CAERDROIA

THE JOURNAL OF MAZES & LABYRINTHS
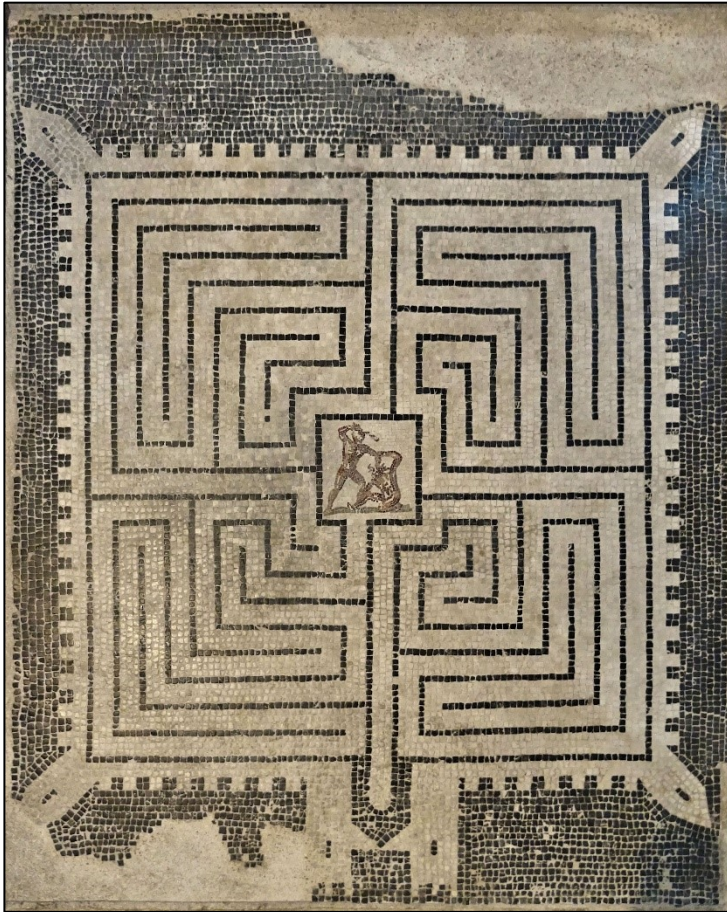
: XLVI :

CAERDROIA 46

CAERDROIA

The Journal of Mazes & Labyrinths

46th Edition

The Roman mosaic labyrinth in the newly refurbished Museo Archeologico San Lorenzo in Cremona, Italy. Created in the 1st century CE, Theseus battles the Minotaur at the centre. Photo: Jeff Saward, April 2016

CAERDROIA 46

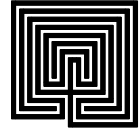## *The Journal of Mazes & Labyrinths*

Contents

Caerdroia 46 was produced during May, June and July 2017 by Jeff and Kimberly Saward at Labyrinthos HQ. Opinions stated by contributors are not always those of the editors, but Caerdroia welcomes open discussion and endeavours to provide a forum for all who are lured by the labyrinth.

Editorial - Caerdroia 46

Jeff Saward, Thundersley, July 2017

Welcome to the 46th edition of Caerdroia, slightly delayed by real life making more urgent demands on my time, but normal service has now been resumed and publication is now finally completed. This edition has something of a Scandinavian flavour, with several articles looking at the labyrinths, old and new, in Northern Europe, a review of lesser-known labyrinth writing and the last in a series of mathematical studies of symmetrical labyrinths.

Another project, long promised and now finally taking shape, is the new Labyrinthos and Caerdroia website – www.labyrinthos.net – now online with a wealth of new material, including a wide selection of downloadable PDF files of commonly requested articles from old out-of-print editions of Caerdroia, and more recent editions as well. More will be added over the coming months as time allows and the pages of the website become fully populated. The new photo library pages will especially showcase the photographs, prints, artefacts and other archival material in our extensive collection, accumulated over the last 40 years.

Our next edition, Caerdroia 47, is scheduled for publication in spring 2018. As always, if you have a paper or shorter article you wish to submit for inclusion in the next edition, send it to me as soon as possible, along with the usual labyrinthine snippets and curios that help fill the pages...

Jeff Saward, e-mail: jeff@labyrinthos.net – website: www.labyrinthos.net

The "Troy Town" on the island of St. Agnes, Isles of Scilly, off the SW coast of England. The most southerly of the historic stone labyrinths (originally built ca. 1729), a feature on these Scilly labyrinths is scheduled for Caerdroia 47. Photo: Jeff Saward, May 2017

The Castillo de Petrer Labyrinth Graffito
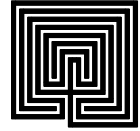
Jeff Saward

Labyrinths scratched in the form of graffiti are widespread and documented throughout the recorded history of the symbol. Distinct from more formal carvings and inscriptions, the majority might be considered somewhat 'unofficial,' and while some are in plain sight, others are hidden away in dark corners or on the back walls of public buildings at archaeological sites and in temples, churches and cathedrals, etc. Their preservation is for the most part quite fortuitous, for the majority of examples were surely created with no intention that they would be preserved for posterity. Indeed, the hasty way in which most graffiti labyrinths were created, with little regard for absolute perfection of line, and occasional errors left uncorrected, often preserves the idiosyncrasies of construction techniques for individual labyrinth designs, details that would otherwise be erased if the inscription were to be further developed or carved to greater depth into the underlying matrix. These can provide an insight into the technique of the (invariably unknown) individual that drew the labyrinth in question, and also the means by which such designs were passed from one person to another, between nations and continents and across thousands of years.

Just such an example was recently brought to my attention, carved on the wall of a medieval castle in Southeast Spain. The Castillo de Petrer overlooking the small town of Petrer, approximately 30 kilometres northwest of the popular tourist resort of Alicante, is one of a series of similar stone castles built during the late 12th century by the Muslim Caliphs to guard the passes and valley leading into the hills above the coastal plains of this area of Murcia. All share common plans of quadrangular towers, often three stories tall above a basement, surrounded by polygonal crenelated walls, the whole structure built on a base of solid bedrock and masonry, filled with rammed earth.

*The Castillo de Petrer, Province of Alicante, Southeast Spain*

As a consequence of the Christian conquest of the Muslim kingdom of Murcia in the mid-13th century, the Castillo de Petrer came into the possession of the Loaysa family, nobles who maintained possession of the barony until the late 14th century, at which point it changed ownership again and was subsequently sold to the Perez de Corella family in 1431. At this time the castle was extensively restored and modified and the basement of the central tower, formerly a cistern for water storage, was converted into a jail room, entered by a small door on the south eastern side. This small vaulted dungeon, 3.85 meters long by 2.95 m. high, is of considerable interest, for much of the lower two metres of its plastered internal walls are covered with graffiti, the majority created by its occupants during the 15th and 16th centuries, along with a few more recent inscriptions (mostly names and dates) added by visitors in the early 20th century.

In the late 1970s, when the castle was undergoing restoration (1974-1984), the debris that had accumulated in the dungeon was removed and the extensive graffiti on its walls was revealed. In the late 1980s the graffiti was studied and catalogued by Concepción Navarro Poveda and subsequently published in 1993. Poveda's catalogue records the hundreds of inscriptions preserved on the walls, including Arabic and Spanish text, figures of humans, birds and animals, various symbols (some clearly drawn with compasses), simple calendars, often just horizontal lines cut by numerous parallel lines (presumably recording days of captivity), chequer boards and also some exquisitely detailed hunting scenes, including one of a soldier in all his finery with two dogs on leashes.

While the majority of the symbols and figures are typical of such graffiti from the late Middle Ages from across Europe, the costumes of the more detailed figures are typical for the region during the late 15th and the 16th century, which would be consistent with the use of the room as a prison at that time. Therefore, it is probably quite reasonable to ascribe a similar date to one further symbol to be found on the southwest wall of the dungeon. Lightly but confidently scratched into the plaster, just inside the doorway, is a large labyrinth 46 centimetres in diameter and remarkably circular despite being hand drawn (there is no evidence that a compass has been used in its creation). At first glance this labyrinth appears to be of standard 'classical' form, drawn from a 'seed pattern' with a central cross and looping angles, but closer examination reveals it to have 13 circuits, 14 walls, surrounding the central pathway and a very unusual seed pattern.

The labyrinth and adjacent graffiti inscribed on the inner wall of the dungeon of the Castillo de Petrer, Alicante, Spain

Diagram: Poveda, 1993
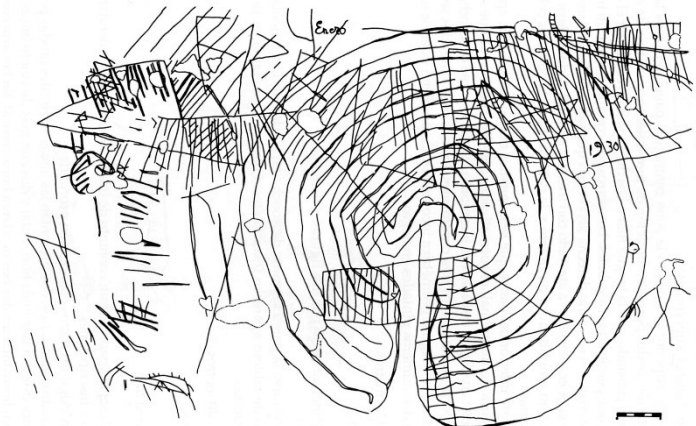
The labyrinth graffito inscribed on the inner wall of the dungeon of the Castillo de Petrer, Spain
Photo: Jeff Saward, December 2016

The Petrer labyrinth (diagram by Jeff Saward). Notice that the long pathway added to form the entrance of the design and the lines connecting the loops in the lower half of the design results in two extra circuits being added to the overall path count and its very unusual design

While this specific design would appear to be previously unrecorded, it is not without similarities to other several other labyrinths, also found in Spain, of a type commonly known as "Otfrid labyrinths," after Otfrid of Weissenburg who is credited (probably mistakenly) with the creation of the design, perfectly drawn with a compass in a Gospel manuscript dated to ca. 871 CE [Kern 2000]. However, a much older example of what is apparently the same design has recently been discovered on a petroglyph panel at Lucillo in the province of León in northwest Spain [Campos 2008]. Provisionally dated to the Bronze Age, it probably predates the Otfrid's handiwork by the best part of two thousand years or more!

The labyrinth in the manuscript of Otfrid of Weissenburg, ca. 871 CE (photo: Österreichischen Nationalbibliothek)

In the northeast of Spain, the pebble mosaic pavements that decorate the porticos of a number of churches in the region of Vizcaya, around the city of Bilbao, likewise contain several labyrinths of the Otfrid style with a small change to the design that essentially converts it into a simple maze [Juaristi & Gogeascoechea 2008]. While these examples date from the early 17th century, several centuries after the Petrer inscription, they provide further evidence of the use of this otherwise rather rare variety of labyrinth in the Iberian Peninsula during the post-medieval period.
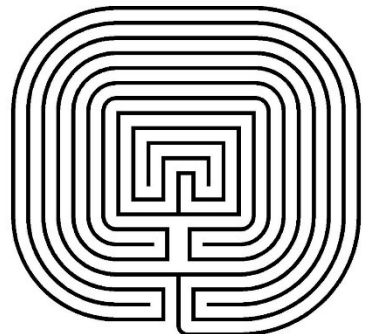
Pebble pavement labyrinth, San Pedro de Murueta, Spain, created 1604 (photo: Jeff Saward, 2009) and plan of its slightly modified Otfrid design. The omission of the line between the 'middle' pair of loops creates a design that is essentially a simple maze instead

While we will never know where the creator of the Petrer labyrinth graffito obtained their knowledge of this exact design, it is clear that they were fully conversant with the use of the seed pattern process to create a complex freehand labyrinth design. The symbolism of this labyrinth scratched on the wall of this claustrophobic jail room is also debatable, but the long association of the labyrinth with the prison in which the Minotaur was incarcerated could perhaps have been what came to mind for the unknown prisoner five or six hundred years ago?

Jeff Saward, Thundersley, England; January 2017
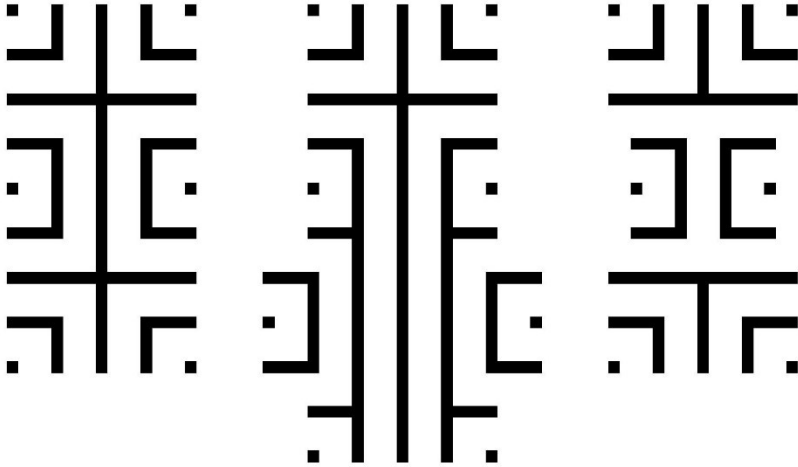
The seed patterns of the Otfrid manuscript labyrinth (left), The Petrer graffito labyrinth (centre) and the Murueta pebble pavement labyrinth (right). Small changes to the seed are reflected in the difference seen in the finished designs. Diagram: Jeff Saward

Acknowledgments:

References:

Campos, Juan C. "Labyrinth Petroglyphs in Maragatería, Spain" *Caerdroia* 38 (2008), p. 22-25.

Juaristi, Joseba & Arantza Gogeascoechea. "Labores de Troya: Church Labyrinths in Northern Spain" *Caerdroia* 38 (2008), p. 4-21.

Kern, Hermann. *Through the Labyrinth*. Munich: Prestel, 2000, p. 110.

Poveda, Concepción Navarro. *Graffitis y Signos Lapidarios del Castillo de la Mola (Novelda) y del Castillo de Petrer*. Instituto de Cultura, Provincial de Alicante, 1993, p. 107 & 111.

"Built in Honour of Odin and Danced Around"
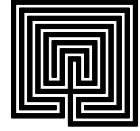
John Kraft

Introduction

The first tentative steps of antiquarian research in Sweden were taken during the 17th century, and labyrinths were not neglected in those studies. Indeed, the antiquarian Johan Hadorph, the leading figure of this exploratory work for some 27 years between 1666 and 1693, paid attention to them several times. He also had his own interpretation of their origins, considering them to have once been used in pagan cult practices.

Early Records of Swedish Labyrinths

1666 was the year that the first Swedish law was passed to provide protection for ancient sites and during the same year the clergy from every parish were given the assignment to report what they could find of prehistoric grave fields, rune stones and other monuments from the past. Interestingly, studying these reports, old maps and other written records from the 17th and 18th centuries reveals that labyrinths in the Nordic countries were as a rule not called "labyrinths" before the 19th century. The old, common names used in Scandinavia were *Trojeborg*, *Trojaborg*, *Trojenborg,* etc., all names that allude to the ancient city of Troy.

The earliest of these reports from local priests mentioning a labyrinth came in 1672 from Lossa parish, west of Stockholm: "On the grounds of Sanda, on top of the big hill, close to a windmill is a Tröyenborgh of stones, built with 15 circles. Very monumental."[1] The same labyrinth is also mentioned by Johan Hadorph. In a short note, probably written following a visit in 1684, he wrote: "On the grounds of Ålbrunna there is a big hill called Röra backe, there is a Troijenborg of 6 big mounds, where there has been a lot of sacrifice to the heathen gods."[2] Hadorph's description of a "Troijenborg of 6 big mounds" is confusing. The labyrinth and the mounds or cairns are still there, they form an impressive group of ancient monuments, but they are clearly separated from each other. Hadorph's note cannot possibly have relied on the earlier report from 1672, where the six big mounds are not mentioned. Professor Carl Ivar Ståhle, who worked with these texts for many years, told me in a letter in 1977 that Hadorph visited Lossa parish in 1684. My guess is that Hadorph's short description of the Troijenborg is therefore from that occasion.

Johannes Arenius, the son of the minister of Lossa parish, mentioned the same labyrinth in his dissertation from 1717: "In the parish Lossa is a big hill in the forest, called Röraring because in ancient times this hill was adorned with winding paths of stone, where the young people in the summer, up to this day, used to come together for playing (or dancing)."[3] Arenius' account is interesting because he came from the neighbourhood, but it is frustrating that he does not give a better description of the labyrinth. Lars Salvius also mentions this location in 1741, he writes that at: "Röra backe… on the grounds of Sanda is a big hill… On the top of it one can see Röraring, a place surrounded with stones, where the young people used to play during summer in ancient times."[4] I suspect that Salvius had read Arenius' dissertation and relied on it for his own account.

Rösa ring

Stone foundation □

Ceremonial road (9th century)

Labyrinth ● 2 mounds
4 cairns

N

55 m
45 m
35 m
40 m
50 m
60 m
30 m
20 m
25 m
15 m
10 m
5 m

5 graves

60 graves

Traces of bronze foundry

10? Graves

5 graves

140 graves

6 graves

30 graves

10 graves

Sea level around 800 AD

50 graves

0   200 m   400 m

Rösaring (formerly known as Röraring), Lossa parish, Sweden

Map: John Kraft, 2017
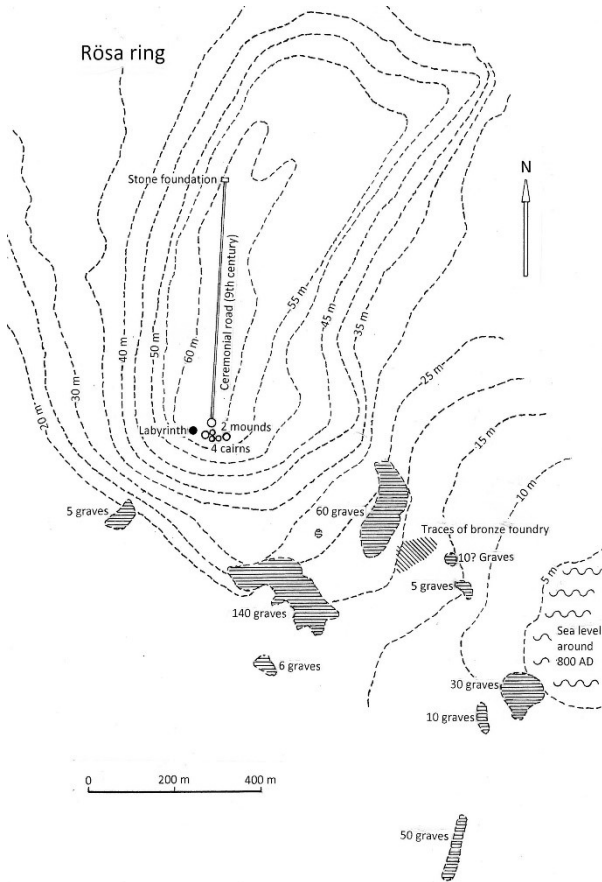
On top of large sand hill (an esker) with magnificent view over the surrounding landscape is a labyrinth with sixteen walls and entrance to the west. Close to it are four large cairns (10-18 metres diameter), seemingly of Bronze Age type (but not necessarily from the Bronze Age) and two other mounds (14 and 24 m. diameter). From the biggest mound there is a straight, 540 metres long road, pointing to the north. Its direction is almost precisely north-south (4° 08' - 184° 08' measured by the astronomer Curt Roslund). David Damell has dated the road to the 9th century, that is to say early Viking Age. He suggests that the road had ceremonial purposes.

