XIV.

# EXPERIMENTS

ON THE

# DIPPING NEEDLE,

MADE BY DESIRE OF THE

# ROYAL SOCIETY.

BY

THOMAS HUTCHINS.

REDDE, FEBRUARY 16, 1775.

## EXPERIMENTS ON THE DIPPING NEEDLE.

Stromneſs in the iſles of Orkney, lat. 58° 59′ North, long. 3° 30′ Weſt from London, June 9, 1774.

| ° | ′ | |
|---|---|---|
| 75 | 50 | The index placed Eaſt. |
| 76 | 0 | |
| 75 | 45 | |
| 75 | 45 | |
| 75 | 40 | |
| 74 | 55 | The index placed Weſt. |
| 75 | 0 | |
| 75 | 20 | |
| 75 | 25 | |
| 75 | 25 | The poles of the needle changed, the index placed Weſt. |
| 76 | 10 | |
| 76 | 15 | |
| 76 | 25 | The index facing the Eaſt. |
| 77 | 0 | |

In theſe obſervations the needle was placed horizontal, and the vibration continued between nine and ten minutes. The inſtrument was ſet in the middle of a room up one pair of ſtairs; but being apprehenſive that the iron-grate, fender, poker, and tongs, might, in ſome meaſure, affect the needle, I determined to make a trial in the open air, and in a place free from ſuch obſtacles.

EXPE-

## EXPERIMENTS ON THE DIPPING NEEDLE.

On the Holms in the entrance of Stromneſs Harbour, June 23, 1774. Variation *per* azimuth 24° Weſterly. Long. from London 3° 30′ Weſt, lat. 58° 59′ North.

| ° | ′ | |
|---|---|---|
| 76 | 0 | The index placed Weſt. |
| 75 | 40 | |
| 75 | 45 | |
| 76 | 55 | The index placed Eaſt. |
| 76 | 10 | |
| 76 | 30 | |
| 74 | 45 | The poles changed, and index Eaſt. |
| 75 | 30 | |
| 75 | 0 | |
| 76 | 0 | The index placed Weſt. |
| 74 | 45 | |
| 75 | 0 | |

The needle in all theſe obſervations was left to vibrate from an horizontal poſition. The inſtrument was ſet on the top of the caſe (in which it was packed) and ſtood in the open air, in a fine ſunny day.

## EXPERIMENTS ON THE DIPPING NEEDLE.

In Hudſon's Straits, July 23, 1774, lat. 62° 3′ North, long. 69° Weſt from London, variation 43° Weſterly.

| | |
|---|---|
| 82 50<br>82 30<br>82 40 | The Index placed Eaſt. |
| 81 50<br>82 45<br>83 45<br>82 40 | The index placed Weſt. |

The needle vibrated from an horizontal ſituation. Theſe obſervations were made on a large piece of ice, to which the three ſhips were grappled. I imagine the firſt four experiments may be depended on, as it was calm weather; but afterwards, a breeze ſpringing up gave the ice a circular motion, which made it impoſſible to keep the inſtrument exactly in the magnetic meridian, as may be ſeen in the fifth and ſixth experiments. I re-adjuſted the inſtrument for the laſt obſervation; but finding the ice ſtill continued in motion, I judged it unneceſſary to make any farther experiments at this time, as it could not be done with that exactneſs I could wiſh, or give ſatisfaction to the learned Society to whom I have the honour of tranſmitting theſe remarks.

EXPE-

## EXPERIMENTS ON THE DIPPING NEEDLE.

In Hudſon's Straits, July 27, 1774, lat. 62° 23′ North, long. 71° 30′ Weſt from London, variation 42° 50′ Weſterly *per* azimuth.

| ° | ′ | |
|---|---|---|
| 81 | 45 | The index placed Eaſt. |
| 83 | 12 | |
| 82 | 12 | |
| 83 | 0 | The index placed Weſt. |
| 82 | 45 | |
| 83 | 45 | |
| 83 | 30 | The poles changed, and index Weſt. |
| 84 | 0 | |
| 83 | 35 | |
| 85 | 0 | The index placed Eaſt. |
| 83 | 25 | |
| 83 | 45 | |

I met with the ſame impediment as in the laſt trial of the inſtrument, the field of ice turning round, ſo as to remove the needle conſtantly out of the magnetic meridian; however, I endeavoured to be exact, and re-adjuſted the poſition of the inſtrument twice during the obſervations.

## EXPERIMENTS ON THE DIPPING NEEDLE.

In Hudſon's Straits, July 28, 1774, lat. 62° 25′ North, long. 71° 30′ Weſt from London, variation *per* azimuth 44° Weſt.

| ° | ′ | |
|---|---|---|
| 83 | 0 | The index pointing Weſt. |
| 83 | 0 | |
| 83 | 30 | The index pointing Eaſt. |
| 83 | 0 | |
| 81 | 30 | The poles changed, and index Eaſt. |
| 81 | 40 | |
| 82 | 8 | The index pointing Weſt. |
| 82 | 0 | |

Theſe obſervations were made with the aſſiſtance of Captain Richards, on a table in the cabbin of the Prince Rupert. We uſed all imaginary care to render them exact; yet, at the concluſion, I found the ſhip, though faſt to a field of ice, had altered the poſition of her head: for by placing the index to the North line of the inſtrument, the needle ſtood at 88° 10′ Weſt, inſtead of being perpendicular at 90°.

