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VERNACULAR ARCHITECTURE OF MALTA

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ABSTRACT

A drystone construction means laying one stone beside another and laying course over course on top. Corbelling is a three-dimensional construction around a central axis and composes a false dome. The article uses the author's documentation and survey, comparison and a historical methodology, revealing their connections to pre-historical monuments. The vernacular architecture of Malta is used as a temporary shelter, apiary, well, irrigation system and hunters' shelters. Such objects are mostly hidden in nature but – sadly- also out of the mind of local people. This important architectural heritage needs more professional work, care and activities aimed at informing people and raising pride in the local culture.

Keywords: Malta, vernacular architecture, drystone, construction, corbelling, girna, migbha

ARCHITETTURA VERNACOLARE MALTESE

SINTESI

Il muro a secco è una costruzione in cui le pietre sono posizionate l'una accanto all'altra, mentre gli strati superiori possono essere sporgenti. La mensolatura è una struttura tridimensionale attorno all'asse verticale centrale e forma una cupola irregolare. Dal presente articolo traspaiono la documentazione dell'autore e ricerche nell'ambito del metodo di revisione, comparativo e storico per rivelare i collegamenti tra l'architettura vernacolare e i monumenti preistorici. L'architettura vernacolare maltese è utilizzata per rifugi occasionali, alveari, pozzi, sistemi di irrigazione e rifugi di cacciatori. Tutti questi edifici sono nascosti nell'ambiente, quindi necessitano di maggiore attenzione, elaborazione professionale, cura e attività per presentare il problema nonché per aumentare la cultura e l'orgoglio della popolazione locale.

Parole chiave: Malta, architettura vernacolare, muri a secco, costruzione, corbeling, girna, migbha

INTRODUCTION

The Maltese archipelago, especially Malta and Gozo, is mainly rocky, and the stone (globerigina) is soft and can be cut. The harder stone found on the surface can also be used for drywall constructions. Simple architecture in this style is extremely rich in Malta, especially girna (plural: giren), structures for hunters, and carved architecture such as apiaries and wells, also with irrigation systems. Today, this architecture is almost no longer in use, disappearing both in the environment and in memory. There are few professional treatments, even less quality documentation. Despite the fact that some solutions are unique, there are few even scientific works, so it is not surprising that there are works by non-professionals, laymen in the field, but are a valuable contribution to the knowledge of this disappearing culture. On the other hand, Malta has an extraordinary number of prehistoric monuments in stone, which are richly and elaborately worked and are a model for vernacular architecture. The presentation of simple Maltese stone architecture is based on the composition of a transparent, comparative, developmental and historical methodology. It thus encroaches on various fields of science and provides a basis for further processing by various disciplines, its main purpose being to challenge scientists to present an in-depth treatment from their side as well.

DRYSTONE

Stone is a perfect building material. The simplest construction is laying one stone beside another and laying course over course on top (Rholfs, 1963). Drystone is construction without any mortar or cement: stone is a heavy material and its weight helps give it stability (Juvanec, 2004). Constructions with clay, gypsum and lime mortar are the next step in the building hierarchy.

Clearing a field increases its productivity, and the plants are needed as animal fodder. A side effect is an abundance of stones. Stones in a pile, a heap, simply disappear over time. The only way to hold them together is a construction (Juvanec, 2013). The simplest 'construction' in stone is a megalith. Vertical stones, even if there are a series of them, standing in lines, are not architecture. Not yet. A dolmen is the first step into architecture: two uprights are covered by a stone plate (Oliver, 1997). This composition enables a usable room, a shelter.

A dolmen can also be made of several uprights and plates. These compositions are more usable.

Alternating stones can be used for walls but the simplest construction, corbelling, is made for bridging a gap. A dolmen can also create usable space: dolmen by dolmen composes a 'corridor', a long narrow room, used in prehistory as religious objects and tombs (Juvanec, 2001). Many of them can be seen in Sardinia in the Nuraghe culture of the second and first millennia BC.

CORBELLING

Corbelling is a stepped construction of overlapped courses and composes an open room: a usable space. Corbelling in rows provides a longitudinal construction. Such constructions can be seen in Egyptian pyramids (corridor in the pyramid of Khufu, some cells in the Bent pyramid); in vernacular architecture they are rare. The well, 'aljibe', in Spain near Valencia is composed as longitudinal corbelling and its construction can also be seen from the outside (Juvanec, 2017).

In three dimensions around a central axis, corbelling composes a false dome (Rovero & Tonietti, 2014). The groundplan is theoretically circular, but it can be square or even rectangular – but only at floor level. After 50 cm, it becomes more and more circular. The upper part of the false dome has to be a circle, because there are horizontal stresses (Rovero & Tonietti, 2012).

The construction can be covered by a stone plate or with a wedge. All systems of groundplans are familiar in Malta: circle with circle, square with circle and square with circular groundplan inside.

Corbelling can be composed of similar stones (with at least two even surfaces, as fractured blocks of rock), or as a composition of random stones – as volcanic rock in Iceland or the Canaries. Objects with even shaped stones can make better architecture: they have vertical walls and controlled false cupolas. The most beautiful objects are *trulli* in Apulia and *kažun* in Croatia, as well as *cabane* in France.

Recent architecture in Malta is constructed of soft stone, 'globerigina' (Jaccarini, 2002), because it is suitable for sawing into blocks. Vernacular architecture is the product of circumstances, it is built in unshaped stone, found in the terrain. It is very hard to find proper stones with at least one even surface, but some structures in Malta are really perfect compositions.