Two extensive grave fields immediately south of the hill have 200 visible graves altogether, among them several large mounds (three are 23-29 metres). A settlement has been located close to the grave fields, with datings from 200-550 CE. In the settlement area there are remains of a bronze foundry dated to 800-1100 CE and an artefact from the Bronze Age has also been found. This suggests that the settlement could have been in use from the Bronze Age through to the end of the Viking Age. It has been interpreted as a large early farm (Sanda) that was later split into several farms (Älbrunna, Ekeby, Tibble and Sanda). The early farm might have been the residence of a local chieftain during the late Iron Age, with a cult place for a large surrounding area. The bronze foundry from the Viking Age indicates that this settlement had high status. This part of Sweden is generally rich in rune stones but none are found in this neighbourhood, which could indicate that this settlement lost its importance at the end of the Viking Age.[5]

The antiquarian Johan Hadorph and his illustrator Petrus Törnewall, visited the island of Öland in southeast Sweden in 1673. Their focus was on churches, grave monuments and rune stones. Hadorph's diary and many (maybe all) of Törnewall's drawings have fortunately been preserved.[6] While in the parish of Köping, on Öland, Hadorph wrote: "west of the church, a bit to the north, are still visible stones of 2 Trøyenborgar which have been there in ancient time, built in honour of Odin and danced around." These two labyrinths were not known to labyrinth researchers until quite recently. Ragnhild Boström mentioned them in a description of Köping church published in 1977, and she told me about them several years later.[7] It is not known if Törnewall made a drawing of these labyrinths, if he did it has not survived, as it cannot be found in the archives. Törnewall kept some of his drawings for years after completion, alleging that he wasn't paid for his work, and as late as 1689 Hadorph had to ask the governor of the province where Törnewall lived for help to reclaim them. It seems as if he was successful, because in the inventory after Hadorph's death in 1693 some drawings from Öland are mentioned. Another inventory from 1695 confirms that Törnewall had by then delivered at least a smaller part of the drawings.[8]

The Mystery of Rudbeck's Labyrinth

This leads us to another enigma of Swedish labyrinth research. The Swedish professor Olof Rudbeck (1630-1702) published a picture of a stone figure in the Taflor (Tabulae) atlas volume of his four volume work "Atlantica" in 1679.[9] Although not of an obvious classical type, the diagram can still to be interpreted as a labyrinth. This drawing is well known among labyrinth researchers, it was published by W.H. Matthews in 1922 and also by Waltraud Hunke in 1940, but unfortunately both give misleading references to the year when Rudbeck's Taflor was published. It has been suggested that the drawing depicts a labyrinth on Öland for the simple reason that three of the other drawings on the same page (labelled Tab 35) are from Öland, but Rudbeck's text makes no reference to the six pictures in Tab 35, so there is no clue to the exact location of the labyrinth. The labyrinth drawing has a number of small figures and letters without explanatory text and was printed upside down, which can clearly be seen from the figures.

Petrus Törnewall also worked for Rudbeck in 1677-78 and made several of the drawings for the Taflor volume. Could he simply have taken some of the old drawings from his visit to Öland with Hadorph in 1673, which he kept because he had not been paid for them, and used them to fill out a whole page in Rudbeck's Taflor? In that case the labyrinth in Taflor might be identical to one of the two labyrinths at the church of Köping, previously mentioned in Hadorph's diary in 1673.

Fortunately there are other sources that can shed light on this mystery. In the University Library at Lund there is copy of Rudbeck's Taflor that once belonged to Petrus Törnewall. In this book he has added his signature (P.T.) on the bottom line of all drawings by his hand. It turns out that the six pictures in Tab 35, have no signatures at all. Törnewall also made a register of the drawings in Taflor which he had drawn.[10] A comparison between the copy with his signatures and the register reveals that they are not totally synchronised, but both exclude Tab 35 from Törnewall's drawings.[11] This must surely mean that the drawings in Tab 35 were not made by Törnewall, and therefore are not from his visit to Öland in 1673.

So who else could have drawn the Öland pictures in Tab 35? One possible candidate is the "antiquarius" Jonas H. Rhezelius who spent six busy summer weeks on Öland in 1634. The expedition was organized and funded by the Crown, and his investigation actually had a wider scope than Hadorph and Törnewall's later work in 1673. He explored churches, grave stones, rune stones, Iron Age forts and many other things. Rhezelius also made drawings and wrote short descriptions of the places he visited.[12] Rhezelius'diary from 1634 with his drawings has also been preserved.[13] The diary shows beyond doubt that Rudbeck borrowed three of his pictures in Tab 35 from Rhezelius, but the labyrinth picture (figure 134) is not among them![14] The library of Uppsala University has a few preserved pages of Olof Rudbeck's handwriting, with excerpts from Rhezelius'diary and copies of some of the drawings.[15] Among those copied drawings are the three used in Rudbeck's Tab 35. But the labyrinth picture is likewise not amongst them. Rudbeck probably showed his excerpts to the carver who prepared the wood-block illustrations for his Taflor in 1679.

All of this provides firm evidence that the labyrinth picture in Taflor has not been drawn by Rhezelius, and Törnewall is likewise hardly possible. So, who could have drawn the labyrinth and the other two pictures (figures 130, 131 and 134) in Tab 35? Most of the illustrations in Rudbeck's Taflor were drawn by one of two persons, either Petrus Törnewall or Samuel Otto. Therefore one can assume that most of the pictures which cannot be ascribed to Törnewall were drawn by Samuel Otto, but unfortunately no original drawings by Otto have survived.

Consequently I suspect that the labyrinth picture in Tab 35 (fig. 134) was drawn by Samuel Otto, simply because it is difficult to imagine that any other person could have been the artist. Otto came from the north of Sweden. His father was a bailiff among the Sami (lappfogde) and was responsible for the operation of a well-known silver mine at Nasafjäll. Samuel was one of Rudbeck's students, obviouly favoured by the professor and chosen to draw many of the pictures in the Taflor. Axel Nelson, who published a new edition of Rudbeck's Taflor in 1938 was also of the opinion that Samuel Otto probably made the drawings in Taflor which cannot be ascribed to other persons.[16] This supports my guess that the labyrinth in Taflor was drawn by Otto, and if my conclusion is correct, it could be that the labyrinth is not actually from Öland at all. Indeed, a better guess might be somewhere in Northern Sweden, where Samuel Otto was born, and where most of the labyrinths in Sweden are situated.

The "labyrinth" in Olof Rudbeck's Taflor from 1679, Tab 35, fig. 134
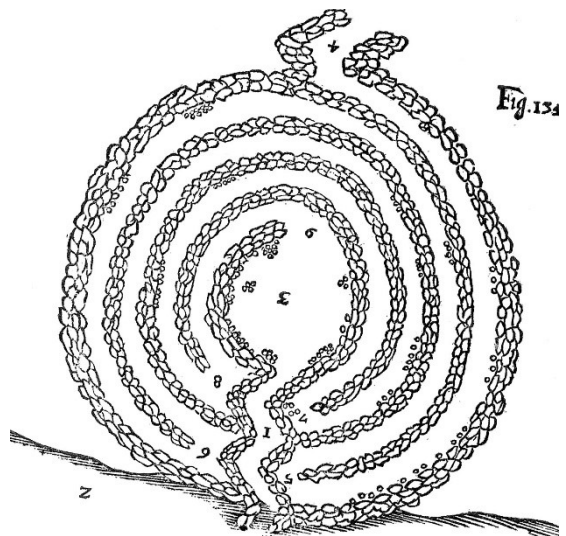
The Records from Skänninge

An early surveyor's map of the town Skänninge from 1638-39 shows three separate pieces of land called *Trojenbårgzgärdeth* (gärde = field) immediately west of the town.[17] Together they cover approximately 35 acres. The same field is called *Troyenborg gärdet* on a map from 1691, *Trögenborgsgiärdet* in 1699 and *Trollenborgs eller Östra Giärdet* in 1712. The names *Trollenborgs eller Östa giärdet* and *Trållenborgsbacken* are also found on a map from 1776 and another map, from 1815, also has the names *Trollenborgs eller Östra gärdet* and *Trollenborgsbacken* marked.

The vicar of Skänninge should have written and delivered a report on the ancient remains of his town in 1666, but he failed to do so. The reason might have been that his sister was married to Johan Hadorph. Anyway, Hadorph took over the job and wrote an unusually long and detailed report. Hadorph grew up in the neighbourhood, at the Haddorp estate in the parish of Slaka and must have been familiar with the ancient remains at Skänninge. Hadorph's text has the character of a draft paper with various deletions and corrections. It actually consists of two versions describing the city of Skänninge and its labyrinth. The longer version is dated 1678. He writes that in the direction of Vadstena: "where on a high hill there is still an old Troienborg built of stones, where people say there has been a square in ancient times and a street is still visible. This Troyenborg is still visited by the children of the town sometimes in the summer and they run in and out of it according to old custom."

The other version is shorter and undated. There Hadorph gives the following description of the labyrinth: "…to the north in the direction of the road to Vadstena is a park above the field of the town, on a hill, where it is possible to trace streets and house foundations, like a separate quarter of the town, there it is also a Tröyenborg of small stones, built in ancient time, where the old have had their playing grounds and divine service in the pagan time, because on such high hills and places, where people could look out far away, have they done such things."[18] Carl Ivar Ståhle told me in 1977 that both versions were probably intended as model reports, maybe to encourage unwilling clergy to write more detailed reports. But it seems that neither of Hadorph's draft reports was ever sent to his brother-in-law at Skänninge to be copied, signed and returned to Stockholm.

Interestingly the name of this labyrinth has remained in use at Skänninge to this day, where a district of the town, a bridge, a street and a school all have names containing the word trojenborg. But the labyrinth must have disappeared long ago and its exact location had likewise been forgotten. In a report to the Nordic Museum in 1933 it was suggested that two stones erected at the south-western end of Skänninge marked the place of the former Trojenborg.[19] The same idea is also mentioned briefly by Bengt Cnattingius in a history book about Skänninge.[20] But this must be wrong, as the correct location of the labyrinth is surely the one described by Hadorph in his report from 1678. When Hadorph's draft reports were published in 1969 it was an eye opener. The amateur archaeologist Olle Lorin, who comes from Skänninge, has worked with this problem for several years and his conclusions are in my opinion convincing.[21] He has also found an unpublished manuscript by Johan Engdahl from 1753 that further fills out the gaps in Hadorph's description. Engdahl mentions Skänninge's old place of executions, *Galgelyckan* or *Tiufvelyckan*, south of the town, where there were still remnants of a gallows in his day. He compares it with a new place of execution, from the 17th century, west of the town, on a hillock called *Troijenborg*. There is

a preserved written source recording that a thief was hanged there in 1672. Engdahl describes this hillock as located on the *Trojenborg giärdet*.[22] It is obvious that Engdahl knew what a trojeborg was, since he describes it as a *konstring* (artificial ring), but that doesn't mean it was still preserved in 1753, indeed, I'm sure that if the labyrinth still existed in 1753 he would also have described it in his 400-page manuscript on Skänninge.

Crucially, Engdahl's description leaves no doubt about the location. This place of executions, situated outside the town, 1.5 kilometres northwest of the church and the central square, is still called Galgbacken (Gallows hill) on modern maps. Another name is Karlsborgsbacken, situated close to the road to Vadstena. The same place of execution is also shown on a map from 1815. This must have been a dominant hill in the neighbourhood west of Skänninge, and the location, close to the road to Vadstena, fits perfectly with Hadorph's description. Regrettably the hill is nowadays totally ruined by a gravel pit, so there are no traces left of the labyrinth originally described by Hadorph.

The probable location of the Trojenborg at Galgbacken (Gallows hill), northwest of Skänninge, as suggested recently by Olle Lorin
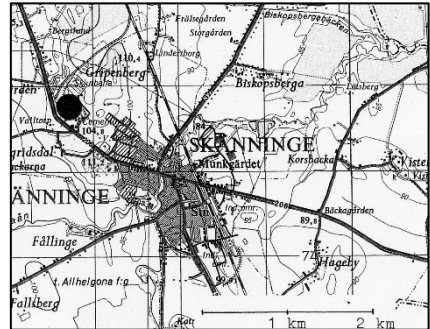
Heathen Cults?

It is interesting that Johan Hadorph's descriptions of three labyrinths all have references to pagan cults. From Köpingsvik in 1673 he writes: "…2 Trøyenborgar which have been there in ancient time, built in honour of Odin and danced around." From Skänninge he writes, probably in 1678: "…a Tröyenborg of small stones, built in ancient time, where the old have had their playing grounds and divine service in the pagan time, because on such high hills and places, where people could look out far away, have they done such things." His observation at Rösaring, probably in 1684, is: …where there has been a lot of sacrifice to the heathen gods.

He was obviously convinced that labyrinths were connected with the heathen gods and their cult practices. But where did he get that idea from? I don't think that Hadorph simply fantasized about the heathen cult. He was known for his sober judgement, indeed compared with other antiquarians of the time, particularly Olof Rudbeck, he avoided speculation. He was an ambitious collector of information, not known as an interpreter of prehistory and in the *Svensk uppslagsbok* (Swedish Encyclopedia) his lack of creativity is even described as his weakness.[23] His oldest report, from Köpingsvik, is the most specific, it clearly points to the cult of Odin. The other reports are more open to interpretation, but it is possible that Hadorph picked up the idea of the connection of the labyrinth to a heathen cult in honour of Odin during his visit to Köpingsvik in 1673. Hadorph's "reports" from Skänninge are dated 1678, but Professor Ståhle has told me that the year was added by Peringskiöld, his successor as state antiquarian, it is not written by Hadorph's hand. However, Ståhle believed that the dating was correct, as Peringskiöld would not have had any reason to give misleading information on this.

Labyrinth and Trojeborg

It is striking how many of the labyrinths mentioned in these early Scandinavian sources are called *trojeborg*, *trojenborg*, *tröjeborg* or *tröjenborg*, while there are only a few examples of the word *labyrinth*, all of them from the 18th century. An early example is in a verse from Lule in Lappland: *Labyrrinth* (1723-32). Another example is a *Labyrinth* at Viborg in Jutland (1743). In 1751 Linné mentions garden labyrinths (*labyrinther*) in the gardens of mansions in Scania. Most contemporary people who had studied Latin, mainly the clergy or the nobility, had probably heard the legend of Theseus, Minotaurus and the Cretan labyrinth, but this association of the foreign word *labyrinth* with the trojeborg figures is obviously a late phenomenon in Scandinavia.

There can be no doubt that the old, established name for these figures in Scandinavia was *Trojeborg*, *Trojenborg* or *Tröjenborg*, and variations in spelling are surprisingly limited in the early sources from the 16th to 18th centuries. The name seems to be very homogeneous and the same word is used by all levels of society, from the King's court and the antiquarians to the clergy and simple farmers. This word must have been well known and firmly established in the Scandinavian languages, since even the foreign gardeners building labyrinths in the royal gardens in the 16th century quickly adopted the indigenous word instead of the labyrinth names they might have been used to in their countries of origin. The dominance of the trojeborg names is overwhelming in the records from the 16th and 17th centuries and I think it is reasonable to assume that these trojeborg names were the oldest in use among the Scandinavian labyrinth names, and that all the other names in this part of Europe were in some sense secondary.

John Kraft, Copenhagen, Denmark;
April 2017
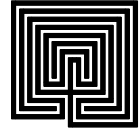
The labyrinths in Sweden, with names of the places mentioned in the text
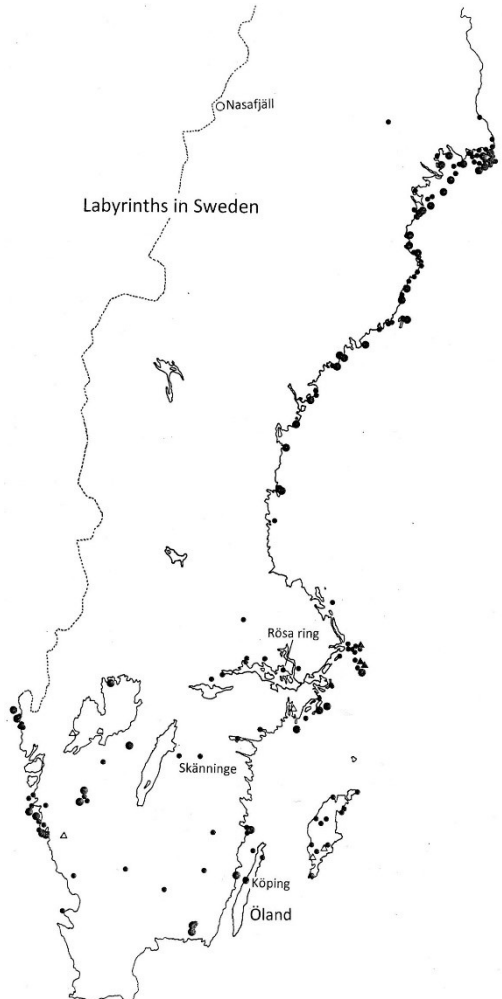
Notes:

1. *Rannsakningar efter antikviteter*, band I, häfte I, Uppsala 1960, p. 55.

