VARIATION OF THE COMPASS.

	Deg.	Min.	
It appears from lines run by Mr. Scull in Pennsylvania, in the year 1710, the variation of the Magnetic Needle was about, (viz. the north end thereof,)	8	30	W.
In 1793, by Robert Brooke, observed to be	1	30	
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1794 the needle was observed to recede westward by Robert Brooke, of Philadelphia, Mr. Humphreys, of Maryland, and other scientific men in Virginia: *the mean rate per annum had been, eastward, nearly 5 minutes.*

In 1802, it was known to Reading Howell, of Philadelphia, to have receded westward, and was then more than

1 *deg.* 30 *min.* W.

In 1804, it was noted, by several men of science, to be 2 *deg.* W.

In 1805, it was observed, by George Gillet, Surveyor General of Connecticut, at Hebron, in that state, to be

deg. 50 *min.* W.

In 1813, by the same gentleman, *5 deg.* 20 *min.* W.

So it appears that the variation of the Magnetic Needle, westward, has been increasing since 1793, at a mean rate of nearly *three minutes* per annum. This is also the annual mean rate of progressive change in variation, according to S. Thorn, Deputy Surveyor General of the state of New York. In 1813, according to the same progressive motion, it must be 2 *deg.* 27 *min.* and is yet increasing westward.

I have observed a difference of *eight minutes* in the Magnetic variation from *four* o'clock, P. M. to *eight* o'clock, A. M. only sixteen hours apart. This is called diurnal variation, which, in the opinion of Robert Patterson, may sometimes amount to near *fifteen minutes.*

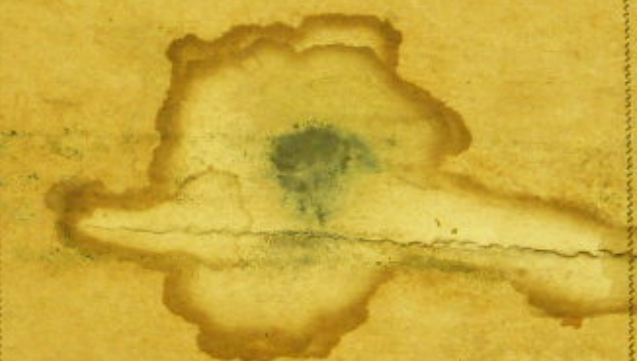
Therefore, in finding the correct quantity of variation, respect must be paid to heat and the state of the atmosphere, as thunder-gusts, aurora borealis, cold damp air, and other natural phenomena.

From the foregoing observations and matters of fact, it appears to be of the first importance, that in all surveys, the variation of the Magnetic Needle should be correctly ascertained. I presume, therefore, that the following methods will be acceptable to gentlemen engaged in this scientific pursuit.

To find a true meridian line supposed to extend to both poles, (and also crossing the equator at right angles) and on all parts of such line to find how much the Magnetic Needle differeth from that line:

Method 1st.—By an azimuth; a good time-piece is necessary if a horizon cannot be observed.

Method 2d.—By amplitudes; a horizon is necessary by this method if a good time-piece is not at hand.



Method 3d.—With a sextant and a natural horizon, or a reflecting artificial one, take the sun's altitude at meridian, and with a time-piece determine the precise time—all shadows then point out the true meridian.

Method 4th.—By the rays of the sun let through a small hole in a window shutter or wall, into a dark room. Let fall a perpendicular from such hole, let the luminous spot be received on a horizontal floor, (which may be proved by a spirit level)—draw concentric circles, whose centre shall be the perpendicular aforesaid—then at meridian, mark the solar spot on the floor, or about two hours A. M. and P. M. mark the spot on the same circle—bisect and draw the meridian, allowing for the difference of declination in the elapsed time.

Method 5th.—A simple mode in the fields or other place convenient. Set up two poles nearly east and west, fasten at the top of them another pole, horizontal within 20 or 30 degrees, so that the polar star may be seen under it—the eye placed conveniently at the distance of from 12 to 20 feet—then with a plumb line suspended, observe the greatest distance of the polar star east or west. With a surveying compass or an azimuth compass, the bearing of the place of sight and the perpendicular line of observation may be taken—the Needle will then show its own variation, allowing the semi-diameter of the stars' apparent motion, 2 *deg.* 1 *min.* 42 *sec.*—or the greatest distance east and west of the polar star may be observed with the plumb line, and the space on the pole bisected; let fall a perpendicular therefrom, take the bearing by a compass as before, and the needle shall point out its own variation.

