

THE STONE ROWS OF TORMSDALE

A Voyage to Central America, the Realm of the Dead
(Caithness, NE Scotland, c.1600 BC)

Dr. R.M. de Jonge, drsrmdcjonge@hotmail.com

J.S. Wakefield, jayswakefield@yahoo.com

Summary

The stone rows of Tormsdale, now buried under peat beside the Thurso River, in NE Scotland, are known from 1982 and 1984 surveys as described by Myatt. The monument consists of two groups of stone rows pointing NW, and a NS row. The stones are shown to encode latitudes, which describe the coastal sailing route via the Upper North to Central America. For the voyage segments with sea-crossings, the sailing directions and sailing distances are encoded. The latitudes of Central America are emphasized. The monument can be dated to c.1600 BC.

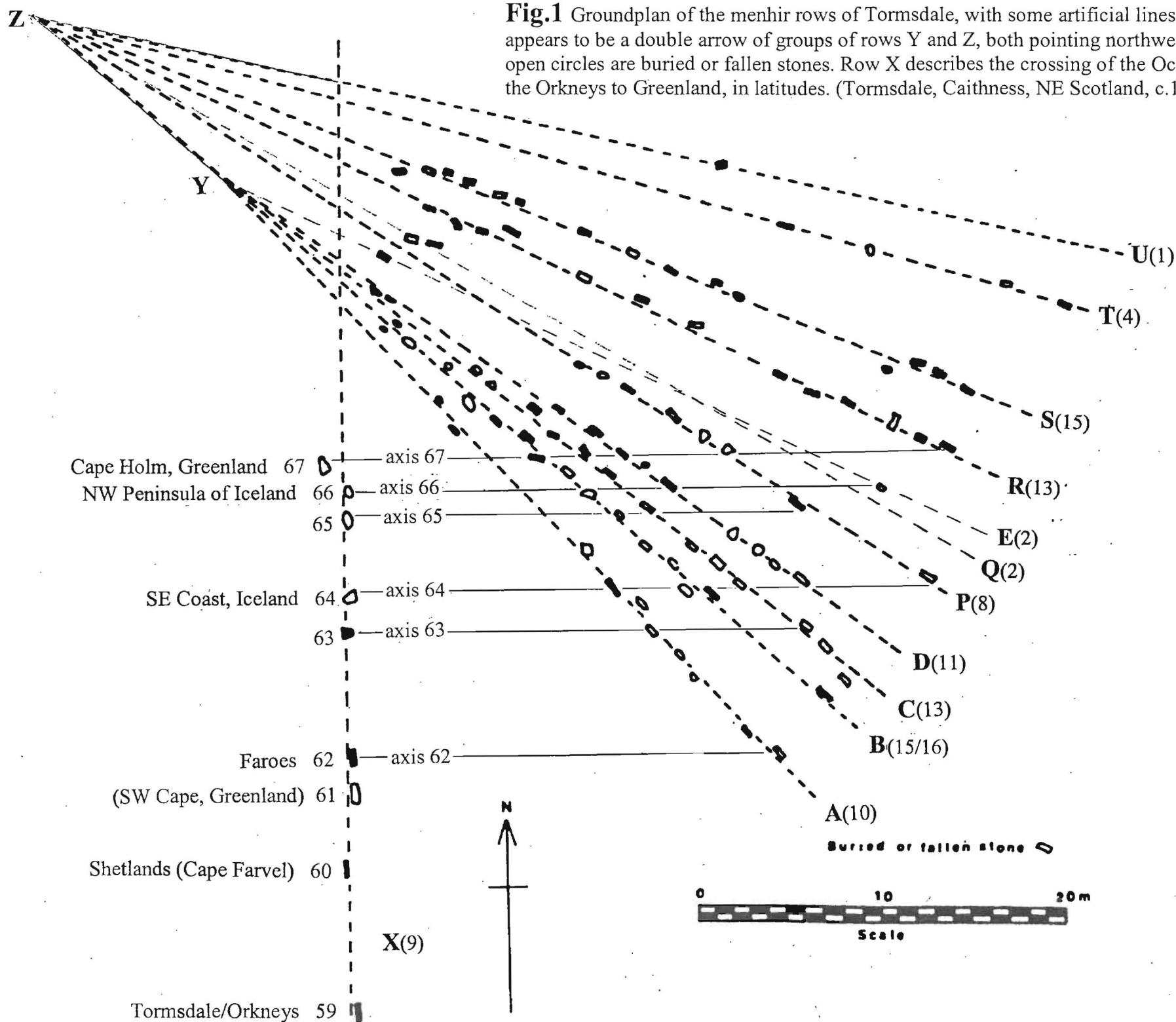
Introduction

The megalithic monument of Tormsdale consists of a fan of rows of low stones about 1 meter above the original ground level (Fig.1). It is located in the region of Caithness, in the NE corner of Scotland, alongside the small Thurso River, about 15 miles (24km) from both north and east coasts (Map1, Ref.1). In the spring of 2003, we tried to visit the site to get an impression of the heights of the individual menhirs, and to take photographs. However, in spite of accurate directions in the literature, we were not able to find the stones. Like a number of other sites in the region, the rows of Tormsdale are buried in the peat.

Photo 4 shows the depth of peat being harvested, off the dirt road north of Tormsdale. The peat layer is more than a meter high. This area on the north coast of Scotland is called the "Flow Country", a blanket bog that developed after the Ice Age. It is claimed to be one of the most important ecosystems of its kind in the world. The authors were astonished by the number of curlews and oystercatchers nesting in the bogs. Formerly, large estate owners employed groundskeepers who burned the heather to the ground in August each year, to provide better feeding for the sheep in the spring. Now there are fewer sheep, the estate owners have died, some of the estates are hotels, and people have moved away. The estate lands of the Tormsdale site have been sold for the windfarm, and for tree farms, which adjoin the site.