2. Manuscript *Ff 10*, a collection of different short notes by Hadorph, National Library of Sweden, Stockholm.

3. Johannes Arenius, *Avhandling om "Fjärdhundra"*, Uppsala 1717, p. 68, translation from latin to Swedish by Anna Nilsén.

4. Lars Salvius, *Beskrifning öfver Sveriget, första tomen om Upland*, Stockholm 1741, p. 241.

5. David Damell: *Rapport 4515/79*, Fornlämning nr 85:1, väganläggning, vikingatid, Sanda-Säbyholm, Låssa socken, Uppsala 1982. Peter Bratt: "Arkeologiska undersökningar vid Rösaring," *Rapport 2000:11*. Stockholms läns museum. Emilia Pasztor, Curt Roslund, Britt-Marie Näsström and Heather Robertson: "The sun and the Rösaring ceremonial road," *European Journal of Archaeology*, Vol 3, 2000, pp. 57.

6. Hadorph's diary in manuscript *S 30*, Uppsala University Library. Törnewall's drawings in manuscript *S 74*, Uppsala university library and in manuscript *Fm 46*, National Library of Sweden, Stockholm.

7. *Köpings kyrkor*. Sveriges kyrkor (170), Öland, p. 9.

8. *Taflor till Olaus Rudbecks Atlantica*, (1679). Faksimilupplaga utgiven av Axel Nelson. Uppsala 1938, p. 8.
   Henrik Schück: "Minne av Johan Hadorph," *Sv. Akad. handl*. 43, Stockholm 1933, pp. 73, pp. 86 and p. 120.
   Henrik Schück: *Kungl. Vitterhets-, historie- och antikvitetsakademien*. Dess förhistoria och historia, 2, Stockholm 1933, pp. 387-393.
   Ragnhild Boström: "Petrus Törnewall och Ölands kyrkor," *Fornvännen* 80-92, 1959, pp. 80.
   Ragnhild Boström: "Rannsakningar, Johan Hadorph och Petrus Törnewall på Öland," *Kalmar län, årsbok för kulturhistoria och hembygdsvård 1996/97*, pp. 45.

9. *Taflor till Olaus Rudbecks Atlantica*, (1679), Faksimilupplaga utgiven av Axel Nelson. Uppsala 1938, Tab 35, fig. 134.

10. Manuscript *U 142*, Uppsala University Library.

11. *Taflor till Olaus Rudbecks Atlantica*, Faksimilupplaga utgiven av Axel Nelson. Uppsala 1938, p. 7.

12. *Svenskt Biografiskt Lexikon*, band 30, pp. 82.

13. Manuscript *Fc 5*, National Library of Sweden, Stockholm.

14. Tab 35: figs. 132, 133 and 134.

15. Manuscript *R 551*, Uppsala University Library.

16. *Taflor till Olaus Rudbecks Atlantica*, Faksimilupplaga utgiven av Axel Nelson. Uppsala 1938, p. 7.

17. LSA, D7:1.

18. *Rannsakningar efter antikviteter*, band II, häfte 1, Uppsala 1969, pp. 292 and p. 299.

19. The ethnological survey, EU 5574.

20. *Skänninge stads historia*, ed. Adolf Schück, Linköping 1929, pp. 11.

21. Olle Lorin, *Mitt svunna Skänninge*, second edition 2006, pp. 41.

22. Manuscript *M 90*, National Library of Sweden, Stockholm.

23. Svensk uppslagsbok 1935, band 12.

Contextual Relations of the Coastal Labyrinths of the Baltic Sea

Christina Fagerström

There are probably more questions than answers concerning the dating of the Northern coastal labyrinths, and even more so of their use and practice. In order to stage a possible scenario for their setting, we may need to look for the contextual relations of the coastal labyrinths at a time when it is reasonable to assume they should have been there. In this article, I will try to use the time frame of the arrival of the Roman Catholic Church to the Baltic Sea area, in order to see if this will generate any contextual relations to the coastal labyrinths.

Every day at 4 o'clock p.m., the Weather Forecast for the Sea Areas is broadcast by the Swedish public radio service. It reminds one of the coastal stone labyrinths, if you know the place names of where they are situated along the Baltic and Bothnian Seas, the Åland archipelago, the Finnish Gulf and the West coast of Sweden. The wind, temperature, situation of the sea-ice and seasonal water levels are reported at specific places, from weather stations along the coasts and on the islands, often enough seemingly coordinated with the local distribution of the coastal labyrinths. This is probably not a coincidence.

During the Middle Ages, the weather around the Baltic was colder than today and sea conditions were often foggy, damp and chilly. The winds were predominantly from the west or southwest, and you could only sail with a following wind, otherwise you had to row during daytime and rest at night. According to marine archaeologist Christer Westerdahl, the Venetian monk Fra Mauro made a note in his *Mappa Mundi* world map (created during the 1450s) that the seafarers in the Baltic Sea didn't use nautical charts or a compass, only the sounding line [Westerdahl, 45]. The fishermen, in open rowing boats at the time, must have been well aware of the islands and skerries, with the need for special attention to winds, currents, and the seasonal movement of fish in these waters. With the labyrinths located at points that are still strategic for seafarers in the region today, this provides a probable connection to centuries of fishing and seafaring.

In my research on the Nordic coastal labyrinths, the idea has been to find correlations between the use and probable setting of the labyrinths with the arrival of the Roman Catholic Church in Scandinavia and the Baltic Sea area, and hence the increasing need for fish for religious purposes. There seems to be a corresponding time frame for the arrival of the Church and an initial growth of the fish market, that is to say, the beginning of the 12th century CE if we count from the time the Cistercian monks were established in both Denmark and Sweden. I will examine whether the arrival of the Church and the progressive growth of the fish market in the 12th and 13th centuries could relate to the locations of the Northern coastal labyrinths.

People had no doubt been fishing since time immemorial in the Baltic Sea, and also hunting for seals, seabirds and eggs, but with the arrival of Christianity, there appeared a new situation with the increasing household need for fish turning into a growing market all

around the Baltic. The famous *Skånemarknaden* herring market at Skanör, by the Öresund straight, started at the beginning of the 12th century and expanded to neighbouring Falsterbo in the 13th century, bringing considerable incomes to the Kingdom of Denmark [Ersgård 1989]. Herring (*Clupea harengus*) were especially abundant in the Baltic Sea at that time, disappearing around 1560 (a time that happens to coincide with the Reformation of the Lutheran Church in Denmark and Sweden around 1540), possibly due to changes of salinity.

Finnish historian Matte Klinge writes: "The herring trade was an important economic factor in the Baltic Sea world. The fat Baltic herring had a large market in all of Catholic Europe, where on Fridays and during the two fast periods of the year, you were eating fish." [Klinge, 39]. The same dietary rules would soon be true for people around the Baltic, where the simple fishing of herring for the household expanded into preparation of the fish and the need for salt, storage, transportation and trade. This created a new economy. Apart from their need for the household diet, the fish could also be used for paying taxes, *tionde*, i.e. a tithe to the church and parish, and generate value for barter and trade.

Marine archaeologist Peter Norman in his thesis *Medeltida utskärsfiske* from 1993, counts around 1250 *tomtningar* all along the Swedish Baltic and Bothnian coasts and skerries. These archaeological remnants of seasonal dwellings were most likely set up and used during the fishing seasons in the skerries, often far away from the coast and inhabited islands. Norman documents these sites from Blekinge and Brömsebäcken, the former border to Denmark in the south, along the Swedish coast to the mouth of Torne River in the North of the Bothnian Sea, the border of today's Finland. Out of the 1250 estimated tomtningar, 600 are clustered at 250 sites, and some nearby to labyrinths [Norman, 183].

According to Christer Westerdahl, John Kraft, the foremost authority on labyrinths in Scandinavia, has found convincing correlations between the fishing camps in the Swedish Bothnian coastal region and the frequency and close range of stone labyrinths [Westerdahl, 52]. Out of 141 registered stone labyrinths in Finland [Westerdahl, 180], about half are found along the Bothnian north and east coasts, situated in areas frequented and colonized by Swedes since the 12th century, for instance in Vasa region and at the mouth of the river Kemi. At that time it was possible to reach the White Sea by following the Kemi River.

We should keep in mind that during the Middle Ages, there were recurring waves of Swedish speaking farmers, as well as authorities, seeking to colonize the areas around the Bothnian Sea traditionally used by the Samii, the indigenous people of northern Sweden, Norway, Finland and Russia [Westerdahl, 57]. There are occurrences of labyrinths in Samii contexts, but with so many labyrinth clusters along the northern coasts and skerries, one gets the impression they were used as anchors for visual alignments, borders, and limits. There is an unpublished 1999 paper by Petteri Pietiläinen at the Archaeology Institute of Helsingfors University that considers the rituals, spatiality and social organization in the context of *Jungfrudanserna*, the stone labyrinths in southern Karelia [Westerdahl, 134].

Peter Norman has done his own archaeological research at given stretches along the coast, particularly concentrating on Småland, a region colonized by Swedish farmers during the 13th century, although there had long been occupation alongside the Emån River. The oldest *tomtning* of the many excavated by Norman, situated in Kalmarsund, a stretch of water between Småland and the large island of Öland, dated from around the year 1000 CE. He

finds that fishing in the skerries must have picked up during the 12th and 13th centuries. He concluded this was due to the rise of the market for fish in the Baltic and the onset of urbanism in the 13th century. Fishing in the skerries was a concern not only for the local farmers but also non-locals and urban burghers, sailing extensively and setting up summer camps specifically for fishing [Norman, 183]. Norman takes note of the stone labyrinths sometimes situated close to the old fishing camps, but makes few comments on their contextual relation to the camps, their construction, design, placement or practice. As a rule, the labyrinths are difficult to date, unlike the encampments where cooking heaths often provide material for radiocarbon dating, but should be situated at the same level, or higher, in relation to sea level than the associated fishing camp, in order to have been set up at around the same time or earlier.

The establishment of the Roman Catholic Church around the Baltic Sea was confirmed during the 13th century. An important milestone in its exercise of power were the canons of the Fourth Council of the Lateran, delivered in 1215 CE by Pope Innocent III. Both Westerdahl and Norman refer to the Fourth Lateran concerning the stricter dietary rules for fasting and the need for all individual parish members to confess at least once a year. Fish needed for fasting and tithing spurred the fishing, and by extension, the fish market which is archaeologically confirmed by the excavated fishing camps. The rise of the fish market and the settlement, trade and urbanization of Skanör and Falsterbo during the Middle Ages bears witness to the steadily growing annual herring market and its importance for trade in the Baltic. We now have a correlating time frame for progressive and extended fishing activities in the Baltic and Bothnian seas and the arrival and establishment of the Roman Catholic Church.

The Fourth Lateran Council in 1215 also brought about other fundamental changes around the Baltic Sea. Pope Innocent III proclaimed a new area for missions beside Palestine; Livland and the Baltic provinces known as Marienland (today's countries of Estonia and Latvia) became the focus of attention [Klinge, 28]. This gave rise to a series of "crusades" to the eastern Baltic, in a quest to convert the heathens of the region to the Roman Catholic faith. The Swedes confirmed their colonization of parts of today's Finland by a series of five crusades. The first two are recorded in legend, the third is confirmed by the foundation in 1293 of the Viborg Castle, situated in the eastern part of the Finnish Gulf on the Karelian Isthmus, bordering territory claimed by Novgorod and the Greek Orthodox Church. The Russians soon founded the Kexholm fort further east on the Karelian Isthmus on the waterfront of Lake Ladoga. Another important aim of the crusades was to ward off the competing Orthodox Church from extending their influence closer to the Baltic. We should keep all of this in mind when considering the placement and frequency of coastal labyrinths in the Finnish Gulf and the White Sea. It's also worth recalling that a Russian name for the stone labyrinths, besides "Jericho" and "Babylon," is "Viborg," the name of the Swedish stronghold.

The Danish King Valdemar II Sejr had already led an eastern bound crusade in 1219; conquering Reval, he established a colony in today's Estonia, far away from the then Danish border in Blekinge, south of the above mentioned Kalmarsund. It is in this context we should look at the *Liber Census Daniæ* (Danish Census Book) that contains a piloting *Itinerary* for seafarers, an original document probably written down in 1231. It describes the sailing route

between Utlängan in Blekinge and Reval, today's Tallin, in the new Danish colony in Estonia. The Itinerary, written in Latin, describes the piloting route along the Kalmarsund and follows the Småland coast as close as possible to the shore. This stretch would have been used by most seafarers in the early Middle Ages coming from Denmark and the south, sailing to the Finnish Gulf.

There are further identified islands in the Itinerary with stops in the Småland Tjust archipelago and along the Östergötland and Södermanland coasts. Runmarö is the closest island stop to Stockholm, and further north Arholma, the island landmark to start the crossing over to the Åland archipelago. There is a stop at the island of Kökar and further east at Hangö. From there you can choose to go directly south or along the northern coast of the Finnish Gulf to Porkala, and from there cross over to Reval. Not all of the place names in the Itinerary can be identified, but this is a route still used today and is also the general territory of the coastal labyrinths. Bo Stjernström identified 35 labyrinths in the Åland archipelago, as presented in Westerdahl's catalogue [Westerdal, 191], and there are also 25 labyrinths registered in the archipelago entering the Finnish coastal territory outside Åbo (Turku), stretching to the listed Itinerary stop at Hangö.

There are many suggestions for why this Itinerary was written, but King Valdemar had a convincing reason to control his new colony with the transport of men back and forth, and maybe provide passage for Franciscan monks, as suggested by Jarl Gallén in his 1993 study of the Danish Itinerary. Gallén proposes that King Valdemar assisted the Franciscan monks, so they could establish missions and hold masses along the way at the many different island stops between Denmark and Reval. The Friars could also have been an alibi for the Danish crusade in the name of the Catholic Church. Eventually the Franciscans established a monastery at Kökar, the island in the Åland archipelago midway to Finland mentioned in the Itinerary. There is still a restored chapel at Kökar and there were many other chapels raised along the route.

Did the Friar monks maybe also compile the Danish Itinerary? They had to transport themselves by sea and knew the archipelagos and waters well. During the 13th century you sailed in the Baltic without compass and charts and had to rely on local knowledgeable men to pilot your vessel. These men were not keen on sharing their trade secrets with anyone, but passed it on from father to son. They would certainly not have written down the Itinerary, and definitely not in Latin. With the Friars on board the vessels of the Danish King, they could literally read the Itinerary so the command would not be totally dependent on local pilots. All in all, there are good reasons to come back to the Danish Itinerary in the search for contextual relations to the stone labyrinths in time and space.

Conclusions

There is a general consensus among researchers that the coastal labyrinths have a correlation to seafarers and fishermen. From the daily radio weather forecasts we know that labyrinths are frequently found on islands and coastlines of interest to seafarers and fishermen to this day. We have seen from the research of Peter Norman that the excavated *tomtningar* in the skerries, seasonal dwellings intended for fishing along the coasts of the Baltic and Bothnian Sea, increased in frequency during the 12th and 13th centuries. This in turn seems to relate to the arrival of the Roman Catholic Church in the first half of the 12th

century and the developing fish markets established to meet the demand for fish for fasts and tithes. The Herring Markets fed the demand for Baltic herring throughout Catholic Europe.

Roman Catholic rules for yearly confessions and dietary fish, confirmed by the Fourth Lateran Council in 1215 started the progressively growth of fish markets in the Baltic. The Fourth Lateran also paved the way for crusades to Finland and the Baltic states, with the unique Danish Itinerary piloting the Middle Age "highway" at sea from Denmark, along the Swedish Baltic coast, across the Åland Sea to the Finnish Gulf and on to Estonia. The idea was perhaps less to convert the heathen to the Catholic faith than to provide safe passage to the Novgorod trade and at the same time ward off the proliferation of the Greek Orthodox Church.

These are all contextual relations within the same time frame as approximated for the stone labyrinths. The time frame stands well in comparison with the dating evidence we have for the actual age of the creation of coastal stone labyrinths. Through a combination of measuring the isostatic land uplift, the growth of lichens and surface erosion, Rabbe Sjöberg and Noel Broadbent claimed it is possible to determine the construction dates of labyrinths in the North. During the 1980s, they carried out an examination of 42 selected coastal stone labyrinths at different locations along the Swedish Upper Norrland coast (the Western Bothnian Gulf), a region of high labyrinth density. "The oldest labyrinths were dated to about 1300 CE, with the peaks of the dating curve at about 1550 and the 17th century, petering out towards later centuries" [Westerdahl, 196]. This date range for the stone labyrinths correlates with extensive fishing and the rising market in the Baltic as well as the activities of Swedish colonizers of the areas around the Bothnian Sea. My supposition and subject for further research is that the tradition of creating stone labyrinths started in the Baltic, maybe as descendants of urban labyrinths, inspired by and connected to the arrival of the Roman Catholic Church.

Christina Fagerström, Nybro, Sweden; May 2017
Email: fagerstrom.christina@gmail.com

References:

Ersgård, Lars. "Vår Marknad i Skåne: bebyggelse, handel och urbanisering i Skanör och Falsterbo under medeltiden." *Lund Studies in Medieval Archaeology* 4, 1988.

Gallén, Jarl. *Det "Danska Itinerariet": franciskansk expansionsstrategi i Östersjön*. Helsingfors: Svenska litteratursällskapet i Finland, 1993.

Klinge, Matti. *Östersjövärlden*. Stockholm: Atlantis, 1995.

Norman, Peter. "Medeltida utskärsfiske." *Nordiska Museets Handlingar* 116, 1993.