If the night is windy and the plumb is not steady, it may be studied in clay puddle, molasses, &c. In the place of sight should be a hole of proper size in wood or metal, and when observed by the compass, a plumb line suspended or a perpendicular erected thereunto. An assistant may hold a light, so that the line of observation may be seen more distinctly.

These methods I have thought sufficiently accurate for the purposes of surveying, and hope the simple method may, in skilful hands, be useful in its place.

THOMAS WHITNEY,

Mathematical Instrument Maker.

Philadelphia, March 1st, 1814.

P. S. As I keep a book of record for Magnetic Observations, any gentleman who is pleased to throw light on this important subject, will please to direct, post paid, to me, who will faithfully record such communications as may appear.

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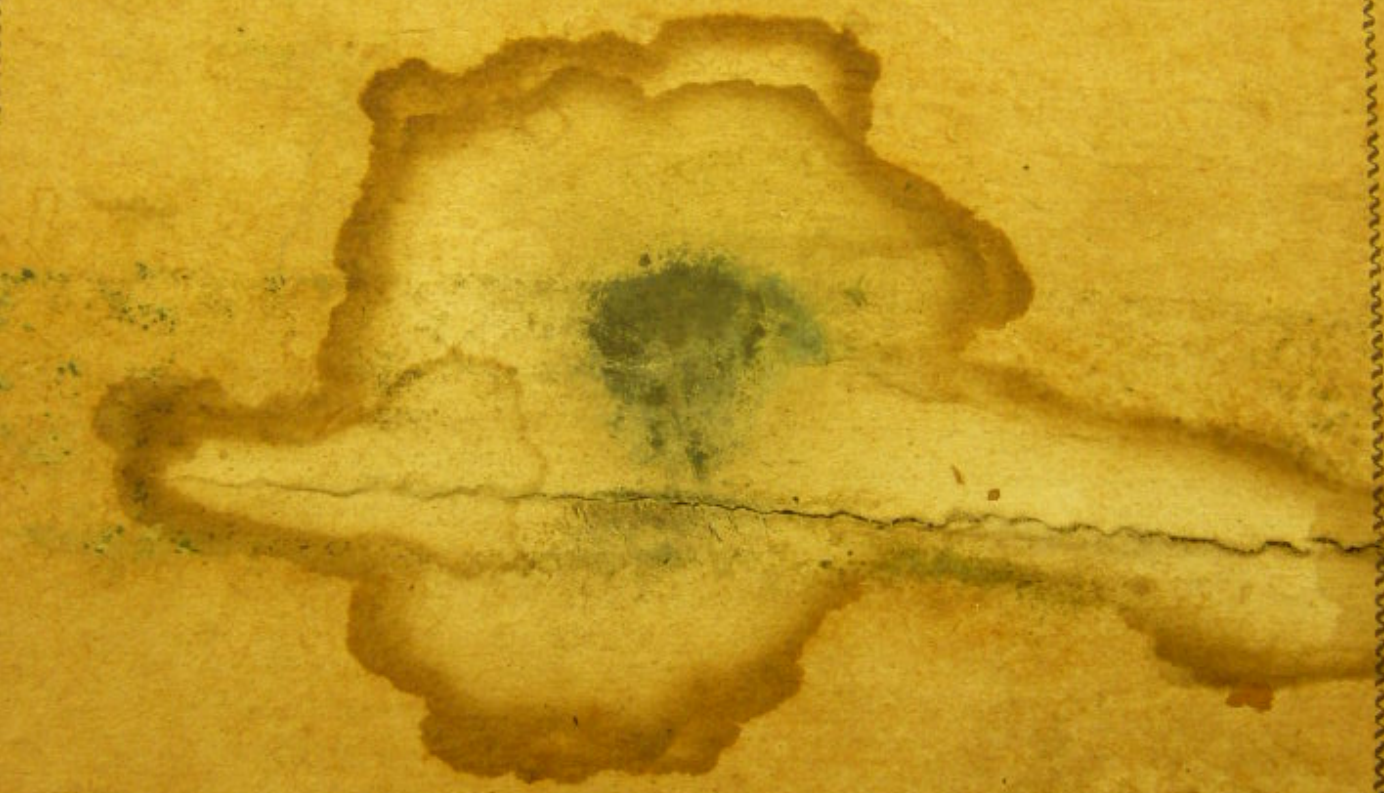

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