The verticality of all stresses is the most important aspect of compositions in drystone. An inclination to the centre, for both walls and shelters, is essential. The main idea is to build objects as truncated cones or pyramids.

Exact blocks enable controlled compositions and details (roofs, overhangs, lintels, slings, fittings such as bowls and pans), but all existing constructions are made with the help of the square root of three.

Image 1: a/ Lintel in prehistoric architecture, Hagar Qim, certainly built on the model of a natural structure in Gozo. b/ On the right-hand picture can be seen its origin. Nature teaches, but a lintel has to be firm enough. In the Gozo example, nature was successful in teaching in the past, but not for the weather conditions: it collapsed some years ago.

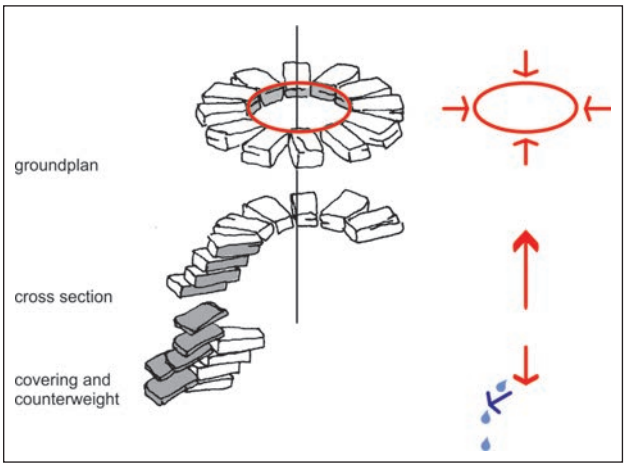

Image 2: A construction of corbelling consists of horizontal courses of stone, overlapping each other. This is the principle in cross section, but a circle is needed in groundplan, especially at the top of the false dome. The point is: there must only be vertical stresses.

Use of the square root of three sounds complicated. It is not. It can be composed with three sticks of the same length. This length is 2r (diameter of the inner space) plus two halves of the width of the wall (2r + 2xw/2 or 2r + w). The complicated length can be measured as depth, simplified by measuring from the entrance to the deepest point of the room (Juvanec, 2009a).

The only composition of three sticks is an equilateral triangle. Where the length of the sticks is equal to 'one', the height is equal to the square root of three, according to Pythagoras (Juvanec, 2013).

This is essential: it is the height of a false dome from the floor to the topstone.

This height is the shortest possible dimension used for a false dome. Of course, the structure can be taller – but it uses much more material and work. There is more space to be heated, a bigger fire is needed, which means loss of firewood.

This is not very difficult mathematics, and it is used in all existing objects constructed in corbelling with small stones. An equilateral triangle is also found in Atreus Treasury, a three and half millennia old structure with a false dome (Juvanec, 2018).

CORBELLED OBJECTS

Corbelled buildings in vernacular architecture can be used as temporary shelters or dense buildings in a city – such as Alberobello in Apulia. Structures can be devoted to people (the dead and the living, for religious purposes or for living), animals or materials (tools, cheese). Structures can stand above ground or below it, covered with plates, gravel or soil, can stand alone or in a combination of several shelters, separating people, animals and even sorting them – by age or size.

Objects in drystone are well known from the Stone Age – and they are still in perfect condition: the tombs on the border between Yemen and Saudi Arabia (Rohlfs, 1963) are from the 6th millennium BC, nawamis in Sinai from the 4th, and tombs in Oman from the third millennium BC, the sacred well Sant'Anastasia in Sardinia is from the second millennium BC (1200 BC; Juvanec, 2014) – to mention only a few of them.

The most important architecture in drystone composed in corbelling is the Italian 'trullo'. There

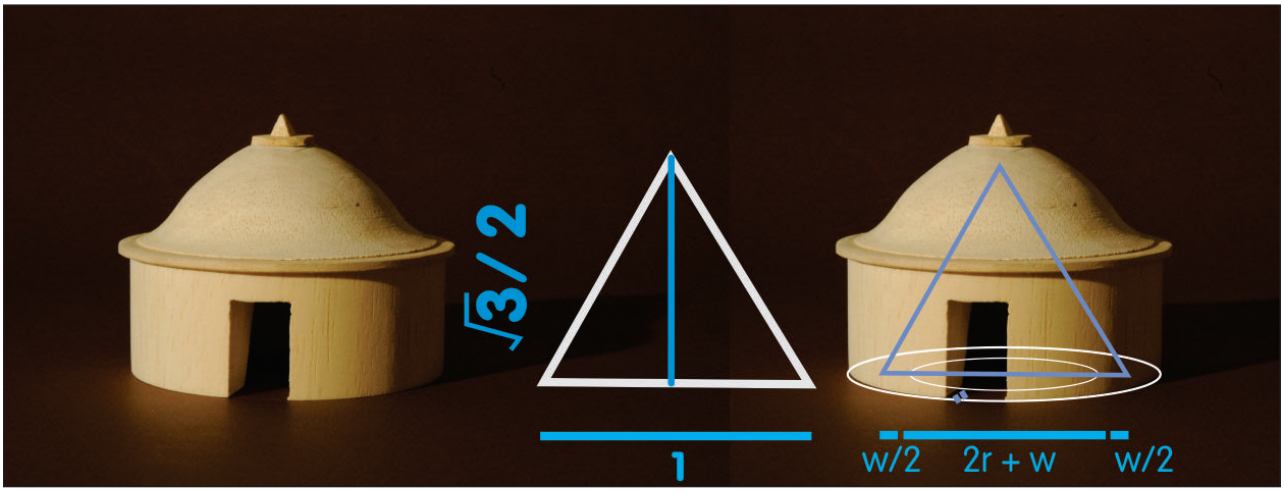

Image 3: An equilateral triangle can be found in a false dome. The dimension of the baseline can be measured as the diameter of the groundplan plus two halves of the width of the walls.