Westerdahl, Christer. *Livets och Dödens Labyrint.* Skärhamn: Båtdokgruppen, 2016.
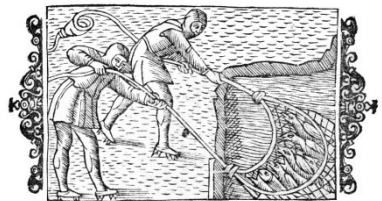
MAX IV – A Special Labyrinth Variation

Bosse & Anita Stjernström

A special variation of the old classic labyrinth path recently installed in the centre of a large circular high-tech laboratory in Sweden

MAX IV is a high-tech synchrotron laboratory operated by the Swedish Research Council and Lund University in the southern Sweden. It is built on a large area of farmland northeast of Lund and is part of the new transformation area called Science City. The project started in 2011 and MAX IV was opened on June 21, 2016. The FOJAB Arkitekter company in Malmö was responsible for all the buildings at the facility and landscape architect Jenny B. Osuldsen at Snøhetta from Oslo was the team leader responsible for designing the landscape at MAX IV, which also includes a "secret garden" with a landscaped labyrinth in the central courtyard of the large synchrotron facility. Traffic on highways passing nearby on both sides of the site generates ground vibrations that can affect the research scientific experiments in the laboratories, so by changing the gently sloping landscape surface to a wavy, chaotic hilly surface, the designers have managed to decrease these ground vibrations by up to 30%.

The MAX IV Facility from the air. All photos courtesy of Snøhettas picture archive

When the architects at Snøhetta were searching for a concept for the 16,000 square metre open air courtyard, their idea was to offer a new dimension to the research facility. The court yard is not open to the public, but is highly visible from the new office buildings and is surrounded by the 11 metre tall circular building that is the synchrotron. Osuldsen had the idea to use the ancient classic labyrinth design as a reminder that great ideas have been executed by humans for many centuries, and the mysterious precision of a labyrinth can be an inspiration for the researchers working or visiting the MAX IV.

This genius design is based on a simple basic figure, a four-armed cross with an angle placed between each arm and a dot placed in each angle. By connecting one cross arm end with one of the nearest angle ends with an arc and then continuing to connect next nearest free dot or angle end with a new arc outside the previous arc, and by continuing in the same fashion, you get the eight walls of the classic labyrinth. Looking at old rock carvings and inscriptions you can see that the basic figure is always carved or drawn first, and the circular arcs added after. The design has survived for well over 3000 years and been used in different periods, in different ways and for different reasons, for protection or for success. In Scandinavia fishermen built hundreds of them from rocks, some with 8, 12 or 16 walls and used them from the Middle Ages until the middle of 1800s. Children would likewise draw them with a finger on frozen windows.

Very often the path of a labyrinth is actually defined by its walls, but here in the MAX IV "secret garden" the grass creates the walls of the labyrinth. The pathway is laid at the same level and is formed of "stepping stones" of Swedish Öland limestone, each approximately one metre square, which provides a notable contrast with the green grass. The light surface of the stones is dotted with many fossils which tells a much older history, of the shaping of geological layers. The entire surface of the garden is slightly domed, both to provide water runoff and to highlight the centre of the garden and the synchrotron. At the "end" of the labyrinth path is a pergola provided as a gathering point and frame for social interaction. Trees have also been planted within the circuits to create more sheltered and intimate areas within the vast courtyard. The microclimate inside the ring is less windy compared to the hilly landscape around the synchrotron and more exotic species have been planted as a celebration of the botanic systematics invented by Carl von Linné, who was a student at Lund University. As a nickname for the courtyard, we named it "Linné's labyrinth." It will take time for the trees to mature, so the grassy labyrinth, 90 metres in diameter, will be very visible in the beginning, and the trees will add a new dimension in time and space and add more layers over the coming years.

The labyrinth in the "secret garden" at the centre of the MAX IV synchrotron facility

The main reason for creating the labyrinth was to give the researchers a place to relax, go for a walk, look at the fossils, walk and study the labyrinth path and sit down or swing in the central pergola. The garden is a place to meet, communicate, discuss and think about new ideas. Some may also try the 400 meter long running track that surrounds the labyrinth. However, this "secret garden" cannot be generally be entered without permission, as scientific experiments can be disturbed by traffic. To enter the courtyard, you must either cross over or under the ring of the synchrotron. From the office building you enter above the ring, and may reach the courtyard from a stairway. In order that maintenance trucks can get to the courtyard, there is a tunnel from the parking area that runs beneath the ring, surfacing straight through the labyrinth!

Max IV design, drawing: Bo Stjernström

Seen from high above, at first sight the labyrinth path looks perfect, but look closer and count the rings and you will find that there are only six circuits. The innermost ring is missing, the centre has been changed and the entrance arrangement has been shifted downwards. This invention looks very nice, but is actually quite different from the classical labyrinth that was used as prototype. This design no longer has a simple basic structure either for the walls or the path. The good thing is that it may make the visitors begin to think and discuss the design and perhaps some may figure out how the original prototype might have looked.
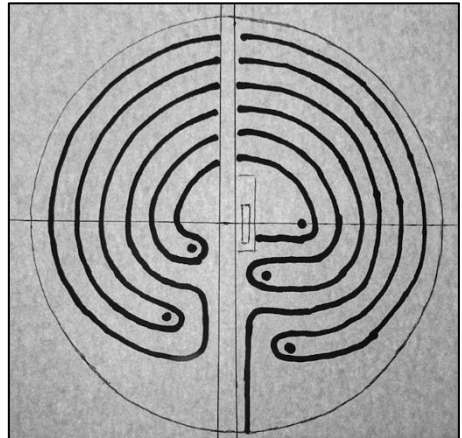
Bosse & Anita Stjernström, Västerhaninge, Sweden; January 2017

Jenny Osuldsen, the designer of the Max IV labyrinth.

Hidden Treasures: Chapters about Labyrinths, in "Non-Labyrinth" Books

Jan Sellers

Introduction

Since the turn of the century, a growing number of publications have accompanied the rise of interest in labyrinths. These publications include a number of chapters to be found in books that are not primarily about labyrinths. Even in today's world of web-based research, such publications are not always easy to find.

In the course of my research on the use of labyrinths in Higher Education, I became intrigued (and often distracted) by the books I came across: books that were often outside my research area but that might be of interest to others, books that held hidden treasures. I began to compile a list, which has grown erratically over the last few years. To date this includes 34 such chapters, spread across 28 books, published between 2000 and 2016 in Canada, the UK and the USA. I have included in this list:

- Chapters that are about the labyrinth, ranging from metaphor to historical artefact;
- Chapters that are about both labyrinths and mazes;
- Chapters that are not solely, or even primarily, about labyrinths, but where (in my view) there is a significant amount of discussion about labyrinths (e.g. discussion of creation of a quiet space including use of labyrinths).

The themes of the books and chapters are widely varied, ranging from health, healing and spiritual care, to walking, the arts, teaching (at various levels) and exploration of the metaphor of the labyrinth in the practice of academic research. The purpose of this article is to draw the attention of readers to the existence of this diverse body of literature, and to briefly outline the fields covered. This is a list that grows in fits and starts and inevitably, there will be omissions. I discuss 20 of the chapters briefly in the present article.

I should be clear that I am not making any specific recommendations. The accuracy of these chapters on matters labyrinthine is as variable as their themes, but nevertheless each may have something to offer readers interested in their particular field and some are powerful contributions. In most cases, there is a sole chapter of immediate relevance, sometimes within a monograph and sometimes in an edited collection.[1]

In developing this article I have made many draft lists of themes, as most of the chapters can be fairly described as exploring more than one key topic. For example, the book *Open Spaces, Sacred Spaces* [Stoner and Rapp, 2008] explores healing, wellbeing, spirituality, community cohesion and service, all through the creation of beautiful open spaces in some very challenging contexts; its three chapters making use of labyrinths are no exception. I have endeavoured below to cross-reference chapters amongst some broad thematic headings, recognising the limitations of this process: my judgment here is subjective and another writer might devise different groupings. I leave it with readers to explore further in any direction they feel drawn to.

Education: children and young people

Sandra Wasko-Flood, an artist and Veriditas-trained labyrinth facilitator, discusses the impact of "labyrinths for creativity and peace in schools" in her work with children and young people in elementary and middle schools in the USA [2011, 144-59]. This work is about freeing creative confidence and making a deep connection between peace and creativity. Wasko-Flood includes accounts of labyrinth-making with children, so that schools then have their own peaceful resource for future use. She provides practical examples of the labyrinth as an inter-disciplinary tool, including a powerful illustration of "peace wishes" with participant responses [2011, 154-8]. Her chapter is one of a collection of essays designed, as the book title indicates, to support teachers and teacher educators in *Cultivating Curious and Creative Minds* [Craig and Deretchin, 2011].

Chris Trwoga develops similar themes in two chapters of his book on *The Power of Outdoor Learning,* in a Forest School context [2013, 54-76 and 77-94]. Together, these two chapters provide 20 detailed lesson plans and project ideas, for children and young people. Each lesson plan includes aim; one-line summary of activity; resource list, with attention to low cost or no cost options; method; reflection. The lessons develop systematically, beginning with "Drawing a Labyrinth" [2013, 57] and heading outdoors to create labyrinths from many materials. In addition to teachers, these practical guidance notes could be very helpful for adult enthusiasts who may be knowledgeable about labyrinths but uncertain about how best to work with materials outdoors for temporary installations. The lesson plans include considerable diversity. Topics vary from "Making a pebble labyrinth for people with disabilities. (Aim: to encourage research and reflection on the needs of others)" [2013, 64-5] to "Number and labyrinths" [2013, 91].[2]

In *Mathematics Galore* [2000], Christopher Budd and Christopher Sangwin offer an innovative collection of ideas for teaching mathematics. The book is designed to appeal to all levels, from primary school children (and teachers and parents) to university students. Mathematics is related to the everyday and to the imagination, through chapters that include castles, espionage, dance and sundials. Chapter 1 features labyrinths and mazes [2000, 9-36] with a lively variety of stories, puzzles and mathematical exercises.

Open Spaces Sacred Spaces, discussed below, also shares experiences of young people and families, with the introduction of a labyrinth to a troubled community [Brau, Stoner and Waters, in Stoner and Rapp, 2008].

Higher Education: Teaching and the Research Process

Mathematics Galore (above) is one of a growing number of books that now provide specific ideas and approaches for those interested in use of the labyrinth in university teaching. Creativity is a common theme and use of the labyrinth is a new approach for a new era, as seen in the title *Teaching with Joy: Educational Practices for the 21st Century* [2007, edited by Sharon Shelton-Colangelo, Carolina Mancuso and Mimi Duvall]. Chapter 2 of this imaginative book focuses on "teachers' efforts to encourage students to pause long enough to journey inward away from the chaos of everyday life, something rarely encouraged in conventional classrooms" [2007, 3]. In their contribution to this chapter, Shelton-Colangelo and Duvall discuss a Women's Studies programme where students have built two stone circles in a lovely setting on their rural campus. These are a drumming circle dedicated to Sojourner Truth, and a stone labyrinth. The women students are non-traditional entrants to

university; the authors report that drumming and labyrinth walking can have a powerful impact, enabling students to find their own voices and share very difficult stories. The holistic approach to teaching exemplifies the goals of this volume, illustrating one way to "foster a more loving learning environment that promotes harmony, self-discovery, and interconnectedness" [2007, 5].

Creativity is also a critical theme in *Engaging Imagination: Helping Students become Creative and Reflective Thinkers* [James and Brookfield, 2013]. In "Playing Seriously: Legos and Labyrinths," Alison James discusses two kinaesthetic approaches to learning [2013, 115-138]. As James explains, working with Lego is a natural leap ahead in the process of using any object, such as salt and pepper pots at the dinner table, to embody ideas, actions, events - anything, in fact, other than salt and pepper [2013, 115]. Both Lego and labyrinth are ways of working physically with metaphor. In the section on labyrinths, James outlines a variety of examples supporting the student learning experience, including Dr Kay Sandor's teaching of nurses at the University of Texas, USA, in relation to wellbeing, and Alex Irving's work with Media Studies students at Liverpool John Moores University, UK (see also Sandor and Froman, 2006 and Irving, 2016).

An outline of a labyrinth workshop which may readily be adapted for use, a brief account of the beginning of a university labyrinth project and further examples of teaching and learning with the labyrinth appear in my own chapter, "The Labyrinth: A Journey of Discovery" in *Creativity in the Classroom: Case Studies in Using the Arts in Teaching and Learning in Higher Education,* edited by Paul McIntosh and Digby Warren [2013, 209-223]. While each case study in this collection draws on the arts, the teaching involves students from a wide range of academic disciplines including (for example) Economics, Healthcare and Medical Education.[3]

In an essay that explores her own personal, spiritual and professional development, Fran Grace [2011, 47-64] offers a thought-provoking discussion of her own journey as a teacher in higher education, looking specifically at how she teaches and has taught in the past. She shares a journey of radical change that eventually led to a whole-hearted engagement with contemplative approaches to teaching and learning. Grace is now Professor of Religious Studies and steward of a pioneering "contemplative classroom" at the University of Redlands (California, USA). She has used the labyrinth in teaching (discussed more fully in Grace, 2016) but in her 2011 chapter, the focus is on labyrinth as metaphor for the path she has travelled. The chapter is a contribution to a book on the introduction of meditation in the college classroom, an invitation to exploration that draws on nearly 30 years of reflection, discussion and practice [Simmer-Brown and Grace, 2011, xi].

Metaphors for, in and of Education Research (edited by Warren Midgley, Karen Trimmer and Andy Davies, 2013) is a fascinating exploration of how education researchers use the power of metaphor to illuminate their research questions, research journeys and research discoveries.[4] In the first chapter, introducing the book, two of the editors use a labyrinth walk as a metaphor to offer a framework for readers: "whilst walking the labyrinth of this volume, we would encourage readers to be purposefully engaged in ongoing reflection with a mind that is open to always discovering something new" [Midgley and Trimmer, 2013, 4]. Chapter 5, by Janice Jones, is a sustained reflection on her experience as a doctoral student, drawing on reflective journals [2013, 66-90]. Jones considers the power of metaphor to shape both the path of the researcher, and the researcher's own understanding of her journey.

Rather than the male-dominated story of Theseus and the hero's journey, Jones draws on the legend of Persephone, with its three key characteristics: sacrifice, transformation and rebirth. These are qualities inherent in the demanding journey from neophyte researcher, to become one who is acknowledged (and self-acknowledged) as expert in her field, a change that is painfully won through Persephone's "journey of patience, contemplation and quiet courage" [2013, 74]. The metaphor of Persephone's journey is illuminated by the twists and turns of the labyrinth path, acknowledging the fear, doubts, resistance and eventual transformation of the researcher who emerges, bearing knowledge, ready to influence the world anew as an agent of change. "The adventure has been all consuming: I am transformed and can never return to that earlier self" [2013, 84].

Walking

Rebecca Solnit reflects on labyrinths, mazes and imagery in the fifth chapter of her book *Wanderlust: A History of Walking* [2001, 64-78]. She discusses her first encounter with the paved labyrinth at Grace Cathedral, San Francisco. Solnit explores the idea of "being real creatures in symbolic space" [2001, 70]: "If the body is the register of the real, then reading with one's feet is real in a way reading with one's eyes alone is not. And sometimes the map *is* the territory" [2001, 70]. The labyrinth is a source of physical connection between traveller and story, past and present: "Symbolic structures such as labyrinths call attention to the nature of all paths, all journeys" [2001, 72].

In her book *An Altar in the World* [2009], Barbara Brown Taylor offers ways to reconnect with the spiritual in the everyday. From the experience of encountering others, to the experience of carrying water, each is "an exercise in being human that requires a body as well as a soul" [2009, xvi]. Taylor places labyrinth walking amongst a number of world traditions where walking is a spiritual practice. Her reflections on "the practice of walking on the earth" [2009, 54-68] invite us to consider the role of all of our senses. She comes to the labyrinth as a beginner, and leaves it with a profound dream, an acute awareness of the divine. Labyrinth walking becomes an example of engaging with a spiritual practice through doing it rather than discussing it: "You just begin, and the doing teaches you what you need to know" [2009, 58] and as she notes later, *"Solvitur ambulando...* 'It is solved by walking.' What is 'it?' If you want to find out, then you will have to do your own walking" [2009, 61].[5]

Tim Ingold's work also explores walking, as one aspect of *The Life of Lines* [2015]. The author ranges over interdisciplinary terrain in a study that is, as one reviewer states, a "stunningly original series of meditations on life, ground, wind, walking, imagination and what it means to be human" [2015, i]. I found this book both difficult and fascinating and it is not easy to discuss a single chapter in isolation. To begin with a critical concept from an earlier chapter, Ingold argues that to be human is to do with both being and, crucially, becoming. The process of becoming, which we live as an integral aspect of being human, means that to be human becomes a verb, humaning and humanifying [2015, 115-119].

Humans are line-makers, path-makers, trail-makers: to walk is to draw a line. In his chapter "The Maze and the Labyrinth" [2015, 130-137] the maze is about intentions, choices continually having to be made, with dead-ends as set-backs, as in a quest for shopping in a busy city: "... in so far as the maze-walker is wrapped up in the space of his own deliberations, he is perforce absent from the world itself. In the labyrinth, quite the opposite is the case" [2015, 132]. Here, both labyrinth and maze are places where one may get lost, but in

completely different ways, and both labyrinth and maze are conceptual. Ingold distinguishes between walking a maze (with one's own intentions) and following the path of a labyrinth (where the focus is on a deep and immediate attention to the present). The maze-walker is a navigator from point to point; the labyrinth path-follower is a wayfarer who must watch their step, be attentive to all that is around them: "Path-following is therefore not so much intentional as *attentional.* It thrusts the follower into the presence of the real" [2015, 133].

Readers who facilitate labyrinth events will note Ingold's use of the word "intention" as very different from the use of the word in setting "intentions" prior to a labyrinth walk. It is a use of language that calls us, in fact, to a close attention, an attention that rewards the reader. The subsequent chapter, on "Education and Attention," continues with the images of labyrinth and maze to challenge traditional approaches to education. The labyrinth becomes a rich metaphorical vision of difference, of different possibilities for the one who is fully present: "The price of such presence is vulnerability, but its reward is an understanding, founded on immediate experience, that goes beyond knowledge. It is an understanding on its way to truth" [2015, 137].