The stone rows at Tormsdale were first recorded by the Archaeology Branch of the Ordnance Survey in 1982 (Ref.32), and a subsequent survey was done in 1984, as described by L.J. Myatt (Ref.1). He says: "The stone setting covers an area of approximately 60m x 60m and is on ground which rises very gradually to the SE. The area is grass covered for the most part and has been colonized by soft rushes which make it difficult to identify the full extent of the rows of stones visually, since many of the stones protrude only a small distance above the surface and others appear as small hummocks on the surface where the grass has grown over them". Myatt states that peat cutting had taken place on the northern and western sides of the Rows of Tormsdale,

Fig.1 Groundplan of the menhir rows of Tormsdale, with some artificial lines (Ref.3). It appears to be a double arrow of groups of rows Y and Z, both pointing northwest. The open circles are buried or fallen stones. Row X describes the crossing of the Ocean from the Orkneys to Greenland, in latitudes. (Tormsdale, Caithness, NE Scotland, c.1600 BC)



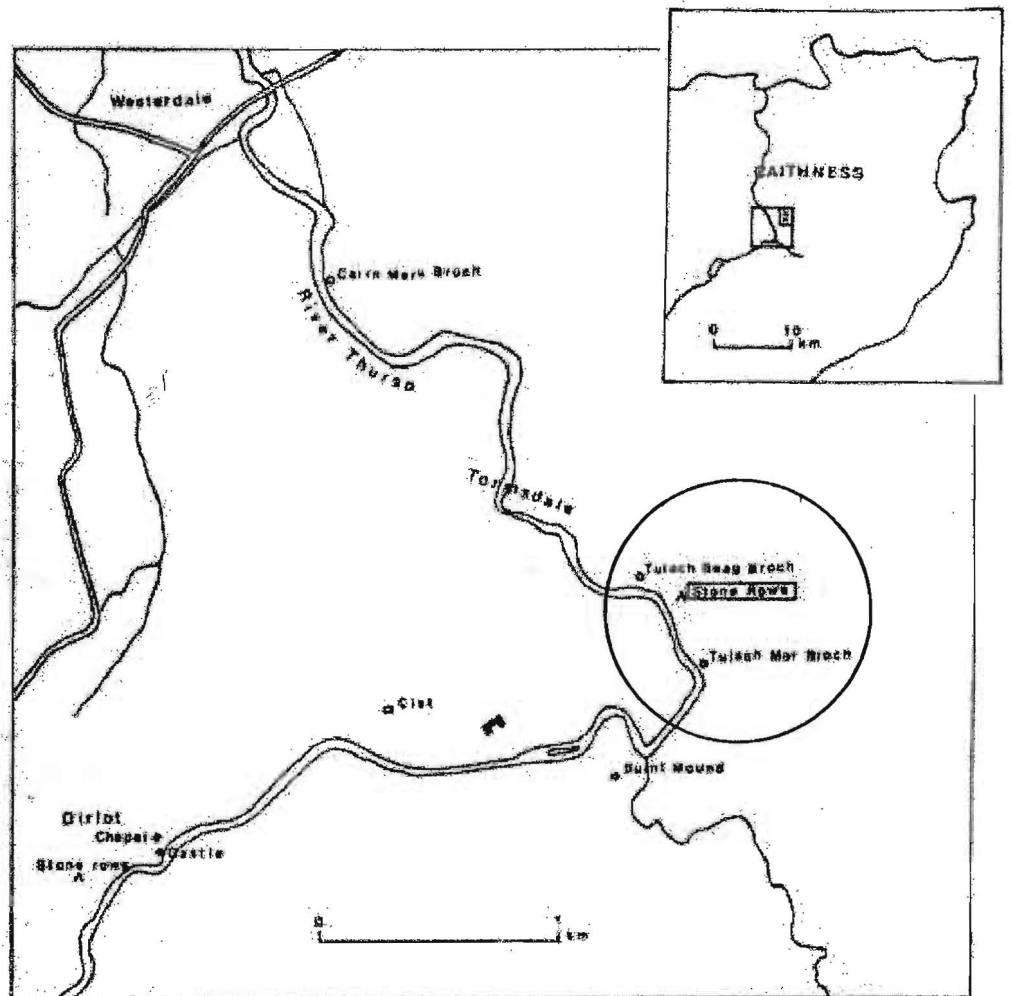


Fig.1 Location of Tormsdale stone rows

Map 1 Location of Tormsdale Stone Rows on the Thurso River in Caithness, NE Scotland (Ref.1)



Photo 3 View South, across the top of Tulach Brag Broch (to Tulach Mor Broch in the distance). The Tormsdale Rows are probably in the grass left of the river bend.



Photo 4 Current peat harvesting along the dirt road north of Tormsdale.

where he found some stones fallen and displaced. “When plotted on a large scale drawing, the stones were seen to be aligned in fan-shaped rows, with a single isolated row which has an azimuth due north and south... the tallest stones occur at the south end of this single row” (Ref.1).