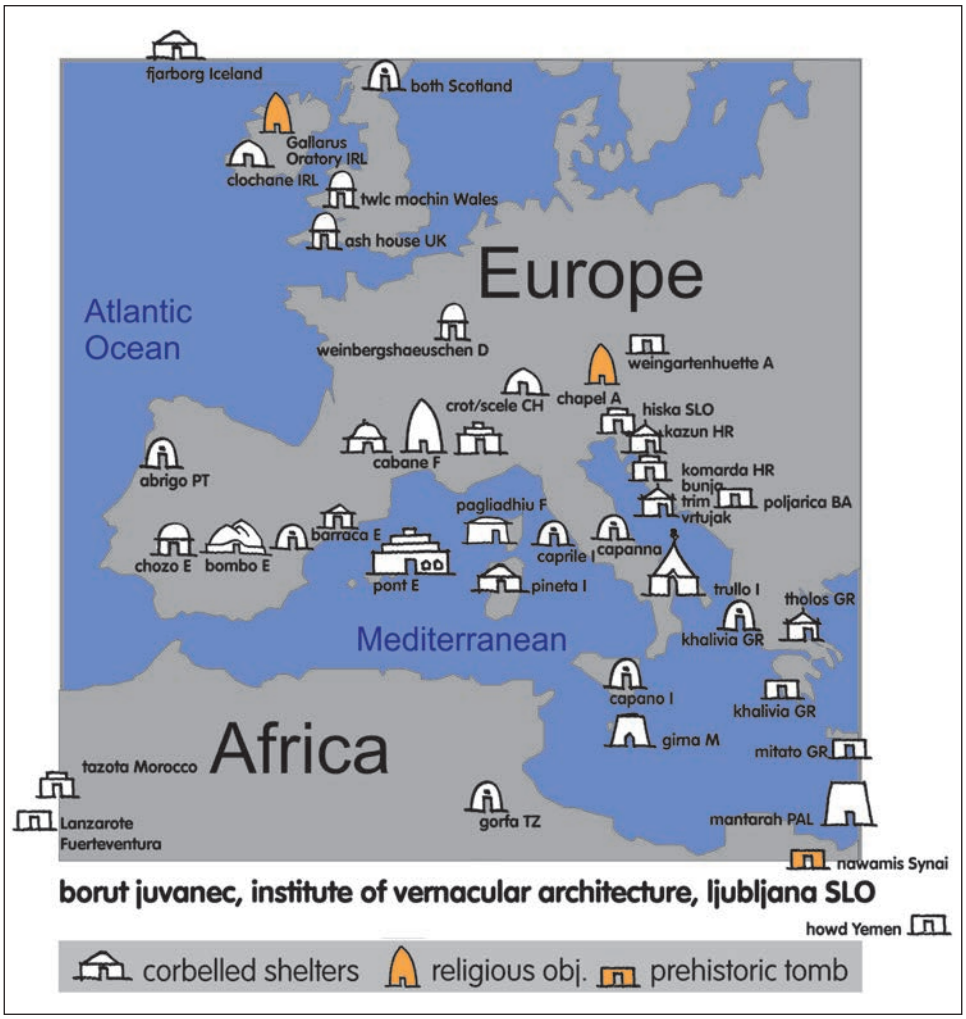

Image 4: Documentation of drystone objects in a false dome in Europe and around the Mediterranean (Institute of Vernacular Architecture, Ljubljana, Borut Juvanec 2021).

are three cities made in this system: Alberobello, Locorotondo and Martina Franca in Apulia. This architecture is used as living structures for people and animals. Typical circular constructions can be found in these three towns, but in the countryside, trulli have all possible shapes (groundplans, cross sections, elevations).

Drystone constructions can be found everywhere in the world, though most densely in the Mediterranean, on both European and African sides. The oldest sacral object is Atreus Treasury in Mycenae, where the false dome was hewn (it was covered by metal sheets) and looks like a real dome (Juvanec, 2009b).

Stone shelters – as vernacular architecture –in Sardinia have a direct model in Nuraghe culture with nuraghi towers (some of them have a double or even triple false dome, one above another, Juvanec, 2014).

Drystone and its inscription into the UNESCO List of Intangible Heritage in 2018 (UNESCO, 2018) is important for both architecture and local culture.