Spirituality and Community Engagement

Open Spaces, Sacred Spaces [Stoner and Rapp, 2008] illustrates the work of the TKF Foundation, "supporting the creation of public greenspaces that offer a temporary place of sanctuary, encourage reflection, provide solace, and engender peace" [2008, iii]. Three chapters in this book explore the creation of labyrinths, as part of new community initiatives leading to the construction of beautiful outdoor spaces. This book has an unusual and helpful structure. Each project is outlined by one of the two lead authors, followed by further information and reflections from designers and from members of the community involved in initiating and leading the project. Chapters include a much-loved garden created from "waste" ground in a tough neighbourhood in East Baltimore, USA, the "Amazing Port Street Sacred Commons" [Brau and Waters 2008, 35-49]. Writing of young gang members after the death of a friend, the pastor Karen Brau wrote: "... these kids knew - they felt on some level - that the labyrinth was sacred space, and in their suffering, they came to it" [2008, 238]. Chapter 5 discusses the Healing Garden at the Whitman-Walker Clinic of Northern Virginia, USA, supporting patients with HIV/AIDS and their families and friends [Hufford-Anderson, Lindstrom and Waters, 2008, 81-93]. The garden also serves to build bridges with the local community, with labyrinth walks organised by a local artist who serves as the labyrinth coordinator [2008, 92]. Finally, chapter 12 introduces us to "ThanksGiving Place" in Baltimore, USA. This labyrinth garden serves as the spiritual heart of a major community renewal project, an inter-faith initiative with extensive, much-needed senior housing and youth services for local people on the site of a former sports stadium [Sharp and Stoner, 2008, 171-183]. This book is beautifully illustrated, with large colour photographs and several garden plans: it has found a place amongst books I make available for browsing at labyrinth events.[6]

Discovering the Spirit in the City [Walker and Kennedy, 2010] is also rooted in the work of a specific organisation, in this case the London Centre for Spirituality. This publication includes a number of essays and poems, sharing both reflection and inspiration. Antonia Lynn [2010, 16-27] writes about the creation and use of the Fen Court Labyrinth in the heart of the city of London, UK, a place for "prayer in the streets" [2010, 16]. Lynn shares ideas about developing a prayer life in the most busy and urban of environments, such as the night

of a glorious full moon, "finding the wild in the city" [2010, 23]. The labyrinth becomes "symbol and tool for an urban prayer life" [2010, 18] and its centre is a metaphor for love, for beauty and for the divine.

Chapters discussed elsewhere in this article also have a strong bearing on spirituality and community engagement. These include chapters in *Sacred Space: Right Relationship and Spirituality in Healthcare* [Wright and Sayre-Adams, 2000, 2009]; *Teaching with Joy: Educational Practices for the 21st Century* [Shelton-Colangelo, Mancuso and Duvall, 2007] and *An Altar in the World: Finding the Sacred Beneath our Feet* [Taylor, 2009].

Health and Wellbeing

In Esther Sternberg's *Healing Spaces: The Science of Place and Well-Being* [2009] the author discusses the modern history of research on stress in her chapter "Mazes and Labyrinths" [94-124]. Her discussion of labyrinths includes a number of factual errors, and the chapter is marred by descriptions of women researchers that strike an oddly sexist note. The chapter however provides a valuable link between Herbert Benson's research on exercise, meditation and the "relaxation response" [Benson, 2000, 2011], and labyrinth walking. Benson's research is of considerable interest to those involved in research on stress and the labyrinth "effect."[7] In illustrating her theme, Sternberg discusses work by Ann Berger, who introduced a canvas labyrinth at the Pain and Palliative Care Unit at the National Institutes of Health Clinical Center in the USA. Initial obstacles were overcome and the labyrinth has now become a popular resource for staff, for patients and for their families: time to slow down, to trust, and to go forward one step at a time [2009, 121-4].

Stephen G. Wright and Jean Sayre-Adams are Chair and Director of the Sacred Space Foundation in Cumbria, UK. Their book, *Sacred Space: Right Relationship and Spirituality in Healthcare* [2000] is a powerful account of the ways in which they have explored and addressed exhaustion and burn-out amongst those in carer roles, both care professionals, family carers and those working in many related fields. In chapter 4 [2000, 63-114] they explain and discuss labyrinths and labyrinth walking as one of a number of "pathways to the sacred" including the paths of meditation, sanctuary, prayer and relationships. Their approach to labyrinths, and broader aspects of their work, are discussed further at the Sacred Space Foundation's website.[8]

Other chapters to turn to in relation to health and wellbeing, discussed elsewhere in this article, include *Meditation and the Classroom: Contemplative Pedagogy for Religious Studies* [Simmer-Brown and Grace, 2011]; *Open Spaces, Sacred Spaces* [Stoner and Rapp, 2008] and *The Power of Outdoor Learning: 107 Lesson Plans and Projects for Schools* [Trwoga, 2013].

Conclusion

I have highlighted in this article a wonderfully diverse range of chapters about labyrinths, within contemporary books that do not have labyrinths as their primary focus. These books are to be found in many different disciplines, from the teaching of mathematics or forest school learning, to studies that explore the nature and history of walking and the walker. For me, this continues to be a source of fascination and changes in understanding as I am introduced to new ideas and approaches, often from perspectives that I would not usually seek out. Happenchance and serendipity, and a considerable capacity for distraction, have enabled me to add to the collection, and I appreciate the contributions that others have made to date on hearing of this interest.

My full list of these "hidden treasures" is online on my website at www.jansellers.com - I hope that this may be helpful to readers and researchers. Evidently, readers are likely to know of more such chapters. My website list will be updated from time to time. Readers are warmly invited to alert me to potential additions, bearing in mind the broad parameters for inclusion: chapters in books, including essays in art or museum catalogues, where the title of the book does not alert the reader to the hidden presence of a chapter on labyrinths or mazes - potentially, a hidden treasure.

<div align="right">

Jan Sellers, London, England; March 2017

website: www.jansellers.com

</div>

Bibliography:

Annnmei. *Girl in the Maze* [cover illustration]. In *Metaphors for, in and of Education Research,* edited by Warren Midgley, Karen Trimmer and Andy Davies. Newcastle, UK: Cambridge Scholars Publishing, 2013.

Benson, Herbert, with Miriam Klipper. *The Relaxation Response.* New York: Harper Collins [WholeCare edition], 2000.

Benson, Herbert and William Proctor. *Relaxation Revolution: The Science and Genetics of Mind Body Healing.* New York: Scribner, 2011.

Brau, Karen, Tom Stoner and Jerry Waters. "Amazing Port Street Sacred Commons." In *Open Spaces Sacred Spaces,* edited by Tom Stoner and Jerry Waters, 35-49. Annapolis, USA: TKF Foundation, 2008.

Budd, Christopher J. and Christopher J. Sangwin. *Mathematics Galore! Masterclasses, Workshops and Team Projects in Mathematics and its Applications.* New York: Oxford University Press, 2000.

Grace, Fran. "From Content to Context to Contemplation: One Professor's Journey." In *Meditation and the Classroom: Contemplative Pedagogy for Religious Studies,* edited by Judith Simmer-Brown and Fran Grace, 47-64. SUNY Series in Religious Studies. New York: SUNY Press, 2011.

Grace, Fran. "A Semester Within." In *Learning with the Labyrinth: Creating Reflective Space in Higher Education,* edited by Jan Sellers and Bernard Moss, 142-47. Palgrave Teaching and Learning Series. London and New York: Palgrave, 2016.

Hoch, Daniel B., Alice J. Watson, Deborah A. Linton, Heather E. Bello, Marco Senelly, Mariola T. Milik, Margaret A. Baim, Kamal Jethwani, Gregory L. Fricchione, Herbert Benson and Joseph C. Kvedar. "The Feasibility and Impact of Delivering a Mind-Body Intervention in a Virtual World." *PLoS One* 7, no.3, March 28, 2012. doi 10.1371/journal.pone.0033843

Hufford-Anderson, Caroline, Geof Lindstrom and Tom Stoner. "Whitman-Walker Healing Garden." In *Open Spaces Sacred Spaces,* edited by Tom Stoner and Carolyn Rapp, 81-93. Annapolis, USA: TKF Foundation, 2008.

Ingold, Tim. *The Life of Lines.* Abingdon: Routledge, 2015.

Irving, Alex. "Enterprise and Arts: Creative Interventions with the Labyrinth." In *Learning with the Labyrinth: Creating Reflective Space in Higher Education,* edited by Jan Sellers and Bernard Moss, 196-202. Palgrave Teaching and Learning Series. London and New York: Palgrave, 2016.

James, Alison and Stephen Brookfield. *Engaging Imagination: Helping Students Become Creative and Reflective Thinkers.* London and New York: Jossey Bass, 2014. See also: http://engagingimagination.com/, accessed 28 February 2017.

Jones, Janice K. "Into the Labyrinth: Persephone's Journey as Metaphor and Method for Research." In *Metaphors for, in and of Education Research,* edited by Warren Midgley, Karen Trimmer and Andy Davies, 66-90. Newcastle, UK: Cambridge Scholars Pub., 2013.

Lynn, Antonia. "Prayer in the Streets: The Labyrinth as Symbol and Tool for an Urban Prayer Life." In *Discovering the Spirit in the City,* edited by Andrew Walker and Aaron Kennedy, 16-27. London: Continuum, 2010.

Midgley, Warren and Karen Trimmer. "'Walking the Labyrinth:' A Metaphorical Understanding of Approaches to Metaphors for, in and of Education." In *Metaphors for, in and of Education Research,* edited by Warren Midgley, Karen Trimmer and Andy Davis, 1-9. Newcastle Upon Tyne, UK: Cambridge Scholars Publishing, 2013.

Marcus, Clare Cooper and Naomi Sach. *Therapeutic Landscapes: An Evidence-Based Approach to Designing Healing Gardens and Restorative Outdoor Spaces.* Hoboken, New Jersey, USA and Canada: Wiley, 2014.

Sandor, M. Kay and Robin D. Froman. "Exploring the Effects of Walking the Labyrinth." *Journal of Holistic Nursing* 24 (2006), no.2: 103-110.

Sellers, Jan. "The Labyrinth: A Journey of Discovery." In *Creativity in the Classroom: Case Studies in Using the Arts in Teaching and Learning in Higher Education,* edited by Paul McIntosh and Digby Warren, 209-223. UK, Bristol: Intellect. USA, Chicago: University of Chicago Press, 2013.

Sellers, Jan and Bernard Moss, eds. *Learning with the Labyrinth: Creating Reflective Space in Higher Education*. Palgrave Teaching and Learning Series. London and New York: Palgrave, 2016.

Sharp, Jack and Tom Stoner. "ThanksGiving Place." In *Open Spaces Sacred Spaces,* edited by Tom Stoner and Carolyn Rapp, 171-183. Annapolis, USA: TKF Foundation, 2008.

Shelton-Colangelo, Sharon and Mimi Duvall. "Circles of Learning in the Women's Studies Class." In *Teaching with Joy: Educational Practices for the Twenty-First Century,* edited by Sharon Shelton-Colangelo, Carolina Mancuso and Mimi Duvall, 39-44. USA, Lanham, Maryland: Rowman and Littlefield, 2007.

Solnit, Rebecca. *Wanderlust: A History of Walking.* London: Verso [paperback edition], 2002.

Sternberg, Esther M. *Healing Spaces: The Science of Space and Wellbeing.* Cambridge, Massachusetts: Belknap Press [paperback edition], 2010.

Stoner, Tom and Carolyn Rapp, eds. *Open Spaces Sacred Spaces.* Annapolis, USA: TKF Foundation, 2008.

Taylor, Barbara Brown. *An Altar in the World: Finding the Sacred Beneath our Feet.* Norwich: Canterbury Press, 2009.

Trwoga, Chris. *The Power of Outdoor Learning: 107 Lesson Plans & Projects for Schools.* Somerset Natural Learning Academy, UK: Winding Road Books, 2013.
See also: http://snla.co.uk, accessed 28 February 2017.

Trwoga, Chris. *The Power of Labyrinths.* Somerset Natural Learning Academy, Winding Road Books, 2016.

Wasko-Flood, Sandra. "Labyrinths for Creativity and Peace in Schools." In *Cultivating Curious and Creative Minds. The Role of Teachers and Teacher Educators: Part II. Teacher Education Yearbook XIX,* edited by Cheryl J. Craig and Louise F. Deretchin, 144-159. Lanham, Maryland: Rowan and Littlefield Education in partnership with Association of Teacher Educators, 2011.
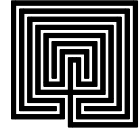
Wright, Stephen G. and Jean Sayre-Adams. *Sacred Space: Right Relationship and Spirituality in Healthcare.* London: Churchill Livingstone, 2000.

See also: www.sacredspace.org.uk/videos.html, accessed 28 February 2017.

Notes:

1. Five books in my list to date include more than one such chapter. Stoner and Rapp (eds), *Open Spaces Sacred Spaces* (2008) include discussion of labyrinths in three chapters, as do Marcus and Sach in *Therapeutic Landscapes* (2014). The following have two relevant chapters: Midgley, Trimmer and Davis (eds), *Metaphors for, in and of Education Research* (2013); Trwoga, *The Power of Outdoor Learning* (2013) and Ingold, *The Life of Lines* (2015).

2. Chris Trwoga's chapters are available for purchase as individual documents through the Somerset Natural Learning Academy (http://snla.co.uk). See also his recently published book *The Power of Labyrinths* (2016), not to be confused with his chapter of the same title in *The Power of Outdoor Learning* (2011).

3. For further inter-disciplinary approaches, see Sellers and Moss, 2016.

4. The cover illustration, by artist Annnmei, is a modern take on Lewis Carroll's Red Queen, presented as a young researcher. A crowned woman is at the centre of a maze that forms part of her dress, the farthingale of 16th century courtly wear. She is caught up amongst confusing green shoots and post-it notes but prepared for action with a pair of scissors.

5. Though not specifically part of the discussion of labyrinths, this chapter is also notable for a reflection on mindful walking as experienced by wheelchair users, through the teaching of the Buddhist monk Thich Nhat Hanh [2009, 60-61]. The approach uses mindful observation of a walker who is themselves practising mindful walking, at Plum Village, a Buddhist monastic community in France. The example is of a mindful walk, not a labyrinth walk, but the method may well offer a reflective possibility for wheelchair users and others who have restricted mobility where a labyrinth path is concerned. I make this suggestion with two reservations. First, people may prefer to use a finger labyrinth; second, the approach needs careful consideration before use, so as not to infringe on the labyrinth experience of the walker. Bearing in mind the open nature of many labyrinth events, I myself would (a) invite the wheelchair user to observe a seasoned labyrinth walker rather than a beginner, and (b) secure permission for the observation in advance. I can see this is less likely to be a factor in a monastic setting. I would be interested to hear of the experience of others in this regard.

6. The TKF Foundation has launched an extensive research project, in progress at the time of writing, examining the impact of five major new greenspace initiatives across the USA. Some research papers are available online at their website and more is to follow. Such research may well include reference to labyrinths and to labyrinth walking. More information is available through the TKF Foundation: http://naturesacred.org

7. Herbert Benson has published extensively on the concept and practice of the relaxation response and on walking, exercise and meditation in this regard. He is additionally cited, on occasion, as a source for research that specifically addresses or makes reference to labyrinth walking. I have endeavoured to follow this up but have been unable to find any publications in this respect, either in books or academic articles, apart from (a) a remark quoted in WebMD (www.webmd.com/balance/guide/labyrinths-for-modern-stresses#1) and (b) a fleeting reference to a labyrinth in research on stress reduction in a virtual world (see Table 2, in D.B. Hoch et al). If readers can offer any clarification, I would be glad to know more.

8. A second edition of *Sacred Space: Right Relationship and Spirituality in Healthcare* is now available (Wright and Sayre-Adam, 2009: see www.sacredspace.org.uk).

Searching in the Mirror

Richard Myers Shelton

Abstract: True non-trivial unicursal labyrinths cannot be completely mirror symmetric. But the transpose operator can be used to define a kind of symmetry that comes as close as possible to mirror symmetry. (The strict definition applies only to labyrinths with an odd number of courses, but it can be weakened to include labyrinths like Abingdon with an even number of courses.) This "near mirror symmetry" is not common historically, but it is exhibited by many of the labyrinth designs recently installed in the London Underground.

This is the third and final installment in my series on Symmetry. The first highlighted Greys Court as an exemplar of *self-duality*, the symmetry most natural to labyrinths [Shelton 2010]. The second focused on the 14th century Icelandic labyrinth called Wayland's House, whose hybrid *Wayland symmetry* approaches mirror symmetry and has shown up in several modern labyrinths [Shelton 2015]. This third installment explores how close we can come to true mirror symmetry and still remain within the framework of a true unicursal labyrinth. It turns out that there is a natural "mirror symmetry" corresponding in many ways to self-duality, and it, too, has shown up in a few well-known labyrinths – and appears in fully a third of the 270-odd labyrinth designs developed recently for Mark Wallinger's "Labyrinth" project in the London Underground.

For this discussion, I will use the following narrow definition of what it means to be a well-behaved "Gothic labyrinth": a unicursal labyrinth like Chartres, in which there are no "center crosses" (so the path doesn't cross the main axis), no "side jumps" that connect non-adjacent lanes on the interior axes (so the interior turns always join adjacent lanes), and no "Z-jags" where the path switches courses but doesn't switch direction from clockwise to counter-clockwise or vice versa (so the path always alternates directions at the turns). Most well-known labyrinths obey these rules, but there are many in the field that do not – Roman-style labyrinths being the chief exception. Toward the end of the article I will relax some of these rules.

Self-duality

I'll start by reviewing self-duality, focusing on a pair of self-dual labyrinths that will point the way toward the new type of "mirror symmetry".

The usual example of self-duality is the Chartres design, one of the first Gothic designs (perhaps *the* first). It exhibits the following properties that define self-duality for well-behaved 4-axis labyrinths:

1. The turns along the main axis (the *throat*) duplicate each other on each side of the axis, but in reverse order.

2. The rear axis mirrors itself across the middle course: each turn on the axis has a mate on the other side of the middle course and the same distance from it.

3. The two side axes are reverses of each other: each turn along one axis (going from the outside in) is matched by a turn on the other axis (going from the inside out).

All three of these rules are special cases of a more general characterization of self-duality: if you pair up the axes around the circumference, starting from the two sides of the main axis (which are themselves considered a pair) and working all the way around both sides of the circumference to the rear axis (which gets paired with itself), the paired axes must reverse each other: thus the two sides of the main axis must be reverses of each other; each set of paired side axes must be reverses; and the rear axis must reverse itself (it must be symmetric with respect to the middle course).