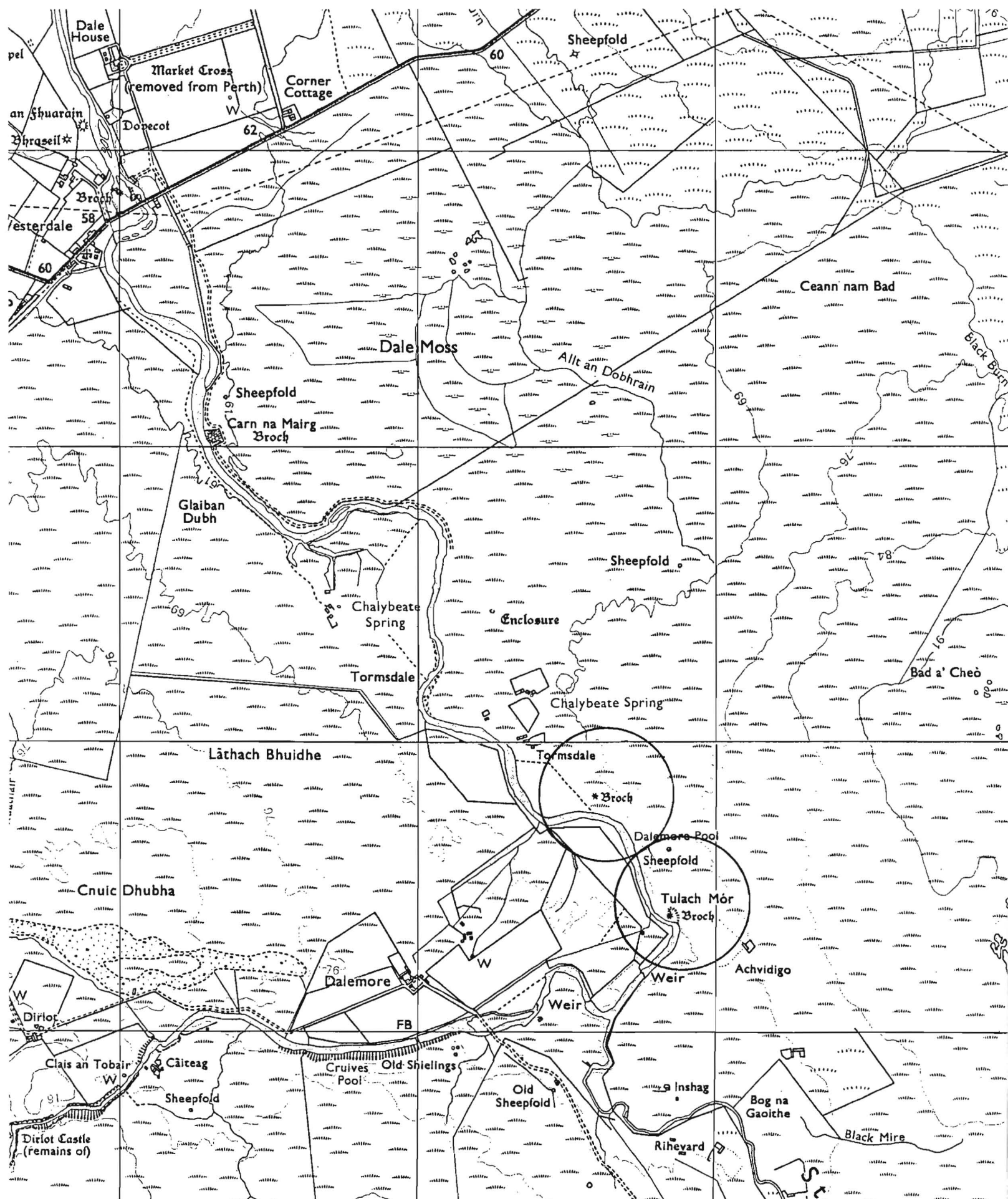
The site is located between two ruined brochs, once graceful circular drystone towers, dating from the Iron Age (Map 2, Ref.31). Photo 1 provides an ENE view from the west bank of the Thurso River to the Tulach Mor Broch, with the new windfarm nearly completed behind it. The authors found the area open for walking, but marshy. The Broch has intriguing mounds around it, surrounding a pool of the river that is out of the current. It looks like a great place for fishing or netting salmon. The Tormsdale Rows are supposed to be 300m north of this broch. Photo 2 gives a NW view across the Sheepfold, which is 200m north of the broch. The rows should be at the right side of the bend of the Thurso River, some 100m NW of the fold. Photo 3 is shot from downriver, looking south across the top of the other broch (Tulach Beag Broch), to Tulach Mor Broch in the distance. The Tormsdale Rows are probably in the weeds, about 100m left of the river bend.

Nearby Sites

From Tormsdale, the Thurso River runs a short distance north to its mouth, going over beautiful small falls at the Westerdale bridge (Maps 1,2), where large salmon are occasionally still caught. Ancient ruins are all over the maps of Caithness, so the area has been densely inhabited since the Stone Age. About a mile due west, and upriver from Tormsdale, is the site of the Dirlot Stone Rows. Map 1 shows these rows, but again they were not to be seen. The heather growth has swallowed them up. What gets your attention (looking downstream) are the ruin heaps of Dirlot Castle, dating from the Iron Age, on a rock spire surrounded by cliffs and a big pool of the river down below, and a 19thC graveyard built of castle stones on the cliff edge. Photo 5 shows the bucolic view upstream, up the valley of the Thurso.

Photo 6 shows a portion of the rows of Loch Stemster, off the A9, a few miles SSE of Tormsdale. Due to less peat, the stones stick 3-4 feet above the ground. This is also true for the only signposted row site, the famous and easily found “Hill of Many Stanes (Stones)”, 15 miles (24km) ESE of Tormsdale, shown in photo 7. The more than 200 stones in 23 slightly fan shaped rows appear to descend the hill, overlooking the seacoast and oil rigs in the bay to the south (Ref.3).

There are a total of 32 multiple stone row sites in the rather flat regions of Sutherland and Caithness, in NE Scotland (Refs.3,7). Similar sites occur in Dartmoor and Exmoor, in SW England, and in Brittany, France. In Brittany, however, the stones and the rows are on average three times as large (Refs.21-25). All the rows in Scotland consist of only small stones, often located along rivers or lochs (lakes). Some of them are reported to be “disturbed, others even removed” during the times of the land clearances, when the tenant farmers were replaced with sheep by their chieftains. However, we find that the condition of most sites is usually better than reported. In the book “From Carnac to Callanish” (Ref.3), author Aubrey Burl classifies the Tormsdale site as “ruined, but recognizable”.



Map 2 Detailed map of the area (Ref.31). The Tormsdale Rows are situated on the east bank of the Thurso River, between Tulach Mór Broch (SE), and Tulach Beag Broch (NW). The grid distance is 1 km.