MALTA

Malta, or the Maltese archipelago, lie at the apparent junction between Europe and Africa. Its rich history eloquently testifies that over the centuries, or rather millennia, it has played an important strategic role as a defensive point in the middle of the Mediterranean (Hidič, 2009). The vulnerability of Maltese culture to various foreign influences and its consequent dynamism are reflected in art and architecture (Buhagiar, 1991). Professor De Lucca mentions 'primitive stone shelters' – the shelters are primitive in their basic constructional system only. Their importance is in using found unshaped stones for a pretentious composition: a false dome. The

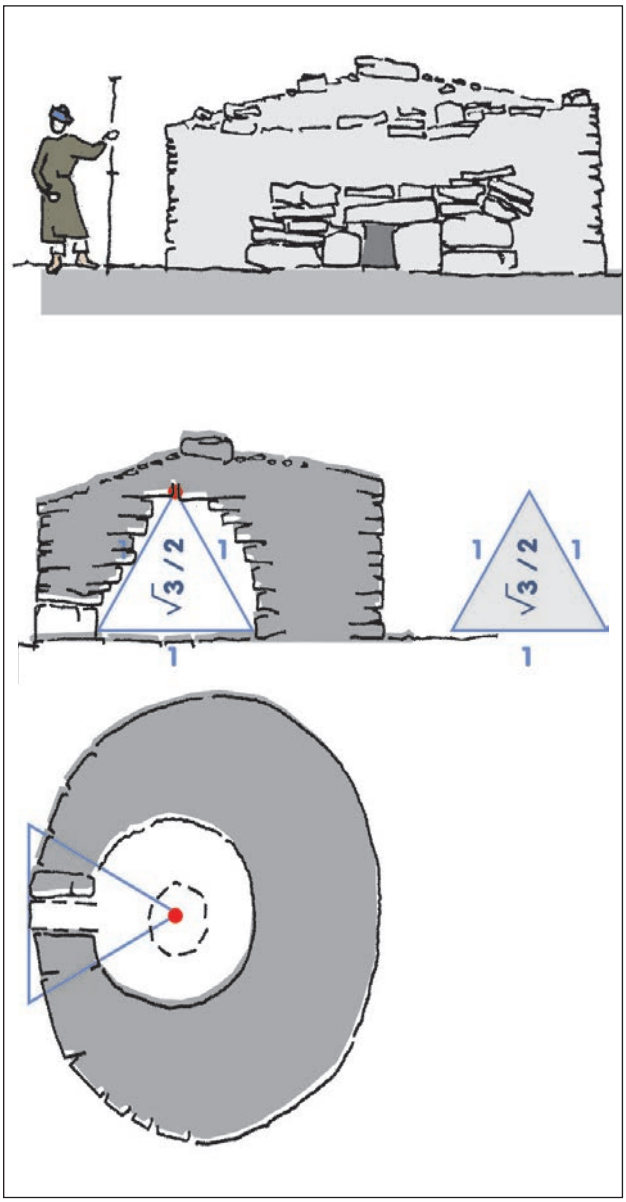

Image 5: Indirizzo di destinatario e mittente; lettera di Cernazai del 19. 11. 1799 inviata in data 21.11.1799 (NMS RAR M5 P1, Foto: P. Farinelli, autorizzata).

predominant influence of a typical Mediterranean island climate, favourable to building activity, must be mentioned here (De Lucca, 1993). The majority of the stone architecture in other countries of Europe is invented anew – without any models (Juvanec, 2022). In Maltese vernacular architecture, models can be recognized from prehistoric temples – but only in principle. All these remains of corbelling are unfinished or ruined. A sound intellect is needed for understanding the principle. Builders of Maltese vernacular architecture showed this intellect in practice. The Skorba temples are from the Neolithic and Bronze Ages, as calculated by radiocarbon dating by Trump. An important link with prehistoric building traditions can be seen here, which constitute a vernacular building type with widespread formal and constitutional parallels in neighbouring countries (De Lucca, 1984).

The Maltese archipelago, mostly Malta and Gozo, are rich in stone: the soft material, called 'globerigina' (Globerigina and Coralline limestone; Hidič, 2009), is suitable for sawing into blocks, but a harder version, found on the surface, can be built into firm compositions, using corbelling, with the final result a 'false dome'. A girna is a herdsman's and animal shelter, migbha is a beehive hut or cave, carved wells and irrigation systems are interesting and, finally, hunters' structures such as 'dura' and 'ruffjana', not to mention walls with all their details, and scarps, which are an important part of the built environment.

The vernacular architecture of Malta consists of the following typical objects:

Girna (plural: giren, also grieni (Fsadni, 1992; Jaccarini, 2002)) is a field shelter.
Migbha (plural: mgiebah) is an apiary or beehive cave.
Water systems consist of stone waterways and basins.
Dura is a hunter's hide.
Ruffjana is a bird trap.
Xbiek is not an object, but an interesting tool, a net for laying to catch birds.

Vernacular architecture, and a girna is a typical representative of it, is invented in every example anew (Juvanec, 2013). In Malta can be seen an exception: the origin, corbelling appears in Mnajdra temples (3700 – 3200 BC) with typical overlapping courses. The system was repeated in Hal Saflieni hypogeum (3300 – 3000 BC). Is this a repetition of the system – but hewn in soft stone? Did builders of giren understand this phenomenon?

Whether they did or not, it is real model for the construction of a girna: corbelling.

GIRNA, GIREN, GRIENI

Human settlements in the Mediterranean have their origins in prehistory, and they are the result of needs and local possibilities – not only in Malta, but throughout the region (Mallia, 2008). Any structure needs to be understood as a cultural unit within its landscape (Vella, 2013).

All these can be seen in Malta for sheltering herdsmen and animals. Barumbari (pigeon huts), giren and mgiebah (apiaries) appear as field objects (Vella, 2014).