Inner Chartres (*Figure 1a*) is another well-known example of self-duality. You can easily verify that it satisfies the three properties above. As long as we restrict ourselves to *non-degenerate* labyrinths (ones with at least one turn on each axis), it is easy to show that there is only one other self-dual Gothic labyrinth with 5 courses and 4 axes, as follows.

First, since the labryses on the rear axis must be paired across the middle course, there must be at least two of them – and *more* than two won't fit. So there are exactly two sets of turns on the rear axis, and they must balance each other: they must connect lanes 1 and 2 and lanes 4 and 5.

That means, in turn, that you can place only one labrys on each side axis, connecting either lanes 2 and 3 or lanes 3 and 4 – any other position would lead to a closed loop with the rear axis. Once you've made that choice for one side axis, self-duality dictates the opposite choice for the other side axis. There are thus only two ways to place the labryses on the three interior axes if you want the labyrinth to be self-dual.

The layout of the turns on the interior axes is called the *template* of the labyrinth, a term introduced by Jacques Hébert [Hébert 2004]. The argument above shows that there are only two well-behaved 5 × 4 templates that are self-dual. These are the templates of Figures 1a and 1c. To fill out either template into a self-dual *labyrinth*, you have to fit it with a self-dual main axis, and experimentation with either layout will quickly convince you that (if you keep the entrance on the left) each template will admit only one self-dual main axis. (In Figure 1a, for example, entering on lane 1 is ruled out because self-duality would then dictate an exit from lane 5, which "short-circuits" the labyrinth – not all of it gets traversed.) Inner Chartres is the solution where the labrys on the left side axis joins lanes 2 and 3. Joining lanes 3 and 4 instead yields the other solution, St. Michael (*Figure 1c*) – and these are the only two well-behaved 5 × 4 labyrinths that are self-dual.

Figure 1 (left to right) a: Inner Chartres in standard position; b: Inner Chartres (mirrored); c: St. Michael in standard position

Hébert discovered the St. Michael pattern as the (4, 8) section of Reims.[1] He proposed this design for the Garden Labyrinth at St. Michael's Church in Sillery, Québec; but Mia Anderson, his pastor at St. Michael's, insisted that the labyrinth would also need a quick exit from the center. To accommodate this, Hébert combined St. Michael and (the mirror image of) Inner Chartres *(Figure 1b)* into a single labyrinth *(Figure 2)* by overlapping the entrance and exit legs of Inner Chartres to form the exit path. The reason this works – and this is the clue that will point to the story below – is because St. Michael and the mirror of Inner Chartres *share the same pattern* except for their entrance and exit. Hébert's clever arrangement allows you to view the labyrinth either as St. Michael (by ignoring the exit path), or alternatively as Inner Chartres (by using the exit path twice: once to get from the entrance to lane 5, and once to get from lane 1 to the exit).
Otherwise the two labyrinths are identical.

Figure 2: The Garden Labyrinth at St. Michael's, Sillery

Overlapping the two legs also eliminates one wall of Inner Chartres, so that the wall structure falls into two disjoint pieces (which is usually not the case for a single-path labyrinth). The Garden Labyrinth in Sillery takes advantage of that by planting bushes for one set of walls and herbs and flowers for the other.

The transpose operator

Figure 1 shows that Inner Chartres and St. Michael are closely related: one is essentially the mirror image of the other – except for the connections to the entrance and exit (and a bit of fudging of the precise position of the other turns along the main axis: I'm assuming that turns automatically adjust themselves to accommodate changes in the layout). Figure 1 in fact illustrates a general method for converting one labyrinth into a related version, its *transpose* [Shelton 2015]: start with some labyrinth *(Figure 1a)*; take its mirror image *(1b)*, which will put the entrance and exit on opposite sides from where they started; then flip the entrance leg up to become the exit leg, and the exit leg down to become the entrance leg *(1c)*. St. Michael is thus the transpose of Inner Chartres – and since the process is reversible, Inner Chartres is likewise the transpose of St. Michael.

Any odd labyrinth (one with an odd number of courses) can be turned into its transpose by this method, as long as it is well-behaved. (The essential part of "well-behaved" in this context is that the path should not cross the main axis: the entrance and exit will be on opposite sides of the main axis and there will be nothing to interfere with flipping the entrance and exit legs around.) This "transpose operator" is a way of creating new labyrinths from old ones. In this sense, it is similar to the "dual operator" that turns a labyrinth into its dual by turning the labyrinth inside out (or equivalently, by rotating its level chart by 180 degrees).

But unlike the dual operator, the transpose operator works only for odd labyrinths – for in even labyrinths the entrance and exit legs are on the same side of the main axis. With even labyrinths you can still take the mirror image, but you can't then reverse the entrance and exit legs, because (being on the same side of the axis) the legs when flipped would have to cross each other, which isn't allowed. Abingdon *(Figure 9)*, with 6 courses, is a convenient even example showing the difficulty.

Self-transpose labyrinths

Symmetric labyrinths, by definition, are those that are "invariant under the dual operator": *i.e.*, if you apply the dual operator to a labyrinth and end up with the same labyrinth you started with, that means the labyrinth is its own dual: it is *self-dual* or *symmetric*, like Inner Chartres and St. Michael above.

In a similar fashion, if you apply the transpose operator to a labyrinth – by taking its mirror reflection and flipping the entrance and exit legs around – and end up with the same labyrinth you started with, that labyrinth is its own transpose: it is *self-transpose*. In such a labyrinth the template (the placement of the turns on the interior axes) has to be mirror symmetric – and the main axis is *close* to being mirror symmetric: all the turns mirror each other across the axis except for the connections to the entrance and exit. The entrance and exit legs must connect to the same level on either side of the main axis, but one heads out and the other heads in. The best-known self-transpose labyrinth is probably the Hood labyrinth (*Figure 3a*), which first appeared on the early 20th century gravestone of Francis Wheeler Hood, 4th Viscount Hood, in Hadlow Down, East Sussex [Labyrinthos]. (This pattern is marketed by the Labyrinth Company as the "Chelsea" design.)

Left: Figure 3a: Hood

Right: Figure 3b: Hood dual = Croxley

The dual of Hood (*Figure 3b*) can be seen in the London Underground station at Croxley (No. 7 in [Wallinger 2014]). It too is self-transpose; and this illustrates a more general fact: the dual of a self-transpose labyrinth will itself be self-transpose. This is easy to see by looking at the level charts (*Figure 4*). The self-transpose nature of Hood and its dual is evident in either level chart: if you take the mirror image of the chart and then flip the entrance and exit connections around, you end up with the same chart you started with, because the level chart (minus the entrance and exit) is a mirror symmetric pattern.

If you take the dual of Figure 4a by rotating the chart by 180 degrees, you end up with Figure 4b. This is not the same as 4a (as it would be if these labyrinths were self-dual instead of self-transpose), but the 180-degree turn preserves the left-right mirror symmetry of the chart, so the resulting dual chart 4b is still self-transpose.

Figure 4a: Hood level chart   *Figure 4b: Hood dual level chart*

There is therefore a nice complementary relationship between the dual and transpose operators:

- The transpose of a self-dual labyrinth is another self-dual labyrinth (as with Inner Chartres and St. Michael, *Figure 1*).
- The dual of a self-transpose labyrinth is another self-transpose labyrinth (as with Hood and its dual, *Figure 3*).

Self-transpose labyrinths are interesting because they are about as close as you can get to true mirror symmetry while remaining unicursal. We've seen that the template is mirror symmetric, and the main axis connections except the entrance and exit are also mirror symmetric. But the entrance and exit connections can never be mirror symmetric in a non-trivial unicursal labyrinth: if the labyrinth has any courses at all, the entrance must turn to the left or the right to join to a course – it can't do both and still be unicursal – and that fact alone breaks the mirror symmetry. Similarly, the exit connection joins to one side or the other, but not both.

So complete mirror symmetry is not attainable in a non-trivial unicursal labyrinth. But in a self-transpose labyrinth, everything that *can* be mirror symmetric *is* mirror symmetric. It is reasonable therefore (if a bit imprecise) to use the term "mirror symmetric" for self-transpose labyrinths: they are entirely mirror symmetric except for the necessary symmetry-breaking fudge required by connecting the entrance to the outside and the exit to the inside. With this little willful bit of imprecision, we have the following correspondence:

- A labyrinth is *self-dual* if and only if it is *symmetric*.
- An odd labyrinth is *self-transpose* if and only if it is *mirror symmetric*.

More 5 × 4 examples

We saw above that Inner Chartres and St. Michael are the only self-dual 5 × 4 Gothics. Hood and its dual demonstrate that there do exist self-transpose 5 × 4 labyrinths – and the obvious question is whether there are any others. The answer (rather surprisingly, since well-known examples of self-transpose labyrinths seem rather sparse) is "yes." For example, if we start with the template of Inner Chartres and adjust the labrys on the right-hand axis so that it connects lanes 2 and 3 instead of 3 and 4 (making the template mirror symmetric instead of symmetric), a suitable mirror symmetric main axis will yield Maffei (*Figure 5a*). This design appeared as a signet in the 16th century [Kern 370, 371] and reappears in Robert Ferré's "Heart of Chartres" design. (A variant appears in Riverside Church in New York City [Labyrinthos].) Applying the dual operator gives Maffei dual (*Figure 5a*), which is likewise self-transpose, but with side labryses adjusted inward instead of outward.
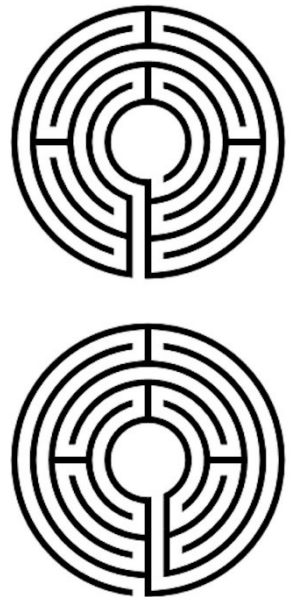
Above: Figure 5a: Maffei – Below: Figure 5b: Maffei dual

There are 8 more mirror symmetric 5 × 4 Gothics – you can easily find them by pushing the labryses around on the axes and experimenting with mirror symmetric connections on the main axis. All have two labryses on the rear axis, and all but two have a single labrys on each side axis. The last pair (and remember, they come in mutually dual pairs) have *two* labryses on each side axis (*Figure 6*).

Figure 6a: Q5 (Filarete)

I call the design of Figure 6a "Q5", a mnemonic for "5-course labyrinth filled by quarters". It has an illustrious history: this design and the more famous 7-course design subsequently used in the floor of San Vitale in Ravenna were both introduced by Antonio Averlino in his *Trattato di Architettura*, published around 1465 under the pseudonym Filarete (Kern 345–348). Q5 thus became quite possibly the very first 5-course Gothic labyrinth to see the light of day.

Figure 6b: Q5 dual

Q5 and its dual, alas, are not very interesting patterns, for the same reason that many Roman-style labyrinths are not very interesting: the path is confined within cramped quarters, as each quarter is filled completely in turn before the path moves on to the next quarter. (These are examples of *sectorial* designs, in which the path fills an area between two axes before moving on to another sector.) Amazingly, this rather pedestrian design appears with some frequency, not only among Kern's historical examples (items 347, 356, 360, 364, 376, 380, 406, 423, 470, 476, 516, 525 & 544),[2] but in modern times as well, especially on merchandise. Partly this is due to the prestige of Filarete, and to the remarkable conservatism of labyrinth design – people will typically stick with a pattern that has some historical imprimatur rather than invent one of their own. But also, I think, we see this pattern being used not so much as a labyrinth *per se*, but as a *representation* of a labyrinth. Much as the Classical labyrinth served as a shorthand to represent the House of Daedalus, Q5 serves as a shorthand to represent the *idea* of a labyrinth – specifically, of a Gothic labyrinth. It's compact, easy to draw, pleasingly symmetric, and looks suitably complex (until you analyze it closely).

The Great Wall

What you will not find among the self-transpose 5 × 4 Gothics is a pattern with only one labrys on the rear axis. This surprised me at first, but I confirmed it by enumerating all possible examples by computer. In all of them, only one course crosses the rear axis. Why is this the case? After all, we should be able to start with *any* 5 × 4 Gothic labyrinth and construct a mirror symmetric derivative by: (a) erasing the right half, (b) generating a new right half by reflecting the left half over to the right half, (c) pasting these two halves together along the rear axis, and (d) changing the mirror reflection of the entrance into an exit. Such a construction is *guaranteed* to yield a mirror symmetric result – why can't we use it to generate a mirror symmetric labyrinth whose rear axis is more open?

If we try this with a suitable candidate, the problem becomes immediately apparent. Figure 7a shows the labyrinth at Phillips Theological Seminary in Tulsa, Oklahoma, installed in 2005. The design is due to Robert Ferré, who adapted the Santa Rosa design to fit an accessible path into limited space. The tight path near the center can be interpreted to give this labyrinth 6 courses, but here I'm considering it as a 5-course labyrinth, with the head of the iconic "question mark" serving as a decorative spiral into the center.

As a 5-course labyrinth, "Tulsa-5" already has a mirror symmetric template, but its main axis is not mirror symmetric because the entrance and exit don't connect to the same course (the entrance connects to 3, but the spiraling exit connects to 5). Figure 7b shows the result of applying the construction above, with Tulsa-5's left side on the left, its reflection on the right, the two halves pasted together (A to A', B to B', and C to C'), and the reflection of the entrance turned into an exit. It's obvious why it doesn't work: the path falls into disjoint loops. The entrance connects through the left side to A, and by mirror symmetry A' then connects through the right side to the exit; so the main path skips B/B' and C/C'.

**Left: Figure 7a:
Tulsa (Phillips
Theological Seminary**

**Right: Figure 7b: Reflecting
Tulsa-5 doesn't work**

The same argument works quite generally: if an $N \times A$ labyrinth has an odd number N of courses (so that the entrance and exit are on opposite sides) and an even number A of axes (so that there is a single rear axis opposite the main axis), then to be mirror symmetric the labyrinth can have only one course that crosses the rear axis. In other words, *the path must fill up the entire left side before crossing over the rear axis into the right side*. For on the left side, the path leads from the entrance to the first crossing of the rear axis, and then on the right side, by mirror symmetry, directly to the exit without crossing the rear axis again. So if there are any other crossings of the rear axis, the main path will bypass them.

A partial converse is also true: the construction above *does* work provided there is only one crossing of the rear axis in the labyrinth you start with. For example, if you start with Inner Chartres (*Figure 1a*), which is symmetric but not mirror symmetric, the construction yields Maffei (*Figure 5a*), which *is* mirror symmetric. Because Inner Chartres fills up its left side completely before crossing the rear axis, the two mutually reflecting halves in Maffei match up without isolated loops.

This observation also makes clear another property of self-transpose labyrinths: the path is necessarily palindromic – much like self-dual labyrinths [Shelton 2010] but for a different reason. The path falls naturally into two mirror symmetric halves, and the turning sequence is therefore necessarily the same backwards as forwards. If you work simultaneously from the beginning and the end of the path, the arcs of the path match up turn for turn by mirror symmetry. Hood, for example, has the following palindromic turning sequence:

1 1 – 2 1 1 2 – 4 – 2 1 1 2 – 1 1

In the mirror symmetric labyrinths we've seen above, the single crossing on the rear axis is not hard on the eye; but in larger labyrinths it becomes increasingly hard to ignore: the rear axis becomes something of a Great Wall through which there is only one gate. This makes it harder to present mirror symmetric labyrinths as attractive installations – though the lone gateway does offer an architectural opportunity for the designer. The other design challenge here is to present the main axis so that it actually *looks* mirror symmetric – *i.e.,* to arrange the turns so that the eye sees the mirror symmetry. Figure 8 shows the design I call "Sun Dogs": to my mind the best of the 7 × 4 mirror symmetric Gothic labyrinths, since the entrance, exit, and rear axis gateway all occur on middle courses, contributing to the sense of balance. I've drawn it in a way to maximize the effect of the mirror symmetry, but additional design elements or landscaping might help to make the main axis and the rear axis truly attractive. Larger labyrinths would offer more of a challenge.

Figure 8: Sun Dogs (mirror symmetric 7 × 4)

One approach to the main axis problem would be to borrow a leaf from Hébert and simply omit the wall between the entrance and exit connections. This gives a ready-made exit path, and allows the walker to enter the labyrinth either to the right or to the left – and since the path is mirror symmetric, the choice makes little difference!

Can we eliminate the Great Wall by making the number A of axes odd rather than even? For in that case there is not a single rear axis (as assumed above), but a pair of them opposite the main axis (provided A is greater than 1). Alas, mirror symmetry eliminates this case immediately: any labrys on one rear axis must be mirrored by a labrys on the other, and together they join the arcs between them into a closed loop. Thus the number A of axes in a mirror symmetric labyrinth must be even – or 1. Even among full course labyrinths (where $A = 1$ and the template is trivially mirror symmetric because there are no internal axes), a mirror symmetric main axis will force the entrance to connect around one course directly to the exit. Thus even when A is 1, the only examples that work are the single course labyrinth – and, curiously, the trivial labyrinth with no courses at all.[3]

"Mirror symmetry" for even labyrinths

For even labyrinths (where the number N of courses is even), using "self-transpose" to define "mirror symmetric" won't work, because even labyrinths (except for the trivial labyrinth) do not have transposes and therefore cannot be self-transpose. But we can work with the other definition: we can specify that the template should still be mirror symmetric, and the main axis as mirror symmetric as possible. For even labyrinths, however, the entrance and exit are on the same side, so they can't connect to same course. We can still require all the other turns along the entrance side of the axis to be reflected by matching turns on the other side of the axis – but that still leaves the two ends opposite the entrance and exit. The only way to salvage this is to make those two loose ends on the non-entrance side connect to each other. The Abingdon labyrinth (*Figure 9*) exhibits exactly this construction: the template is mirror symmetric, the ends X and X' opposite the entrance and exit connect together, and all the other turns on the main axis are mirrored across the axis.