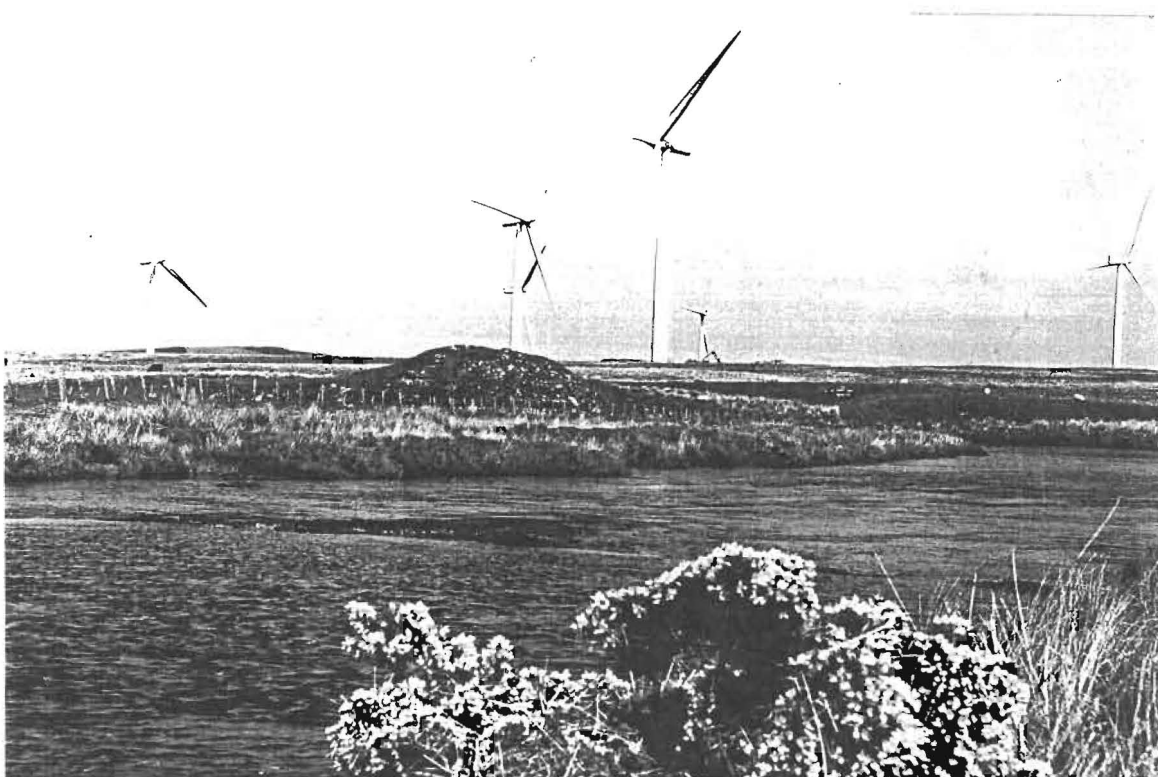


Photo 1 ENE view from the west bank of the Thurso River to the Tulach Mor Broch (Iron Age), with new windfarm behind. (Spring, 2003)



Photo 2 View NW across the Sheepfold. The Tormsdale Rows are supposed to be at the right side of the bend of the Thurso River, some 100m NW of the fold.



Photo 5 Bucolic view WSW, up valley of the Trurso River. A few stones are poking through the grass behind the photographer, where the Dirlot Rows are reported to be. (Spring, 2003).



Photo 6 View north of western row, of the Rows of Loch Stemster (see Loch at upper right). The site is a few miles SSE of Tormsdale; branch off A-9 road is at left.



Photo 7 Hill of Many Stanes, Mid Clyth, view uphill to the north. The site is located due east of Tormsdale, in Caithness, with the bay in the south, and the sea in the east. The 23 rows with a maximum length of 44 meters are roughly oriented NS (2500-1500 BC). (Spring 2003)

However, since we find that analysis of the groundplan reveals a sensible result, we think the rows are actually not ruined, but are actually in good condition, now buried in peat.

The Rows of Tormsdale

Using the groundplan surveyed by Myatt, we see that Tormsdale consists of rows of low stones, forming two arrows, both pointing NW, which are cut by a NS line (Fig.1). The 5 southern rows A-E are directed to one point Y, and form a group, called Group Y. The 7 northern rows B and P-U are focused on distant point Z, and form a group, called Group Z. The important line B is a common row of both Groups Y and Z. In parentheses following the letter labeling of each row is the total number of stones in each row. It is a rather large construction. In total, there are 104 stones, each of them having a length of about a meter, and a width of half a meter, as can be seen using the scale in Fig.1. On the average they are about one meter high. The taller menhirs are placed at the south side of the monument (Refs.1-7).

Like almost all megalithic monuments Tormsdale is a religious construction with a geographic meaning (Refs.8,9). Most of these monuments are located on the west coast of Western Europe. Tormsdale is situated in the NE corner of Scotland, 15 miles upriver from the sea. The rows form two arrows, both pointing northwest. So the monument appears to deal with crossing the Ocean in north-western direction. On a globe, you will see above Scotland, one after the other, the Orkney Islands, the Shetland Islands, the Faroes, Iceland, and Greenland.

This route across the Ocean, "via the Upper North" as we call it, is described in the old megalithic monuments of Stonehenge I (South England), and Loughcrew (Ireland), of c.3200 BC (Refs.8,9). In our previous work, we have shown that this route is illustrated in many early petroglyphs. This monument with its stone rows resembles the Kerlescan rows in Brittany, of c.1800 BC. Kerlescan is dated 700 years after the discovery of America via the Atlantic, c.2500 BC (Refs.8-11). The discovery of this new land on the backside of the Earth brought a lot of excitement, social changes, and many voyages across the sea.

From our previous work, we suspected at the outset of this study, that the Tormsdale rows encoded a description of the crossing of the Ocean to America. Ice core research in Greenland has recently shown that the North Atlantic Ocean had "extreme summertime conditions" prevailing around 2200 BC (Ref.38). This made it easier for these people to explore this route to the Upper North, following the discovery of new lands in the west. Note that the Thurso River flows north from the Tormsdale site to the sea, and upstream, it runs southwest into a beautiful valley (Maps 1,2). Perhaps the location of the monument was chosen because here it was easy to visualize a voyage that ran to the north in the sea, then ran southwest into the beautiful Caribbean.

Crossing from Scotland to Greenland

The stones of Tormsdale appear to represent latitudes, so the stones are numbered by us in a pattern that seems to make sense. This is like re-engineering an engine, and seeing if you can get it to work. When studying the western row X carefully, we soon reach the

conclusion that the southernmost and tallest menhir X59 represents Tormsdale as well as the Orkney Islands, both at about 59°N (see Fig.1). Sailing from mainland Scotland (Tormsdale) to the Orkneys is easy, because they are separated by the Pentland Firth, a narrow strait having a width of only 5 miles (8km). However, to reach the Shetlands at 60°N, represented by the next menhir X60, a very seaworthy boat is needed. With such a boat sailing is also possible via 61°N (X61, sea) to the Faroes, at 62°N (X62). Thus, when we move up the X row of menhirs, to the north, we are sailing north up stones marking the latitudes as we go. In the meantime, arrow Y gives the approximate direction.

The East-West axes from the first three menhirs X59-61 (not drawn) do not touch any stones of the arrows (Fig.1). This appears to mean, that crossing from the Orkneys to the Faroes is considered to be simple. It is not necessary to give more details. This is correct, because the latitude of the Orkneys, at 59°N, corresponds to the sailing direction (59°NW) from these islands to the Faroes, and the 4 menhirs X59-62 used so far, encode the sailing distance involved, 4 Moiras= 4°= 240 NM (1 Egyptian Moira= 1 degree of latitude= 60 Nautical Miles). The monument is telling us that they considered the Faroes to be coastal islands of Europe.

From menhirs X62-67 we drew six horizontal axes ("latitude lines") (Fig.1). Menhir X62, representing the Faroes, is placed at the level of axis 62 of the first stone in row A of the big arrow pointing to Y. When sailing NW, the direction arrow Y is pointing, we arrive via 63°N (X63, sea) at the SE coast of Iceland, at 64°N (X64). Axis 62 touches a first group of 2 stones in row A, and axis 64 hits a second group of 6 stones in this row A. To encode high numbers, it appears an encoding convention has been used, where the first stones of each of the arrow rows counts for "tens". So, if the first group represents the tens, and the second group the units, the encoded sailing direction from the Faroes to Iceland would be 20+6= 26°WNW, which is correct. The axis 64 hits stones in rows A (10 stones) and B (16 stones) which contain together 26 stones, confirming it. The first group of 4 stones in row X, up to X62 (the Faroes), determines this first sailing distance, 4 Moiras= 4°= 240 NM, which is correct.