Image 6: Mnajdra temples in the shape of a cluster could be seen before the roof was built. Nowadays, neither their groundplan or the possible height of the monuments can be seen, calculated with help of the square root of three (photo 1995).

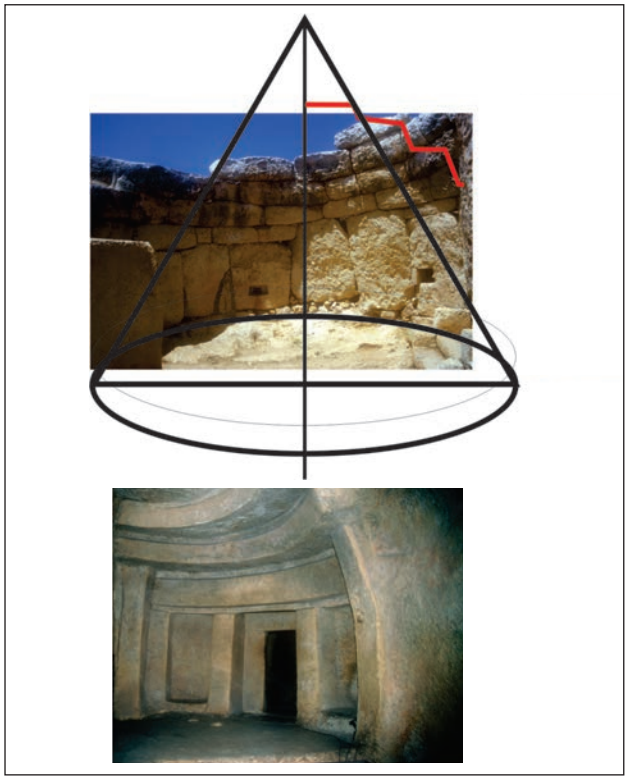

Image 7: Mnajdra and Hal Saflieni: the first courses of stone show the beginning of the corbelling – unfortunately unfinished or today collapsed. The hewn shape of the tomb Hal Saflieni is a repetition of corbelling construction. Overlapping courses are clearly visible: this is proof that corbelling was understood by ancient builders.

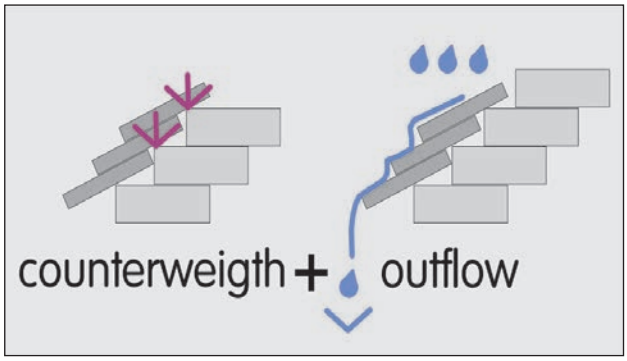

Image 8: Corbelling appears only very rarely as a single layer: it normally contains two– the construction is the first layer and its covering the second. The covering acts as a counterweight and for the outflow of water. There is often a third layer between the two: filler such as gravel or smaller stones. All three layers represent a final stable, watertight and usable composition of a hut.

The earliest cartographic evidence demonstrates that the surviving giren investigated in this field survey were built after 1784 and before 1862, and between 1882 and 1903 (Vella, 2013).

The first scientific article about Maltese giren appeared in 1961, by Paul Cassar (Cassar, 1961), and after some specific articles about this architecture came the book The Girna by Father Mikiel Fsadni (Fsadni, 1998). Its importance is in providing complete information of the subject. This is rare in this field of science, only a few books exist covering

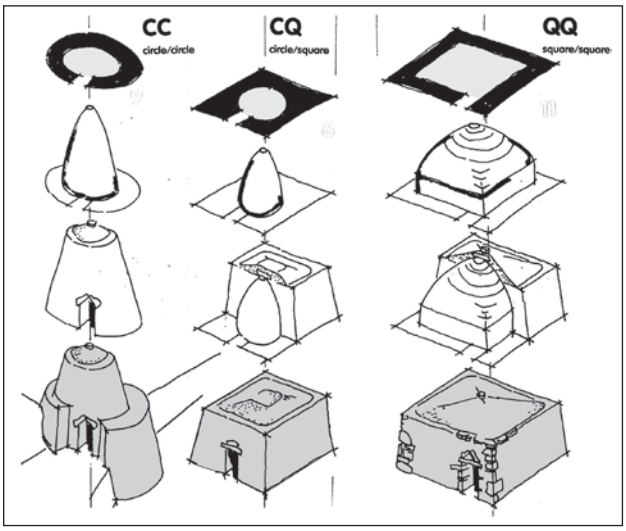

Image 9: A circular outer shape of the groundplan can also have a circular inner surface. Square or rectangular groundplans can have circular or square (rectangular) surfaces. A circular shape outside with a square inside cannot be found on Malta.

all countries: Corbelled Domes (more or less all corbelled constructions in Europe; Loebbecke, 2012), Cabane en pierre seche in France for French cabanes (Lassure & Repérant, 2004), Tholoi d'Italia for Italy (Miosi, 2012) and Hiška in Slovenia (Juvanec, 2016). Other books or articles cover only partial questions within regional borders.

