’s Bay, than in Hudson’s.

‘ But if the tides in Hudson’s Bay can come neither from the Atlantic Ocean, nor from any other northern sea, in which they are constantly much weaker, it follows that they must have their origin in the South Sea. And this is still further apparent from another leading fact, which is, that the highest tides ever observed upon these coasts, are always occasioned by the north-west winds, which blow directly against the mouth of the strait.

‘ Having thus determined, as much as the nature of the subject will permit, the existence of this passage so long and so vainly wished for, the next point is to find out in what part of the bay it is to be expected. From considering every circumstance, we are induced to think, that the attempts, which have been hitherto made without either choice or method, ought to be directed towards Welcome Bay, on

' the western coast. First, the bottom of the sea
' is to be seen there at the depth of about eleven
' fathom, which is an evident sign that the wa-
' ter comes from some ocean, as such a transpa-
' rency could not exist in waters discharged from
' rivers, or in melted snow or rain. Secondly,
' the currents keep this place always free from
' ice, while all the rest of the bay is covered
' with it; and their violence cannot be account-
' ed for but by supposing them to come from
' some western sea. Lastly, the whales, who
' towards the latter end of autumn always go in
' search of the warmest climates, are found in
' great abundance in these parts towards the end
' of summer, which would seem to indicate that
' there is an outlet for them from thence to the
' south seas, not to the northern ocean.

' It is probable that the passage is very short.
' All the rivers that empty themselves on the
' western coast of Hudson's Bay are small and
' slow, which seems to prove that they do not
' come from any distance; and that consequently
' the lands which separate the two seas are of a
' small extent. This argument is strengthened
' by the height and regularity of the tides.
' Wherever there is no other difference between
' the times of the ebb and flow, but that which
' is occasioned by the retarded progression of
' the moon in her return to the meridian, it is
' a certain sign that the ocean from whence

' those tides come is very near. If the passage
' is short, and not very far to the north, as every
' thing seems to promise, we may also pre-
' sume that it is not very difficult. The rapidi-
' ty of the currents observable in these latitudes,
' which prevents any flakes of ice from continu-
' ing there, cannot but give some weight to this
' conjecture.'

I believe, with this excellent writer, that if
a practicable passage exists, it must be at the
bottom of Hudson's Bay, and that all attempts
by Baffin's Bay will be fruitless, because the cli-
mate is too cold, and its coasts are always frozen,
especially towards the north. But the exist-
ence of this passage is rendered still more
doubtful by the lands discovered, in 1741, by
Bering and Tchirikow, under the same latitude
with Hudson's Bay; for these lands seem to
form a part of the great Continent of America,
which appears to stretch under the same lati-
tude as far as the Polar Circle. Of course, the
passage into the South Sea can only be found
about the 55th degree of north latitude.

IV.

Of the Caspian Sea, vol. i. p. 327.

TO what was advanced in order to prove,
that the Caspian Sea is only a lake, and never