Sailing continues in western direction around Iceland, via 65°N (X65), to the NW Peninsula of Iceland, at 66°N (X66). Axis 66 (Iceland) cuts the 7th menhir of row B. This row has a first group of 1 menhir (the tens) and a second group of 6 menhirs (the units, to the 7th menhir), suggesting a sailing direction of 10+6= 16°WNW, to Cape Holm, Greenland, which is correct. The row involved (B) has a total of 16 menhirs, confirming it. The second group of 5 stones in row X (X63-67) shows the sailing distance to Cape Holm, 5 Moiras= 5°= 300 NM, which is correct. Cape Holm is located at the holy Arctic Circle, at 67°N (X67). This is the northernmost line the Sun still shines at midwinter day (Refs.8-17). Menhir X67 is placed at the left side of row X to highlight the special position of Cape Holm, also because it is the northernmost place that will be visited.

In a geographic sense, row A, pointing NW, symbolizes the whole crossing from the Faroes to Greenland. The first group of stones represents the Faroes, the second group is Iceland, and the third group symbolizes Cape Holm, Greenland (Fig.1). Row X now symbolizes the SE coast of Greenland, with the stones of this row representing the

descending latitudes along this coast, to the two south capes of Greenland. Menhir X60 represents Cape Farvel, at 60°N, and menhir X61 is the SW Cape of Greenland, at 61°N. The interesting thing is that, again, the EW axes from these points (not drawn) do not cut any stones of the big arrows. This means that crossing from one of these capes to the coast of Labrador (North America) is dissuaded because no details are given. This advice is in agreement with instructions from several other megalithic monuments (Refs.8,9,33-35).

We know from other monuments and petroglyphs that the Faroes and Iceland were discovered c.3400 BC. Greenland was discovered a century later, c.3300 BC. The megalith builders explored the coastal waters around the south coast of Greenland, but they did not succeed in crossing the Ocean. The monuments of Stonehenge I, in South England, and Loughcrew, Ireland, show that they gave up their efforts to cross Davis Strait, c.3200 BC (Refs.8,9,11,16). This is about 1500 years before the construction of the stone rows of Tormsdale. The famous petroglyphs of Dissignac, Brittany, show that America was discovered via the Bering Sea, c.2600 BC. A century later it was reached via the Southern Crossing from Africa to South America, and also from Greenland to Baffin Island. This happened c.2500 BC, which is about a millennium before the construction of the rows of Tormsdale (Refs.8,9,12,13).

Crossing from Greenland to Baffin Island

The crossing of Davis Strait had not been thought possible for a long time. Even in the "Age of Sail", when great clipperships traversed the sailing routes of the world, the Davis Strait was called "The Wall" in Pilot Books. This is because the warm Gulfstream flowing from the Caribbean meets the cold Labrador Current running south with icebergs calved off the west side of Greenland. This is the greatest temperature difference between two currents in the world, with famous fogs, at their peak in the month of July, just when these early sailors would be trying to cross.

So, Tormsdale recommends crossing Davis Strait from the West Coast of Greenland, which is best symbolized by important row B, the common row of both Groups Y and Z. The coast of Baffin Island is now represented by the western row X (see Fig.2). The westerly placed menhir C0 seems to show, by its westerly offset, that crossing of Davis Strait is possible at 62.5°N, halfway between the axes at 62°N and 63°N. All sailing directions are due west, parallel to the axes. However, no menhir is shown at this level in row X, which symbolizes the coast of Baffin Island. So apparently by this date, this rather long crossing directly to the Frobisher Bay area was known to be possible, but not advised.

The westerly placed menhir B2 shows that crossing to Baffin Island is advised along axis 64, at 64°N to the south of Cumberland Sound. The double menhir B1,2 shows it is strongly recommended. The 5 rows A-E of the southern Group Y support this crossing, 5° above Tormsdale, at $59+5=64^{\circ}\text{N}$. Axis 64 cuts 5 to 6 menhirs in total, encoding a sailing distance of $5.5 \text{ Moiras} = 5.5^{\circ} = 330 \text{ NM}$, which is correct. The same axis cuts the group of 6 stones of row A, including big stone A22, confirming it. The 6 northern menhirs of row X, having axes parallel to the sailing direction, confirm it again.

The westerly oriented stone B6 shows that crossing Davis Strait is also possible along axis 66, at 66°N to Angijack Island, off the coast of Baffin Island. The 7 rows B and P-U of the northern Group Z support this short crossing, 7° above Tormsdale, at 59+7=66°N. This axis 66 cuts 3 stones, encoding a sailing distance of only 3 Moiras= 3°=180 NM, which is correct. The northernmost group of 3 menhirs of row X, having axes parallel to the sailing direction, confirm it. Note that the two Groups of rows Y and Z of Tormsdale encode the two difficult crossings of Davis Strait.