Important articles about giren were also published by Carol Jaccarini (Jaccarini, 2002) and Ernest Vella (Vella, 2013), with detailed reports and photos of these interesting objects.

Giren appear in the northern part of Malta and the southern part of Gozo. Some objects stand alone in the terrain – above all shelters for herdsmen, shelters for animals are incorporated into walls or have yards, enclosures (Vella, 2013). Those open spaces are designed without any order, or have circular or rectangle groundplans. The structures are devoted to feeding, controlling, separating young and older animals and, of course, their safety.

The construction

Although the building of a girna appears deceptively straightforward, it is in fact an elaborate piece of workmanship that requires good planning, considerable skill and much patience (Fsadni, 1998). The technique used is that of corbelling, in which successive courses of dry rubble are laid horizontally, each layer projecting slightly inwards above the previous one up to the desired height, until the opening is finally closed with a few slabs of rock

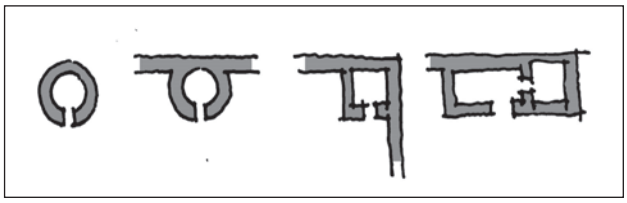

Image 10: Giren can stand alone in terrain, in the wall or can be built into a wall, with several outbuildings for animals.

(Jaccarini, 2002). This is the principle: in reality there are two layers: bearing construction and covering – inside and outside. Overused material – especially with square structures with a circular groundplan – is used to direct all stresses to verticality. Drystone supports only vertical stresses.

Groundplan

Constructions in drystone can normally be found as single-cell objects. They can be composed together, one to another, without any inside connection. Multi-cell compositions, with which cells are devoted to special species or for differentiation of them, are rare: in trullo, Apulia, animals are separated by height (donkeys, swine, chickens), in Croatia (bunja, Dalmatia) by age (younger animals are smaller and also need smaller cells; Juvanec, 2016).

There are three systems in Malta: circle in a circle, circle in a square, square in a square – whereby the square can be prolonged into a rectangle.

A girna stands alone in a pasture, in a wall or uses the wall for composing one or several enclosures.

The shape

The construction needs stability. Vertical wall can be built with real verticality only with exactly hewn stones. If not, the walls have to be leant inwards. This is the first characteristic of a girna construction.

The shape of a circular girna, using this typology, is a truncated cone. A cubic girna is never a real cube: theoretically it is a truncated pyramid. The inclination is of course minimised.

The stepped construction of a circular girna is the result of an abundance of stone. The most widely used stone is frost-shattered outcropping limestone, depending on the geology of the area (Vella, 2013). Clearing a pasture is also needed after the finished giren. The abundance of stone can be constructed into a separate structure (without any use, but a depository of redundant stones: Lassure & Repérant (2004) mentioned 'le clapas', Juvanec (2016) 'grublja' in Slovenia). A second possibility is to make a secondary wall around the object. This wall has no constructional connection to

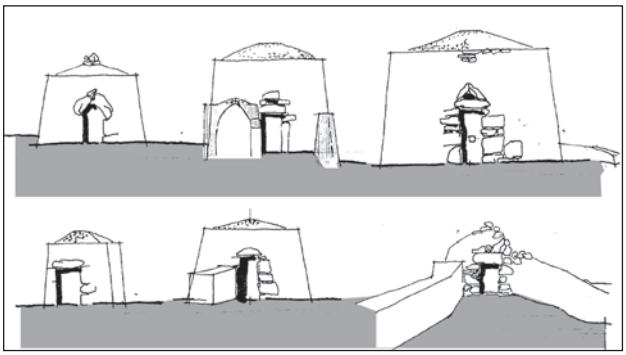

Image 11: Several objects have several shapes of groundplans and elevations. The last has a smaller entrance, devoted to livestock.

the primary wall, it is added later, but seems to be a complete composition of a stepped girna (Ghajn Tuta at Red Tower; Juvanec, 1995).

Proportion systems

Jaccarini noted that 'a recent analysis of the primitive stone shelters of Europe, including giren, indicates that there is a mathematical relationship among the various key dimensions of each of these structures (Jaccarini, 2002).

The widely used proportion system, the 'golden section', as the 'human proportion', seems very complicated, but it is not (Juvanec, 2009a). It also appears in giren as structures in Ghajn hadid, Ix-Xaghra I-Hamra 1 and 2 (Juvanec, 1995).

The most widely used proportion system is a square with its diagonal, equal to the square root of two, if the baseline is equal to 'one'. Squares, rotated by 45 degrees, follow this relation, as the central point of a circle.

A rectangle with width equal to the square root of two (if the height is 'one') is also frequently used. It uses the diagonal of the square and is very simple to compose.

The golden section appears first of all in the human body. Giren are built by human beings, so this proportion system can be understood.

While a square and its diagonal can be composed simply with primitive tools (a wire or sticks, composing a right angle), the golden section can only be the result of the human brain.

Irregular plans are rare and can be seen only as animal shelters, in Malta as pigsties, where the walls have several widths. Even those constructions may have been built as reconstructions of older buildings, on collapsed objects and their ruins.

Specialities

Italian trulli can be found with staircases to the top – because of drying fruit. The same composition is rare in Malta, but it exists near Cirkewwa.