Abingdon thus becomes our canonical example of a mirror symmetric *even* labyrinth – and indeed the earliest historical example of a "mirror symmetric" labyrinth, since it predates Filarete's Q5 by some 400 years. (And I suspect that, just as with Wayland's House, Abingdon's early attempt at mirror symmetry was no accident.)
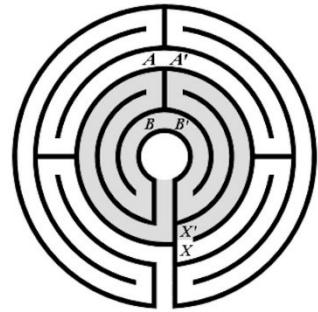

Figure 9: Abingdon

As for odd labyrinths, a mirror symmetric template with an odd number of axes will generate closed loops; so the number of axes must be even, yielding a single rear axis. Abingdon shows that in the even case there can be *more* than one connection across that rear axis. In fact, we know that there must be at least two, since the path must cross from the left side to the right side at some point to fill in the right hand side, but it must cross back again to reach the exit.

But again there is a hard limit: a mirror symmetric even labyrinth must have exactly two such crossings, as the following argument shows (the reader should refer to the labels in Figure 9). The path will lead from the entrance to the first crossing A/A' of the rear axis, and by mirror symmetry it then leads to the point X opposite the entrance without crossing the rear axis again. Similarly, tracing the path backward from the exit leads from the exit to the *last* crossing B/B' of the rear axis, and then by mirror symmetry to X' opposite the exit, again without crossing the rear axis. Since X and X' are connected to each other, the main path leads from the entrance to A/A' to X/X' to B/B' to the exit. If there were any other crossings of the rear axis, they would be skipped.

(Since there must be exactly two crossings, the only full-course even labyrinth that is mirror symmetric in this sense is the labyrinth with just two courses.)

Unlike odd labyrinths, nothing in the even labyrinths guarantees that the turns will be visited in a mirror-symmetric order. We can't conclude in general, therefore, that the path will be palindromic. Abingdon itself provides a counter-example, with its obviously non-palindromic turning sequence:

$$1\,1 - 2\,1\,2\,1\,2 - 1\,1 - 2\,2 - 4 - 2\,2$$

It is tempting to think of X/X' as a "midpoint" that connects the "entrance half" with the "exit half". Abingdon certainly encourages this idea: it's a tidy composite of Key4 and Key2′, in which X/X' divides the three outer courses of the entrance half from the three inner courses of the exit half. In general, however, mirror symmetric even labyrinths are not laid out so neatly: the two "halves" can be different in size, they can invade each other's courses, and X/X' can be far from the true midpoint of the path (*Figure 10*). For an extreme case, you can take any mirror symmetric odd labyrinth and add an extra full course at the beginning or end to get a quite lopsided mirror symmetric even labyrinth – since X/X' will be the join between the new full course and the odd labyrinth you started with (*Figure 11*).

Figure 10: Mirror symmetric 6×4   *Figure 11: Hood dual + Full*

Similarly, you can generate a mirror symmetric even labyrinth from *any* two mirror symmetric odd labyrinths: take the mirror image of one and paste that inside the other, connecting the exit of one to the entrance of the other – just as Abingdon is composed of the two mirror symmetric pieces Key4 and Key2′.

Wayland symmetry

The main drawbacks of mirror symmetry are the Great Wall and the difficulty of emphasizing the mirror symmetry of the main axis. This reflects the fact that mirror symmetry is not the natural symmetry for labyrinths; self-duality is. But the eye is pleased by mirror symmetry, so it is not surprising that designers have pursued it, even in very early examples like Abingdon and Wayland's House.

Both drawbacks above stem from the mirror symmetric main axis, even though, ironically, its mirror symmetry is often obscured by the entrance and exit connections. For visual appeal alone, a self-dual main axis often works better than a mirror symmetric axis. This artificial compromise between symmetry and mirror symmetry is found in several well-known labyrinths, including Wayland's House, Santa Rosa, and Petite Chartres [Shelton 2015]. I call this hybrid symmetry *Wayland symmetry*. It corresponds to the others as follows:

- Symmetry: the template and the main axis are self-dual.
- Mirror symmetry: the template and main axis are mirror symmetric.
- Wayland symmetry: the template is mirror symmetric, the main axis self-dual.

Although this hybrid symmetry can work well visually, the different symmetries of template and throat unsurprisingly do not play well together mathematically, and as a result virtually no general symmetry properties fall out automatically for Wayland symmetric labyrinths. The path is generally not palindromic, for example. However, both the dual and the transpose operators preserve Wayland symmetry, so Wayland symmetric labyrinths naturally come in sets of four: if a labyrinth is Wayland symmetric, its transpose, its dual, and the transpose of its dual will also be Wayland symmetric.

The numbers

Table 1 gives the number of well-behaved 4-axis Gothic labyrinths with these types of symmetry.

Table 1

Dimension	Total	Sym	MSym	Sym & MSym	WSym	Sym & WSym	MSym & WSym
3 × 4	2	0	2	0	0	0	0
4 × 4	8	0	6	0	2	0	2
5 × 4	194	2	12	0	6	0	2
6 × 4	918	2	56	2	34	2	22
7 × 4	13688	68	64	0	92	12	0
8 × 4	65672	8	386	0	262	6	74
9 × 4	879186	684	322	0	576	74	10
10 × 4	4331528	194	2394	12	2578	44	342
11 × 4	56359694	6798	1596	0	5324	476	0

As the "Sym & MSym" column indicates, it is possible (but hard) to be both symmetric and mirror symmetric: both template and main axis must be simultaneously self-dual and mirror symmetric. (Such labyrinths also qualify as Wayland symmetric.) The only two 6 × 4 examples of this are the similar composites Key4 + Key4′ and Key4′ + Key4.

But it's no accident that the only non-zero entries in this column are even labyrinths. With one exception, an odd labyrinth cannot be both symmetric and mirror symmetric. The demonstration is a bit involved, but it illustrates beautifully the requirements of symmetry and mirror symmetry:

1. By mirror symmetry, an odd labyrinth has only one crossing of the rear axis. By symmetry, this must occur at the same distance from the interior as the exterior, therefore on the middle course.

2. This course cannot connect to another lane on the side axes, for if it connects outward on one side axis, by symmetry it would have to connect inward on the other side axis – but by mirror symmetry it would also have to connect outward on that second side axis. Since it can't do both, it can't connect at all.

3. So the middle course connects only at the main axis. Again, if one side connects outward, by symmetry, the other side must connect inward. By mirror symmetry, both must connect the same way (outward or inward) – *unless* they are the exit and entrance, which is the only remaining possibility.

4. Therefore the entrance connects to the middle course, and that course connects to nothing else until at the other end it connects to the exit. The only labyrinth that does this is the labyrinth with a single full course. QED!

The other double types are not quite as hard to achieve. "Sym & WSym" requires a template that is both symmetric and mirror symmetric, plus a self-dual main axis (as in St. Paul, St. Peter, and St. Eric [Shelton 2015]); while "MSym & WSym" requires a main axis that is both self-dual and mirror symmetric, on a template that is mirror symmetric (as in Hood and its dual).

The zeroes in the last column stand out, but they have a simple explanation. The main axis there must be both mirror symmetric (so the entrance and exit must connect to the same level) and self-dual (so the level they connect to must be the middle course). For some odd numbers (5, 9, 13, *etc.*) that can work, as we see in Hood. But when N is one of the alternate odd numbers (7, 11, 15, *etc.*) the middle course has an even number (4, 6, 8, *etc.*) – and the entrance of a labyrinth can never connect to an even-numbered course.

If you relax the rules beyond "Gothic", there are more specimens than are tallied in the table. For example, by allowing the path to be *non-alternating* (introducing Z-jags, where the path does not alternate direction), I can produce the 5 × 4 Desert Lightning pattern (*Figure 12*, whose styling deliberately echoes the basketry of the American Southwest). While this is neither Inner Chartres nor St. Michael (the two 5 × 4 labyrinths tallied as self-dual in the table), it is nevertheless self-dual and therefore exhibits a palindromic turning sequence:

2 1 1 2 – 1 1 – 2 2 – 1 1 – 2 1 1 2

Figure 12: Desert Lightning

Wallinger's Underground

Mark Wallinger, commissioned to commemorate the 150th anniversary of the London Underground, responded with the idea of giving each station its own labyrinth image [Wallinger 2014]. The images were installed in the 270 stations of the Underground in 2013 and 2014.[4] The patterns are executed in 11 different families or styles, which echo more traditional layout styles – among them the usual lopsided Classical shape, the Chartres-style rosette and lunettes, the occasional tight centers or central spirals of turf labyrinths, and a striking adaptation of the angular designs of Native American basketry.

Although there is some similarity among many of the designs, for the most part they are new, and for the most part without duplication. (I count only 6 pairs sharing a pattern, although in each pair the pattern is drawn in two different styles.) They are all odd labyrinths with entrances on the left. They vary in size from 3 to 15 courses and from 1 to 6 axes (though a few technically have 8 unevenly spaced axes, by combining a 5- or 6-axis pattern with a 4-axis inset at the center – as in No. 132 at Holland Park). All are unicursal, although two have isolated loops (No. 101 at Westminster and No. 110 at Kennington).

Such a large corpus affords interesting insight into constructing new patterns. How, after all, do you go about creating nearly 270 new designs? To begin with, the designs expand somewhat beyond the traditional Gothic labyrinth. Some of the traditional conventions are observed: the patterns are all built of concentric circular courses, and none crosses the main axis (except for the occasional decorative central spiral). But over 80% of the designs allow side jumps, and about 30% of the patterns introduce non-alternating Z-jags.

Fully a third of the patterns are self-dual. Self-duality was clearly used as a construction principle, for if the self-duality were accidental, we would expect occasional examples of self-dual templates without self-dual throats; but this never happens. Patterns are also built up as composites by layering smaller components one inside another (up to 7 layers deep); nearly a fifth of the patterns use this technique. More surprising to me, about a third of the patterns are built up by sectors (like Q5), especially among the ones not built on 4 axes.

Some strategies are not followed. Wayland symmetry appears hardly at all, and, I suspect, entirely by accident. There are very few strictly Roman style labyrinths, and none of Hébert's Canonical labyrinths except Chartres itself. The only examples of Rosenstiehl's Alternating labyrinths are Chartres, Inner Chartres, and Alternating 3 × 5. (The labyrinth with an isolated loop at Kennington was perhaps originally intended to be Alternating 3 × 3, for this is what is shown in the diagram for Kennington on the Underground's website – but the diagram does not match the photo of the labyrinth actually mounted at the station)

But the biggest surprise is that over a third of the patterns are mirror symmetric (self-transform) as I have described above; and many of these are much larger than Hood. This is the only place I have seen this construction principle employed so enthusiastically – indeed, Hood, Maffei, and Q5 are almost the only examples in the world beyond the Underground. So naturally I was curious to see how the project dealt with the Great Wall problem.

Some of these patterns do indeed exhibit a bleak Great Wall: a whole series of adjacent loops lined up along the rear axis, as in No. 152 at Barkingside, and these are not particularly attractive designs. But most of the mirror symmetric labyrinths here solve the problem by abandoning the strict Gothic rules and using side jumps to nest large loops along the rear axis – and this strategy often leads to attractive designs. Figure 13, for example, shows No. 203 at Barbican, a mirror symmetric 7 × 4 pattern that works well and provides a varied palindromic path. (No. 156 at Chigwell, featured on the book's cover, looks similar; but its path is too cramped for my taste, with too many consecutive quarter-turns. This is a common failing of patterns that are built up by sector, and many of the Underground's sector-based labyrinths are similarly cramped.)

Figure 13: Barbican (No. 203)

As a general observation, I would say that the Underground labyrinths are more pleasing to the eye than they would be to the feet as walkable labyrinths. Most of them lack the "organic feel" of Chartres (admittedly a high standard). Just what makes Chartres "organic" is hard to pin down precisely. Symmetry is certainly an important aspect of it, but the Underground collection does not lack for symmetry. That's not where the problem lies.

The number of circuits in a labyrinth – the number of times the path leads from one side of the main axis to the other – provides a good diagnostic measure. Chartres has 3 circuits, and this contributes to its sense of wandering widely over space. By contrast, the vast majority of the Underground labyrinths (72%) have only 1 circuit. This is a natural consequence of building the design up by sectors or (as we have seen) as a mirror symmetric pattern – but many of the Underground designs have only 1 circuit even when they don't follow these two construction paradigms.

Of the 28% that do have more than one circuit, two-thirds are composite labyrinths. These naturally have multiple circuits, since each component must contribute at least one circuit. But there is a drawback here too: the components tend to restrict the circuits to narrow bands – again pinning the path to relatively narrow boundaries (though in a different way than sector-based labyrinths).

Chartres on the other hand is neither composite nor sector based, and its circuits lead the walker boldly inward and outward while circling the center multiple times. This is the feeling I miss in many of the Underground designs.

Summary

Briefly, the main points of this article:

- The transpose operator is a natural operator like the dual operator, but operates only on odd labyrinths without center crosses. It yields something akin to the mirror image of the labyrinth it is applied to.

- Self-transpose labyrinths are as close to being mirror symmetric as true labyrinths can be. Such labyrinths can reasonably be called "mirror symmetric" if we remember that this is not quite technically accurate.

- Self-transpose labyrinths must have an even number of axes (except for the trivial and single course labyrinths), and must trace out their entrance side completely before making a single crossing of the rear axis to trace out the other half. The rear axis forms a "great wall" breached by just one course.

- Like self-dual labyrinths, self-transpose labyrinths have palindromic paths.

- "Mirror symmetry" can be relaxed to extend to even labyrinths by requiring the arcs opposite the entrance and exit to connect to each other. As before, such labyrinths must have an even number of axes (except for the two-course labyrinth), but they must cross the rear axis exactly twice. They are not self-transpose and typically do not have palindromic paths.

- Wayland symmetry provides a visual compromise between symmetry and mirror symmetry. Wayland symmetric labyrinths typically do not have palindromic paths.

Richard Myers Shelton, Roseville, MN, USA; August 2016

Bibliography:

Hébert, Jacques. *The rhythmical Structure of the Medieval Labyrinth* (English edition), *La Structure rythmique du Labyrinthe médiéval* (French edition). Québec: 2004.

Kern, Hermann. *Through the Labyrinth*, tr. Abigail H. Clay, ed. Robert Ferré and Jeff Saward., Munich: Prestel, 2000. References to Kern are to image numbers, or to page numbers where no image is provided. Image numbers and page numbers differ somewhat from earlier editions.

Labyrinthos: website maintained by Jeff Saward. Home: http://www.labyrinthos.net Hood: http://www.labyrinthos.net/English%20Church%20Labyrinths.pdf

Shelton, Richard Myers. "Greys Court: An Invitation to Symmetry", *Caerdroia* 40 (2010), pp. 21-35.

Shelton, Richard Myers. "Pieces of Chartres", *Caerdroia* 41 (2012), pp. 38-48.

Shelton, Richard Myers. "Wayland's New Labyrinths", *Caerdroia* 44 (2015), pp. 44-55.

Wallinger, Mark. *Labyrinth: A Journey Through London's Underground*. London: Art Books, 2014.

Wright, Craig. *The Maze and the Warrior*. Cambridge, Massachusetts: Harvard University Press, 2001.

Notes:

1. Sections are formed from larger labyrinths by cutting away courses from the outside and/or the inside and patching up any loose ends that result; see [Shelton 2012]. St. Michael is the section formed from courses 4 through 8 of the Reims Labyrinth. Similarly, Inner Chartres is formed from courses 7 through 11 of Chartres (whence its name).

2. Q5 also appears in an illustration for Cipriano de Rore's 16th century motet *Ave Regina Celorum*, reproduced in [Wright 2001], p. 223. Wright evidently thought the design was a Roman-style labyrinth, but it is not; and despite the claim in his caption, the design does not come "from Roman antiquity". Roman-style labyrinths always connect from one quadrant to the next by taking a jog along the axis separating them, while the path in Q5 simply crosses the interior axes without changing course.

3. The obviously mirror symmetric "Chartres Rose" design marketed by the Labyrinth Company (see [Shelton 2012]) elegantly demonstrates that the trivial labyrinth ε with no courses is also self-transpose. This is the only labyrinth with an even number of courses that has a transpose at all, and since it is the only labyrinth with 0 courses, it and its transpose must be the same labyrinth!

4. Wallinger's book includes photos by Thierry Bal of all 270 designs, but in many of these photos the actual design of the labyrinth is hard to make out. The Underground maintains a website (http://art.tfl.gov.uk/labyrinth/) with more of Bal's photos, and also includes a close-up photo and a diagram of each labyrinth. The canonical numbering of the labyrinths (reflected in a "serial number" in the images themselves) orders them geographically, not alphabetically; the book presents the labyrinths by number, the website alphabetically by station name. Another website with a comprehensive view of the labyrinths (and a better index) is John Cooper's Tumblr (http://labyrinthtubephoto.tumblr.com), evidently a personal project to photograph all the Underground.

Notes & Queries
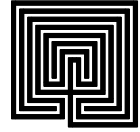
Our regular round up of matters labyrinthine brings together short contributions and notes from Caerdroia readers worldwide, also items from the Labyrinthos Archives that require further research, or simply deserve recording. Similar notes and queries are welcomed for future editions.

A Maze Garden in Taipei City   notes from Baptiste Tavernier

Hedge mazes are not a common feature in the Far East, but a maze I recently encountered in in Taiwan, located at the north border of Taipei city is surely worthy of note. Situated close to No. 105, Section 3, Xinsheng N Rd, Zhongshan District, Taipei City, it has fairly low hedges for the most part and contains four 'squares' with mosaic panels and a separate 'mini maze' at the centre. It is not always in the best condition and a few bushes need replacing, but a stone standing next to the maze tells much of its purpose and history. Translated, the text states:

During the annual meeting of Rotary International, District 3520, in the year 2000, the Director of the Department of Cultural Affairs, Lung Ying-tai, proposed the creation of the Garden Maze. He received a positive response and support from all the members of the Rotary International, District 3520. The maze was designed by Wang Pin-sun, Yang Qian, Wang Haocheng, Xiong Fengqi and Liang Xiujuan in collaboration with the artist Yang Fengchen. The Taipei Garden Maze is now ready. It covers 0.95 hectare, and cost NT$22,500,000 (new Taiwanese dollar). Its construction took about 5 months, when almost 60,000 bushes were planted. The Taipei Garden Maze was completed for all citizens to enjoy on April 7th, 2001. Written respectfully by Taipei Mayor, Ma Ying-jeou in April 2001.