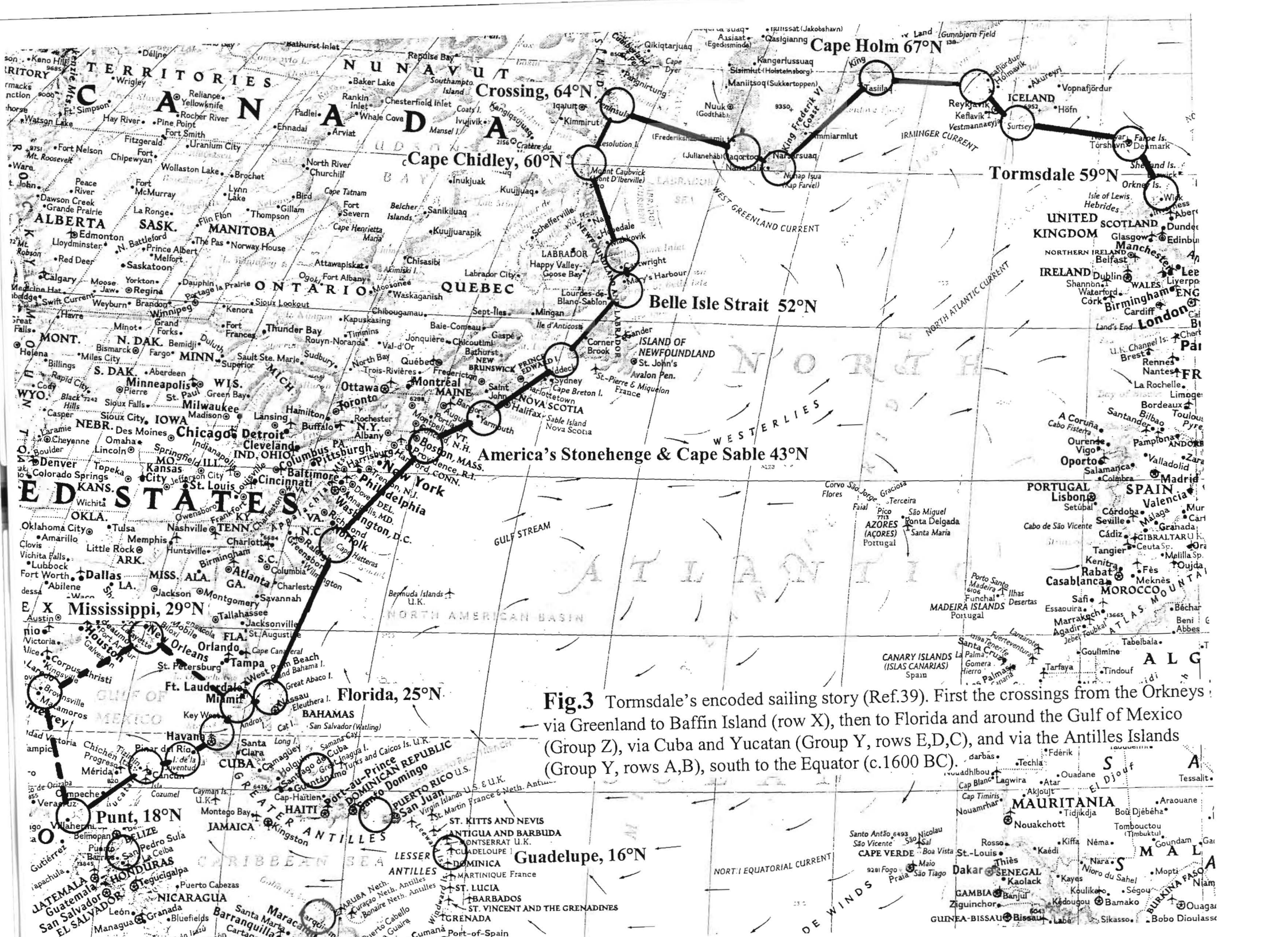
The coast of Baffin Island, symbolized by row X, can be followed to the south (Fig.2). The rather big distance X65-64 represents the crossing of Cumberland Sound, between 65°N and 64°N, and the big distance X63-62 symbolizes the crossing of Frobisher Bay, between between 63°N and 62°N. Finally, the distance X61-60 is the crossing of Hudson Strait, between 61°N and 60°N. The tall menhir X60 is Cape Chidley, the NE Cape of the continent of North America, at 60°N (see Fig.3).

From Labrador to the Caribbean

South of X60 (Cape Chidley, Canada) is big menhir X59 (Fig.2). It is placed at the east side of the row, to prevent sailing into the western Ungava Bay. So, this menhir represents the East Coast of Labrador, at 59°N. This is at the latitude of Tormsdale. Latitudes south of it are represented by the menhirs of Group Z. This group of rows B and P-U possesses a total of 58+1= 59 stones, corresponding with the 58 latitudes of the East Coast of America all the way to the Equator (stone B0, Fig.2). The numbered stones in the rows are followed from north to south in accord with the geography, so to sail south, we go south through the latitudes (stones) of the arrow. The northernmost menhir U58 represents the East Coast of Labrador, at 59-1= 58°N (Fig.2). This is at the latitude of the south point of Ungava Bay.

The next row T has 4 stones representing places and their latitudes along the Labrador coast. The southern menhir T54 represents Groswater Bay (Hamilton Inlet), at 58-4= 54°N. The eastern position of this stone illustrates the eastern situation of this Bay. Here is the start of the most important waterway to the interior of Labrador. The second menhir of the next row, S52, is the entrance of Belle Isle Strait, at 52°N. The western position of the previous stone, S53, indicates, the west bank has to be followed to find this strait. The eastern position of the stone next to it, S51, shows, that subsequently, the east bank should be followed. This bank runs along the west coast of the island of Newfoundland to the south.

Stone S48 is the SW point of Newfoundland, at 48°N. The opening next to it indicates that one has to cross Cabot Strait to reach Nova Scotia. After this menhir are two groups of stones in row S, the first group of 4 stones (S39-42, the tens), and a second group of 5 stones (S43-47, the units), so the sailing direction appears to be 40+5= 45°SW, which is correct. The width of the opening between 48-47 corresponds with the space of about one stone, so, the sailing distance is 1 Moira= 1°= 60 NM. The capes on both sides of Cabot Strait were important in the ongoing copper trade down the St. Laurence River, and leaving Newfoundland through Cabot Strait for the Azores. The eastern position of stone S44 indicates the eastern situation of Sable Island, at 44°N, important when sailing east



from the American coast (Refs.8,9,25-27).

Stone S43 is Cape Sable, the south point of the peninsula of Nova Scotia, at 43°N. The opening in the row next to it indicates that one has to cross the Gulf of Maine. Its axis 43 cuts 3 stones (Fig.2), corresponding to the westerly sailing distance of 3 Moiras= 3°= 180 NM, which is correct. It leads to America's Stonehenge, New Hampshire, at this latitude, which is the most important megalithic site of North America (c.2300 BC, Refs.8,13,36). This monument illustrates in stone all the return routes across the Atlantic to the Old World, a monument used, we think, to teach these routes to mariners. Note that America's Stonehenge is represented by the intersection of rows X and A on axis 43, which indicates the great importance of this site at 43°N. It was the center of a culture that left behind hundreds of megalithic sites in New England.

The opening in row S has a width of about 3 stones, as shown by the group of 3 stones, S39-41, next to it. Both numbers confirm a westerly sailing distance of 3 Moiras. The western position of S42 confirms the western situation of Cape Cod, at 42°N. On the other hand, it is an east cape, of course, and the eastern position of the next stone S41 illustrates the eastern situation of Nantucket Island, at 41°N. The row finishes with S39, corresponding with Delaware Bay, at 39°N, at the latitude of the West Azores.