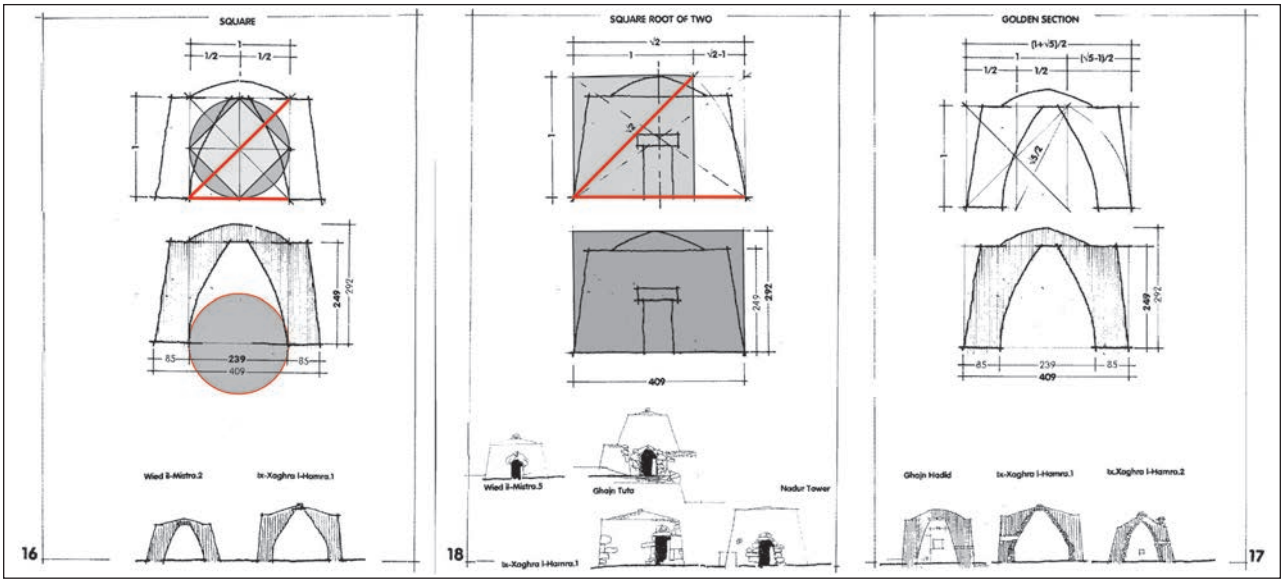

Image 12: Proportions on the basis of 'averaged girna', calculated as a composition of averaged dimensions in the documentation (Juvanec, 1995). Found proportions:
a Square (or circle in groundplan): Wied il-Mistra 2, Ix-Xaghra I-Hamra 1
b Square root of two: Wied il-Mistra 5, Ghajn Tuta, Ix-Xaghra I-Hamra 1, Nadur Tower
c Golden section: Ghajn Hadid, Ix-Xaghra I-Hamra 1, Ix-Xaghra I-Hamra 2.

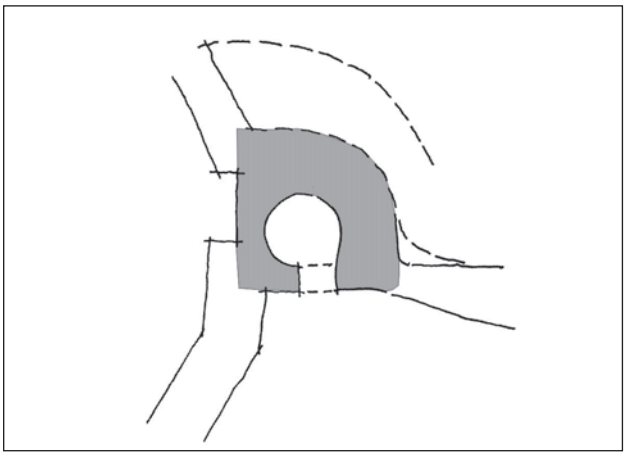

Image 13: A very rare structure without any order shows the exact circular construction of corbelling, although the walls are built without the same widths. These structures were used for livestock.