Plan of the Taipei City maze garden and a view across the low hedges. Photos: Baptiste Tavernier

New discoveries of historic labyrinths in India continue to be reported, and indeed are likely to continue, as interest in the symbol, a part of Indian culture for several thousand years becomes more widespread amongst regional archaeologists and historians, as well as the tourists that visit the many temples and monuments of the sub-continent. Just such a discovery was recently kindly reported to me by Gerald Schügerl of Saalfelden, Austria, who happened to notice an intriguing inscription while visiting the Lakhna Devi temple at the Chaurasi temple complex in Bharmour, in Himachal Pradesh in the north of India.

The inscription, ca. 50 cm square, is situated on a stone pedestal on the left side just inside the entrance to the building and is deep red in colour, the result of many devout pilgrims applying vermillion or red turmeric paste and tracing the design with their fingers over many years. The design of this labyrinth is a particularly complex version of the swastika-type

designs found throughout India (see "Labyrinths in Western India" *Caerdroia* 36, p. 59-62 and "Labyrinth Pavements in Amritsar, India" *Caerdroia* 43, p.54), in neighbouring Nepal (see "A Nepalese Labyrinth" *Caerdroia* 26, p. 13-22) and more recently reported in Thailand (see "The Wongkot Labyrinth" *Caerdroia* 40, p. 36-39). While the Chaurasi temple complex was founded around 500 CE, it has a long history of rebuilding and reuse of material from earlier structures. Consequently, it is very difficult to date specific carvings, but the patina on the labyrinth stone clearly suggests that it is not a recent addition. A smaller (ca. 20 cm square), rough attempt to replicate the design has also been carved alongside at some later date.

The Chaurasi temple labyrinth Photo: Gerald Schügerl

Labyrinths of this swastika-type are evidently widespread in the region, although clearly under-reported and are very much an integral part of the Indian tradition of labyrinth use for many centuries. And just to remind us of this, late last year, shortly after I received the notes and photos from Gerald Schügerl, I was accompanying Kimberly to an arts and crafts trade show in London and spotted some interesting wooden printing blocks for sale on a stand. Modern, of course, they had been made in Jaipur, India, and happen to have a design rather similar to the Chaurasi temple labyrinth – proof, if ever it were needed, of the continuity of these labyrinth traditions in the region!

Wooden print block from Jaipur, India
Labyrinthos Collection

While travelling in central Italy in December 2016, just before Christmas, we stopped in Alatri to see the famous *Cristo nel Labirinto* (Christ in the Labyrinth) fresco in the former church of S. Francesco and talk to the student guides currently showing visitors this most remarkable of labyrinths – the only example known to date of a labyrinth with the figure of Christ at its goal. Our destination that evening was the beautiful town of Veroli, perched on a rocky hilltop overlooking the plains below, one of a series of similarly situated towns with prehistoric foundations in the region of Lazio, and as luck would have it, strolling home that evening with our guide Loredana Stirpe we chanced upon another labyrinth, or rather a simple maze. Designed by the architect Massimo Terzini and installed in 1993, the maze is part of a children's playground in a small park with various sculptural installations that run alongside the via Passeggiata San Giuseppe, near the Porta Roma. Around the maze is the inscription *Hic Sunt Leones* – Here be Lions – a popular phrase on medieval maps for unknown territory, and appropriate words for a maze waiting to be discovered by the adventurous traveller and explored by the inquisitive and young at heart alike.


Hic Sunt Leones, Veroli, Italy

Photo: Jeff Saward, December 2016

The Labyrinth Society

The Labyrinth Society, affectionately known as TLS, was founded in 1998 to support all those working with, or interested in labyrinths. Although based in the USA, it is an international organization with members around the world. Membership in the Society not only connects labyrinth enthusiasts to a worldwide community, but also supports websites and other labyrinth projects that provide information and resources to the world at large, including the Worldwide Labyrinth Locator website that now lists over 5400 labyrinths, and a few mazes, worldwide: **www.labyrinthlocator.org**

The TLS Annual Gathering 2017, will be held October 27-29, on Bainbridge Island, WA, USA. For details and more about The Labyrinth Society, visit: **www.labyrinthsociety.org**
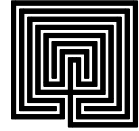
Labyrinth Reviews

Review copies of maze and labyrinth related books, publications, software and CD's, etc., are always welcome for inclusion in future editions of Caerdroia.

Livets och Dödens Labyrint, by Christer Westerdahl. Båtdokgruppen, Skärhamn, Sweden, 2016. ISBN 978-91-87360-86-2. Hardback, 202 pages, numerous colour illustrations, maps, tables, etc.

Christer Westerdahl is a Swedish professor emeritus, with 30 years of research experience on marine archaeology around the Baltic and Bothnian Seas. He has written innumerable articles in Swedish and English scientific forums, including several in past editions of *Caerdroia*. At long last, he has published a book on his thoughts about the 700 or more labyrinths in the region of Fennoscandia, their contexts in time and space, and the possible practices associated with them. This 202-page Swedish-language hard cover book summarizes the up-to-date research on the northern labyrinths. It looks at their placement along the shores and skerries of the Baltic Sea and Bothnian Gulf, their appearance as frescos in churches in Denmark, Sweden and Finland, along with personal reflections on these historical backgrounds. There are fact boxes, catalogues of the coastal labyrinths, placement by counties and parishes, possible dating and maps for each country, drawn from sites registered by the various national antiquarian authorities, museums and researchers, with their appropriate ID-numbers. The book is richly illustrated with photos, maps and graphics and all in all, is a treasure trove for labyrinth research in the north.

However, to say anything for sure about the stone labyrinths is putting your credibility at risk in the Swedish academic sphere. The long held idea that the labyrinths are prehistoric, used for ritual purposes, fertility rites and later maybe for games and leisure, still prevails. But Westerdahl can by now afford to make use of his knowledge of the daily lives, and deaths, of fishermen and sailors in the northern regions during the Middle Ages. His overall hypothesis is an apotropaic function for the labyrinths, which for the coastal examples would provide the living protection against the spirits of the dead and also protect against their own death at sea.

Westerdahl places his emphasis predominantly on the context of the coastal labyrinths, that is the relationship to the place where the labyrinths are located and their extended situation in time and space. This is a good start, but involves a lot of tricky pitfalls. We know the stone labyrinths are there, but we don't know since when, and certainly not for what purposes. One question we should take into consideration, Westerdahl writes, is expressed in the words of the Norwegian archaeologist Åse Sørgård in her 2007 thesis: "What would the northern labyrinths do in nature if they weren't ritual tools to make use of for symbolic practices?"

Hence, we have three questions that can be used in an analysis of the labyrinths' contexts; the *where*, *when* and for *what purposes*. The question of where the labyrinths are located seems a fairly easy one to answer, but it is not. Westerdahl doesn't think we need more knowledge about the labyrinths, but rather new knowledge and analyses of their simultaneity – of their location and their extended space in time. An estimated time for their creation would be crucial for this kind of analysis. But I do think a more pervasive examination is also needed of the labyrinth locations at the shores and islands, their sizes, designs and entrances, the normal weather conditions at any given time, if there is fresh water nearby, if they are placed in "known" fishing waters and under whose authority at the specific time, and if there are visual alignments between them, especially those within the same parishes. This would be most helpful for any further research of these northern labyrinths.

As archaeological researchers with a focus on labyrinths, we have both been inspired by the recent work of the Russian geographer Vyacheslav Mizin. He has focused on the White Sea and Barents Sea labyrinths, as well as making excursions to the overlooked examples in the Finnish Gulf. Mizin has also done extensive research in older scientific texts, in toponyms as well as in the etymology of labyrinth names such as Jerusalem and Jericho. He concludes that the Russian labyrinths are no older than the Middle Ages. This time frame corresponds with the dating of 42 selected coastal stone labyrinths of Swedish Upper Norrland (the Western Bothnian Gulf), carried out in the 1980s by Noel Broadbent and Rabbe Sjöberg, and referred to in Westerdahl's book. Broadbent & Sjöberg used a combination of land uplift, lichenometry (measuring the growth of lichens) and surface erosion, and found the oldest labyrinths were dated to about 1300 CE. The peaks of their dating curve were about 1550, corresponding with the Lutheran Reformation in Sweden and today's Finland, with another peak in the 17th century, petering out towards more recent centuries.

This settles a starting point for Westerdahl's analysis, as he puts it in the English Summary: "Interestingly, the principle distribution of stone labyrinths conforms to the coastlines colonized by Swedish-speaking peasants during the High Middle Ages: Northern Sweden, Western Finland and Estonia. This may also indicate their origin in this period."

With the *where* and the *when* decided for the contexts of the northern coastal labyrinths, are we ready for their possible functions? All researchers agree there must be a relation between the coastal labyrinths and the seafarers. "Death at sea was an ever-present threat among fishermen and sailors, who suffered the highest rate of premature death among all professional categories in Early Modern Times (together with miners)" Westerdahl writes. It is may be playing it safe to stop at the universally perceived apotropaic function of labyrinths, and that their principle function would have been to save seafarers during the Middle Ages from their own death and from those already lost at sea. A question from the audience at a recent lecture on the coastal labyrinths and their historical background was simple enough: "Couldn't they have been used for luck at fishing?" They certainly could. But why then, to refer to Sørgård, would fishermen throughout the Middle Ages, over such a wide geographic area, repeatedly lay out and (somehow) use an intricate design with Roman Catholic connotations such as a labyrinth? That is the crucial question.

<div align="right">Christina Fagerström, Sweden</div>

Learning with the Labyrinth – Creating Reflective Space in Higher Education: Edited by Jan Sellers & Bernard Moss. Palgrave, 2016. ISBN: 978-1-137-39383. Paperback, 246 pages, b+w illustrations.

In a world of haste, including in our institutions of higher education, the labyrinth calls us to slow down, be mindful, and take the time to reflect. Even academics with a rich history of thinking deeply and taking risks can fall into the trap of busyness as we hurry our way through the landscape of higher education. Jan Sellers and Bernard Moss have given us an immensely original and timely resource to address the fallacies of haste and busyness in the academy and return us to our rich heritage of innovative teaching and reflective learning. In *Learning with the Labyrinth*, Sellers and Moss have brought together a diverse group of individuals who are using the labyrinth in creative ways to facilitate learning in higher education. From the introduction that describes this book as "a clarion call for exploration and collaboration" to the conclusion which is no ending, but "a vision and a hope and a continuing journey," this book calls the reader to think deeply and creatively about how the labyrinth can facilitate the mission of higher education. The reader is encouraged to passionately explore the labyrinth as a valuable tool for teaching and learning giving students and themselves the permission to slow down to allow time for reflection and critical thinking both inside and outside the classroom environment. We are invited to be risk-takers and bridge-makers despite the climate of haste in which we work.

This book is not necessarily intended to be read start to finish, although you may certainly choose to read it that way, but rather it is a resource that can be accessed as needed to stimulate creativity and illuminate your path. The chapters within *Learning with the Labyrinth* are as diverse as their authors and the labyrinth experience itself. Some chapters are short case studies designed to stimulate your creativity by briefly describing how the author used the labyrinth in a class project, writing assignment, and conferences among others. Other chapters provide more in-depth examples of labyrinth uses with honest reflections on the benefits and challenges of using the labyrinth in higher education. Finally, this book includes chapters on practical topics such as a basic introduction to labyrinths, how to create simple labyrinths and resources for those ready to initiative their own labyrinth projects. You will find examples from many different disciplines and types of universities.

Learning with the Labyrinth is an essential resource for anyone in higher education who desires to bring creativity, innovation, and reflection into their teaching. It should not, however, be viewed as the exhaustive resource for using labyrinths in higher education. The editors acknowledge this, and I suspect would be sadly disappointed if it were viewed as such. This book is intended to stimulate you to dream using your own experiences and expertise to develop innovate uses for the labyrinth. You are encouraged to not be limited by time constraints, space restrictions, or expectations but to creatively engage your students and colleagues with the labyrinth in spite of these limitations. *Learning with the Labyrinth* certainly provides the vision and practical resources to assist you on your own deliberate journey of incorporating the labyrinth into your teaching and professional activities.

Melissa Powers, University of Central Oklahoma

Submissions to Caerdroia

Caerdroia is always pleased to receive material for publication. Readers are urged to submit papers, shorter articles, notes, information, photographs – indeed, anything labyrinthine – for possible publication in future editions of Caerdroia. Articles and notes should preferably be sent as e-mail attachments in Microsoft Word .doc or .docx format (although .rtf and most other formats are acceptable), or on CD for PC compatible computer. Illustrations and photographs are preferred in .jpg or .tif format at 300 dpi resolution please, but please keep illustrations separate from text, and send as separate files, with position in text clearly marked. Photographs: colour or b&w prints and 35mm transparencies are also welcome if digital versions are unavailable, and will be copied and returned if requested. A preferred style guide for authors is available on the Caerdroia Submissions page on our website.

Because Caerdroia is a specialised journal for enthusiasts, no payment can be made for submissions, but any reproduction fees required will be covered, and all significant contributors will receive a complimentary copy and/or digital PDF. Short notes and press clippings are likewise welcomed, along with plans, postcards, guide books, photographs, etc., from any maze or labyrinth you may visit, for addition to the archives. Deadline for inclusion in Caerdroia 47: December 2017 please, for scheduled publication Spring 2018.

Subscription to Caerdroia

As an enthusiast's journal dealing with a specialised subject, Caerdroia relies on reader subscriptions to allow it to continue to provide a forum for maze and labyrinth research and news. Subscription provides the next edition of Caerdroia and supports the production of the journal, maintenance of the Caerdroia Archives, covering all aspects of mazes & labyrinths worldwide, and our extensive website. A photocopy reprint service from out-of-print editions is also available to subscribers. The annual fee is:

£8 UK, €10 Europe, $15 USA, £12/US$15 (or equivalent) rest of world.

- Payment details: UK: all cheques payable to LABYRINTHOS please, or subscribe online via Paypal – visit our website or contact us for details.
- Europe: payment in Euros is very welcome (fold in dark paper for security), by electronic bank transfer or subscribe online via Paypal – visit our website or contact us for details.
- USA: online subscription via Paypal is preferred – visit our website or contact us for details. US$ bills and US $ checks are also accepted, but please fold in dark paper for security.
- World: online subscription via Paypal is preferred – visit our website or contact us for details. Readers in Canada, South Africa, Australia, N.Z. & the Far East are welcome to pay in UK£ or US$, but please fold in dark paper for security.

Readers in Scandinavia may subscribe by applying to our agent John Kraft:
Rolighedsvej 19/1th, 1958 Fredriksberg C, Denmark. Email: johnkraft44@gmail.com

Readers in Denmark may subscribe by applying to our agent Ole Jensen:
Labyrinthia, Gl. Ryvej 2, Rodelund, 8653 Them, Denmark. Tel: (+45) 86 849944.
Email: labyrinthia@labyrinthia.dk – Website: www.labyrinthia.dk

Subscription or payment queries? - contact us at: info@labyrinthos.net
Caerdroia on the Internet: www.labyrinthos.net

LABYRINTHOS

53 Thundersley Grove, Thundersley,
Essex SS7 3EB, England, UK.
Telephone : +44 (0)1268 751915
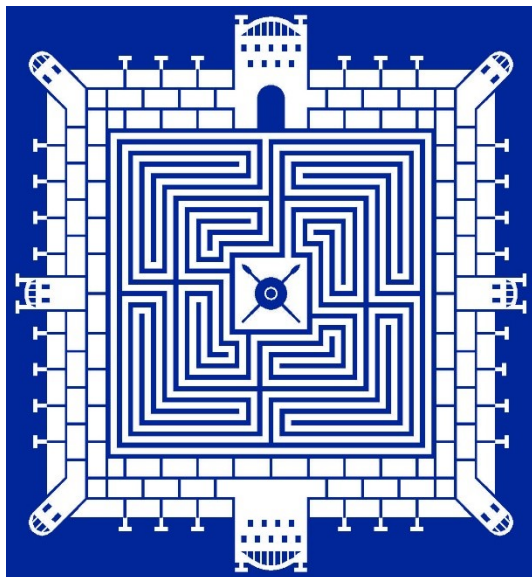**E-mail : info@labyrinthos.net**
Website : www.labyrinthos.net

The story of mazes and labyrinths is as long and tortuous as their plans might suggest. For many, mention of the labyrinth may recall the legend of Theseus & the Minotaur. An increasing number will know of the ancient labyrinth symbol which occurs around the world, at different points in time, in places as diverse as Brazil, Arizona, Iceland, across Europe, in Africa, India and Sumatra. This symbol and its family of derivatives have been traced back 4000 years or more, but its origins remain mysterious. Modern puzzle mazes, however complex their form, are but the latest episode in this labyrinthine story.

Labyrinthos is the resource centre for the study of mazes and labyrinths, with an extensive photographic & illustration library and archive, offering professional consultation and services for owners, designers, writers and publishers. Labyrinthos also provides consultation for maze and labyrinth design and installation, lectures, workshops & slideshows. We also specialise in personalised tour guide services to labyrinth locations. Contact Jeff Saward or Kimberly Lowelle Saward at the address above, or visit our extensive website www.labyrinthos.net for further details of Labyrinthos and *Caerdroia*.

Our annual journal *Caerdroia*, first published in 1980, is dedicated to maze and labyrinth research and documentation. Produced by labyrinth enthusiasts for fellow enthusiasts, it keeps in regular contact with correspondents throughout the world, exchanging information and ideas, to help create a clearer picture of the origins and distribution of the enigmatic labyrinth symbol and its descendants, from the earliest rock carvings and artefacts through to modern puzzle mazes of ever increasing complexity and ingenuity.

Current subscribers to *Caerdroia* include maze and labyrinth researchers and enthusiasts, archaeologists and historians, artists and authors, designers and owners, and members of The Labyrinth Society. As a non-profit making journal dealing with a very specialised subject, *Caerdroia* relies on reader contributions, submissions and subscriptions for support. If you are interested in the history, development, diversity or potential of mazes and labyrinths in any of their forms, perhaps you would care to join us on the path...

Jeff Saward & Kimberly Lowelle Saward, Labyrinthos

CAERDROIA