The eastern position of R35 in row R corresponds with Cape Hatteras, the East Cape of the US, at 35°N. Stone R32 in this row encodes the mouth of the Savannah River, at 32°N, and also may refer to the island of Bermuda, 550 NM offshore, at this latitude. It had already been discovered by c.2200 BC (Refs.8,9). The openings in the rows after these stones illustrate the importance of the mentioned locations. Other possible meanings can be neglected, because we just follow the East Coast to the south.

Stone R28 has been placed at right angles to the row, to warn for the first coastal islands of the Bahamas, which start above the next latitude of 27°N (R27). Early writings of sailors crossing the Bahama Banks for the first time were mesmerized by the transparent water, and fish visible in the shallow waters that extended for days and days of sailing. No doubt these earlier sailors were mesmerized too, as they are today. The last, easterly placed menhir R26 corresponds with the important island of Bimini, on the edge of the Gulfstream, offshore Florida, at 26°N, where megalithic piers continue to be discovered underwater, and in the shallow water along the Banks to the south. The axis from R26 to the westernmost menhir X67 emphasizes the importance of this latitude (see also Fig.3).

Around the Gulf of Mexico

The top angle of Group Z, between rows B and U, is 29°. The fact that the whole arrow is spread at 29° strongly shows there is something very important at this latitude! The mouth of the Mississippi River, at the south coast of the US, is at 29°N. This means that menhir R29 in this row represents the mouth of the Mississippi, too. This river was a very important outlet for the copper mining in Lake Superior, and just above its delta was located the Poverty Point complex, with its huge semi-circular earthworks, flourishing at this date (Refs.8,9,25-27). Poverty Point is thought to have been full of refugees after the comet disaster of 1628 BC (Ref.40). Copper mining and the copper trade was to end

suddenly in the catastrophe of 1200 BC which ended the Bronze Age, but that was to happen 400 years after this Tormsdale monument was built.

The last menhir R26 then represents the mouth of the Rio Grande River, at 26°N. The next rows Q and P also point to Z. They describe the coastal sailing route of Central America, to the south. The last menhir 23 of row P is the holy Tropic of Cancer, at 23°N, and menhir P18 of this row is the south point of the Gulf of Campeche, at 18°N. This stone is situated on axis 67 to the westernmost menhir 67, which emphasizes its importance. Earlier, the westernmost menhir X67 represented the holy Arctic Circle, at 67°N, but it also represents the holy Tropic of Cancer, at the complementary latitude of $90-67=23^{\circ}\text{N}$. The Egyptian SunGod Ra has said: "The Realm of the Dead (menhir X67) is in the west, at the other side of the waters, in the land where the Sun sets." This is the center of civilization in Central America. It is also the famous Egyptian "Land of Punt", described in Queen Hatshepsut's Temple as the goal of ocean voyages lasting 3 years (c.1510 BC).

The last stone P16 of row P corresponds with the culture around the North Coast of Honduras, Belize, and Guatemala, at 16°N. The base row B also points to Z. The northernmost stone B15 gives the south border of this culture, at the level of Cape Gracias à Dios, Honduras, at 15°N (Refs.8,9,25-30). Finally, the westerly oriented menhir B8 represents the Gulf of Panama (Pacific Ocean), at 8°N. This stone points to the 9th, westernmost menhir of row X (X67), because this Gulf can be reached via the Isthmus of Panama, at 9°N.

The Shortest Route to Central America

The monument describes not just one voyage, but a group of routes then in use. These voyages probably took years to complete. Apparently, the monument was a mnemonic tool used as a teaching device, for young folks in Caithness, who wanted to go on the quest for adventure, riches, and fame.

Row Q is directed to the western point Z, but the menhirs Q24 and Q25 of this row are aimed at point Y (Fig.2). This means that the western route just described is not preferred, because a better eastern route exists. The next row E is directed to point Y, and possesses two menhirs, too, also numbered 24 and 25 because this is an alternate route. Menhir E25 is the south point of Florida, at 25°N, and the eastern menhir E24 is Florida Strait, at 24°N. The huge gap in the row between E24 and E25 indicates a crossing. The 2 menhirs provide the southerly sailing distance from Florida to Cuba, 2 Moiras= $2^{\circ}=120\text{ NM}$. The 2 menhirs of the previous row Q confirm it.

Row D is also directed to point Y. The northernmost menhir D23 is the north coast of Cuba, at the holy Tropic of Cancer, at 23°N. On midsummer day the Sun is at right angles above this latitude. The slow northerly movement of the Sun then turns into a southerly movement. From the common usage of 23° and counts of 23 in megalithic monuments, we can see the movements of the Sun were important to them, and infer that they were involved in SunGod beliefs. This stone D23 also encodes the related latitude of the Southern Egyptian Empire, far in the east, at 23°N, the center of the Sun Religion.

The next menhir D22 is the SW Cape of Cuba, at 22°N. The gap in the row D between 22 and 21 is the crossing to Cape Catoche, Yucatan. Row D has a total of 11 stones, showing the sailing direction of 11° WSW. The 2 northern menhirs D23 and D22 provide the sailing distance, 2 Moiras= 2°= 120 NM. The top angle Y, between rows A and E, is to 21°, encoding important Cape Catoche, Yucatan, at 21°N. Menhir D21 represents this Cape, at the end of the crossing. The 2 menhirs of the previous row E confirm the length of the crossing, 2 Moiras. The first group of row E has 1 menhir (the tens), and the second group has also 1 menhir (the units), confirming the sailing direction of 10+1= 11°WSW.

Menhir D19 is the northern area around the Gulf of Campeche, at 19°N. This stone is located on axis 67, to the westernmost menhir, again. Here is the civilization in Central America, which is considered as the "Realm of the Dead" (Refs.25-30). Note, that rows A and X form a triangle, or arrow, containing 18 to 19 menhirs, confirming this pilgrimage to the south point of the Gulf of Campeche, at 18°N and 19°N.

The last menhir D13 of the row is Cape Gallinas, the North Cape of South America, at 13°N. This description of the shortest route to Central and South America was considered to be very important. For that reason row C was constructed, directed to the eastern point Y. Finally, the eastern position of menhir C10 shows, that in spite of the rough tradewind seas, they advised a route (sailing a reach) along the east side of the Island of Trinidad, at 10°N. In this way, the narrow straits at the south side of Trinidad are avoided, where the Trades from the east probably make sailing difficult. Possibly attacks from hostile coastal tribes might have played a role, too.

The Antilles Islands Route

Row A is situated outside the menhirs of group Z. The row has been added, maybe as an afterthought, to the whole construction. This add-on row contains information on an alternative route to South America. The stones of row A had only a modest meaning at the start of the voyage. Now row A describes the less important, eastern Antilles Islands Route. The northernmost menhir A25 is the north coast of Andros Island, at 25°N, or New Providence Island, the site of Nassau. The next menhir A24 is the south coast of Andros Island, at 24°N, or a place along the then-existing edge of the Banks.