EXPE-

## EXPERIMENTS ON THE DIPPING NEEDLE.

In Hudſon's Bay, Auguſt 14, 1774, lat. 56° 53′ North, long. 85° 22′ Weſt from London, variation *per* azimuth 24° Weſt.

| ° | ′ | |
|---|---|---|
| 82 | 0 | The index placed Eaſt. |
| 82 | 0 | |
| 82 | 15 | The index placed Weſt. |
| 82 | 20 | |
| 82 | 50 | The poles changed, and index Eaſt |
| 82 | 35 | |
| 82 | 30 | The index placed Eaſt. |
| 82 | 15 | |

Theſe experiments were made in conjunction with Captain Richards, in the cabbin of the Prince Rupert, whilſt ſhe lay amongſt ice. The ſhip frequently varied the poſition of her head a point of the compaſs; but by replacing the inſtrument as often as we found occaſion, I have the greateſt reaſon to think theſe obſervations (which took up above three hours) are pretty accurate.

EXPE-

## EXPERIMENTS ON THE DIPPING NEEDLE.

At Mooſe Fort in Hudſon's Bay, September 8, 1774, lat. 51° 20′ North, long. 82° 30′ Weſt from London, variation 17° Weſt.

| | |
|---|---|
| 80° 25′ | The index placed Weſt. |
| 80 15 | |
| 80 35 | |
| 79 0 | |
| 80 30 | The Index placed Eaſt. |
| 81 25 | |
| 80 13 | |
| 81 13 | |
| 79 10 | The poles reverſed, index Eaſt. |
| 80 45 | |
| 79 50 | |
| 79 10 | |
| 79 10 | The index placed Weſt. |
| 80 25 | |
| 79 45 | |
| 80 5 | |

The obſervations were made on ſhore. So remarkable difference between them, when I was expecting quite the reverſe, ſurprized me as much as the increaſed inclination of the needle from obſervations made nearly in the ſame parallel of latitude in London. I endeavoured, by drawing a magnetical meridional line with chalk, and paying the greateſt attention to keeping the inſtrument perfectly ſteady and horizontal, to render theſe experiments accurate, and fulfil the intention of the Royal Society.

EXPE-

## RXPERIMENTS ON THE DIPPING NEEDLE.

At Albany Fort in Hudſon's Bay, September 14, 1774, long. 82° 30′ Weſt, lat. 52° 22′ North, variation 17° Weſt.

| ° | ′ |
|---|---|
| 80 | 13 |
| 80 | 25 |
| 79 | 37 |
| 79 | 55 |

I made a trial of the inſtrument at this place, but having loſt the ſlip of paper on which I had noted the experiments, I was dubious whether I ſhould inſert the above or not. I can only recollect theſe four, and am not poſitive which way the index ſtood; however, I remember that the mean of all the obſervations I made was ſomething leſs than 80°. Time will not permit me to repeat the operation during the ſhip's ſtay in theſe parts; I muſt therefore defer it to a future period. During the winter, I ſhall have frequent opportunities of amuſing myſelf this way; and the reſpect I bear the Royal Society, makes every ſervice I render to that illuſtrious body an additional happineſs to

Their devoted ſervant,

Albany Fort,
September 17, 1774.

THOMAS HUTCHINS

OBSER-

## OBSERVATIONS ON HOY, 1774.

| Month. | Hour. | Barometer. | Thermometer. | Weather. | Circumſtances. |
|---|---|---|---|---|---|
| 1774. | | | | | |
| June 11. | 0 15 | 28,63 | 59 | Clear. | On the top of the hill. |
| | 0 30 | 28,60 | 56½ | Foggy. | Ditto. |
| | 4 15 | 30,22 | 63 | Clear. | At low water mark. |

Hoy is a remarkable high hill near Stromneſs, in the Orkneys, and is placed by Mr. MACKENZIE in lat. 58° 58′ North, and long. 3° 30′ Weſt from London. The two firſt obſervations were made on the higheſt part of the hill. Soon after the firſt, a fog was ſeen below ariſing from the water, at length it reached the ſummit of the hill; the air ſeemed very raw and cold to the touch, and the inſtruments ſhewed as in the ſecond obſervation. The barometer continued at 28,60 inches after the fog was gone off, but the thermometer roſe two or three degrees. The laſt obſervation was made at low water mark, about half a mile from the bottom of the hill. THOMAS HUTCHINS.

"*The height of* Hoy *above low-water mark, according to theſe obſervations ſhould* "*be* 249,93 *fathoms, or as near as may be* 500 *yards, neglecting the correction for* "*the difference that may be ſuppoſed in the temperature of the quickſilver at the two* "*ſtations, the quantity of which is uncertain.*" S. HORSLEY.