The opening next to it is the crossing from Andros to Cuba, SE of Florida Strait. The somewhat westerly placed menhir A24 gives a hint for the most desirable sailing direction, SSW. The 2 menhirs A25 and A24 just mentioned give the sailing distance, 2 Moiras= 2°= 120 NM. Menhir A23 is the holy Tropic of Cancer, at 23°N, and the easterly placed stone A21 refers to the easterly situated island of Great Inagua, Bahamas, still today full of Flamingoes in a huge lake, at 21°N. Finally, menhir A18 provides the latitude of the south coasts of all the islands of the Greater Antilles, at 18°N.

The last menhir A16 of the row is the most important island of the Lesser Antilles, Guadeloupe, at 16°N. The neighboring row B is also directed to the eastern point Y, and acts as the base line for the Antilles Route. The northernmost menhirs B14 and B15 provide the latitude of Martinique, at 14.5°N. This island is perhaps the center of

the Lesser Antilles. Note that the first menhirs of the important base rows B and C both represent the Equator, at the level of the mouth of the Amazon River, at 0°N (see Fig.3).

Note, that the stone rows of Tormsdale encode a map in latitudes of the islands of the Caribbean. Along the Windward Islands, because of the easterly Tradewind, it is possible to sail on a beam reach between islands, going either north or south, so by this route it is possible to sail south to the South American coast, and meet other boats arriving from the Cape Verde Islands with the trade wind on the "Southern Crossing" (Ref.8). This Southern Crossing had been in use for 1000 years when these rows of Tormsdale were built.

Dating

The monument of Tormsdale has not been carbon-dated (Ref.3). Its geographic meaning shows it was made after the discovery of America via the Atlantic, c.2500 BC (Refs.8,9). In the 500 years after this date people focused their attention on this new continent, for religious reasons, but also for establishing trade relations. Stonehenge III, the "Sarsen Stone" Circle with the Horseshoe, was built c.2000 BC to celebrate and encode the discovery of America. This date coincides with the start of the strong governments of the 12th Dynasty of the Middle Kingdom (Egypt). Tormsdale, with its rows of small menhirs, is of a completely different design, so, there are reasons to believe that it was built long after 2000 BC. Author A. Burl, who has studied so many sites, states that these types of multiple rows were not constructed after c.1500 BC (Ref.3).

These contemplations provide a time period for this monument. However, possibly, the makers of Tormsdale left a mark for the date. Rows X and A form a right-angled triangle, with axis 62 as a baseline (Fig.2). This shape is the Egyptian hieroglyph for "land" (America). Maybe this triangle encodes the date of the rows. It contains $5+10=15$ menhirs, suggesting a date during the 15th Dynasty of Egypt (the Hyksos Dynasty). The outer arrow rows A and T+U contain $10+5=15$ menhirs, also suggesting this. If menhir X67 is included, the triangle has $15+1=16$ menhirs, suggesting a date during the 16th Dynasty. Base row B has 16 menhirs, also suggesting it.

There are reasons to believe that the menhirs of row X represent Dynasties. If counting the Dynasties continues in next row A, big menhir A22, which marks the most important crossing of Davis Strait, would probably represent the date of the site (Fig.2). This is the 7th menhir of row A, and would mark the $9+7=16^{\text{th}}$ Dynasty, again. This dynasty ruled almost simultaneously with the 15th Dynasty. If we accept a date during the 15th and 16th Dynasties of Egypt, it would mean the stone rows of Tormsdale were constructed in the period between 1640 BC and 1580 BC.

The monument of Lagatjar, Brittany, shows the crossing of the Labrador Sea, from SW Greenland to the coast of Labrador, with a sailing direction of about 45°SW (Ref.37). This crossing is more difficult than the crossing of Davis Strait, described in Tormsdale. Lagatjar dates from c.1600 BC. It appears that Tormsdale cannot be of much later date. For these reasons we assume that Tormsdale dates from the time of the Hyksos Dynasty in Egypt, c.1600 BC.

Discussion

The name of Tormsdale probably stems from the old Norse version of the Sun Religion. "Tormsdale" literally means "Valley of Thor and Orm". "Thor" is the Norse SunGod, and "Orm" is the Norse earthgod, which is the Norse version of Maat, the Egyptian goddess of law and order in the universe (Refs.8,9,25-28).

We find that the rows of Tormsdale also form a latitude map of the southern return route across the Ocean, when working up the Arrow rows from south to north, the reverse of the process we worked through in this article. Bermuda (latitude 32°N) is seen as an important way-point when this is done. The eleven rows A-U encode the nine islands of the Azores and two of Madeira, "stepping stones" back to the Old World. Hopefully, archaeology students will someday be put to work excavating the site, and these routes will be re-studied after re-confirmation of the accuracy of the groundplan.

The rows of Tormsdale and other megalithic monuments were not built by accident, but were carefully designed by the mind of man. In prehistoric times they were, after all, a lot of work to construct. We believe they were mnemonic devices, used by some members of the community to recall data, and retell encoded stories, prior to the relatively recent development of phonetic writing (Refs.8-20). Maybe the groundplan of the Tormsdale site was burnt in a polished plank of wood, and was carried aboard by sailors for navigational purposes. After a few millennia, the methodology used to interpret the numeric encodings was lost, so later people were unable to read the monuments. However, we think we have rediscovered this methodology, and reading the monument this way makes geographic sense, and cannot be presumed to be beyond the ability of men in the Bronze Age.

Aubrey Burl has probably studied Megalithic Row Monuments more than any other person. He states that "Despite the amazement of visitors amongst the bewilderment of stones, .. the subject of megalithic rows is still an almost unstudied aspect of European prehistory. Over the centuries interpretations of the rows have been neither numerous, profound nor plausible. .. This is no longer acceptable (Ref.3)". This article suggests a method to the understanding of these monuments that utilizes a mathematical analysis, combined with recently understood cultural factors. The result is a new understanding of the longings, abilities, and achievements of man in the Bronze Age.

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Correspondence address:

Dr. Reinoud de Jonge
Wentholtweg 8
7214 EG, Epse
Netherlands
e-mail: drsmdejonge@hotmail.com

Jay Stuart Wakefield
MCS Inc.
Box 3392, Kirkland
WA 98083 – 3392
USA
e-mail: jayswakefield@yahoo.com