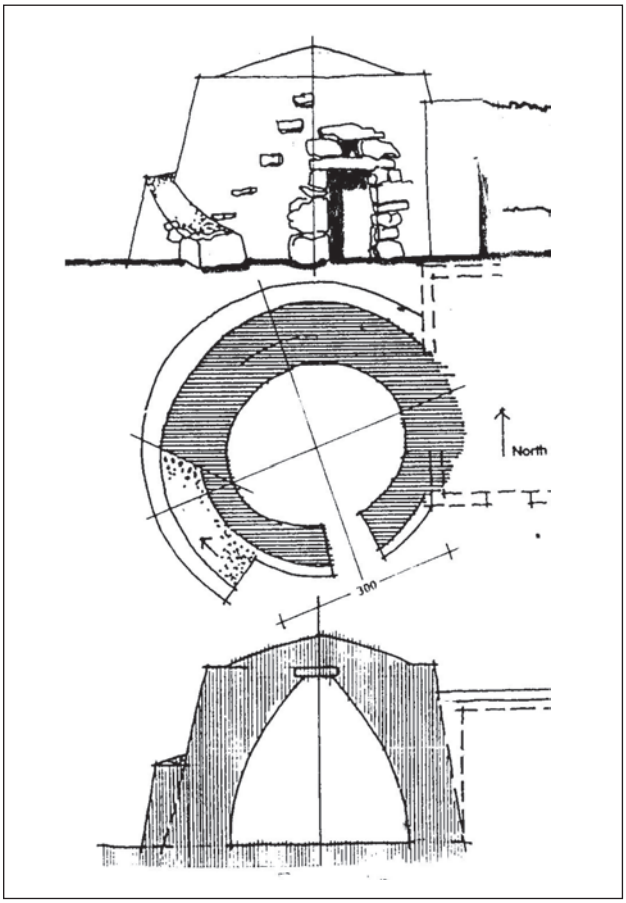

Image 14: In 1995, I met the owner of the girna at the object. I asked about the two constructions, and the man said: 'Oh God, I was young and I used to climb by the steps. Now I'm old and I have to mount slowly around the girna'. Clever mind.

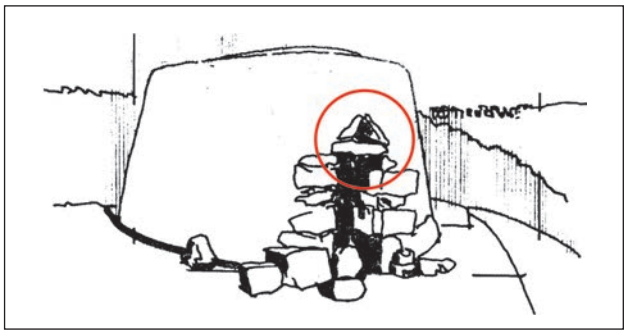

Image 15: A window appears above the door opening: composed of a lintel or made of two flat stones, making an opening in the shape of an 'A' (Mistra, Mizieb). Some giren also have this detail for the main doors.

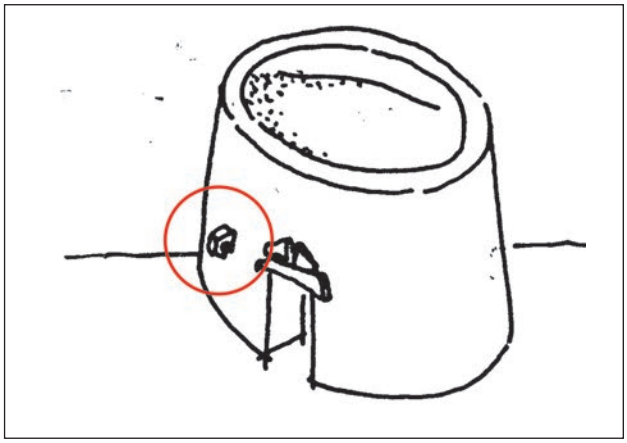

Image 16: The sling is used for tethering the donkey while the farmer is on the field or sleeping after working in the girna (near Nadur Tower).

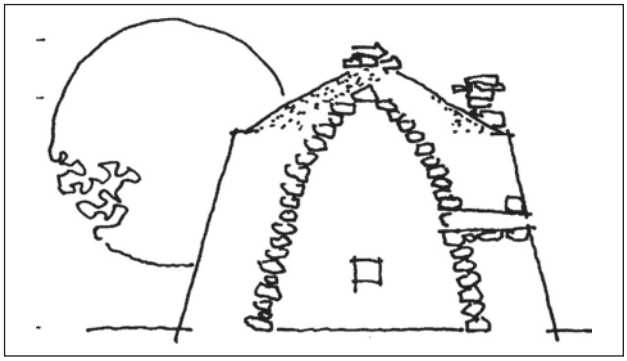

Image 17: Where appropriate, there is a window, especially in hard of access areas, more on Gozo than in Malta. Openings are directed to the most dangerous parts of the pasture, rocks or precipice, to keep an eye on the flock. The unusual position (height from the floor) of the window is understood as such (Ix-Xaghra I-Hamra).

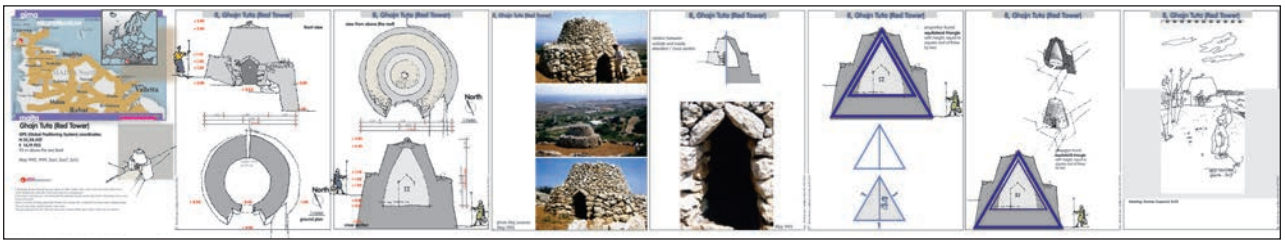

Image 18: Basic documentation consists of several sheets: the first has a map, GPS data, description and a sketch. The technical part has a groundplan with all dimensions, cross section, elevation and view from above. Photo documentation shows the object from the outside, inside and if possible from above (aerial photography, with drone), the next sheet contains details. Proportion analyses as laboratory work, are an important part of documentation. Finally is there a sketch, a hand drawn picture. Documentation can consist of some ten sheets, depending on accessible material and the object's importance. This example is Ghajn Tuta at Red Tower.

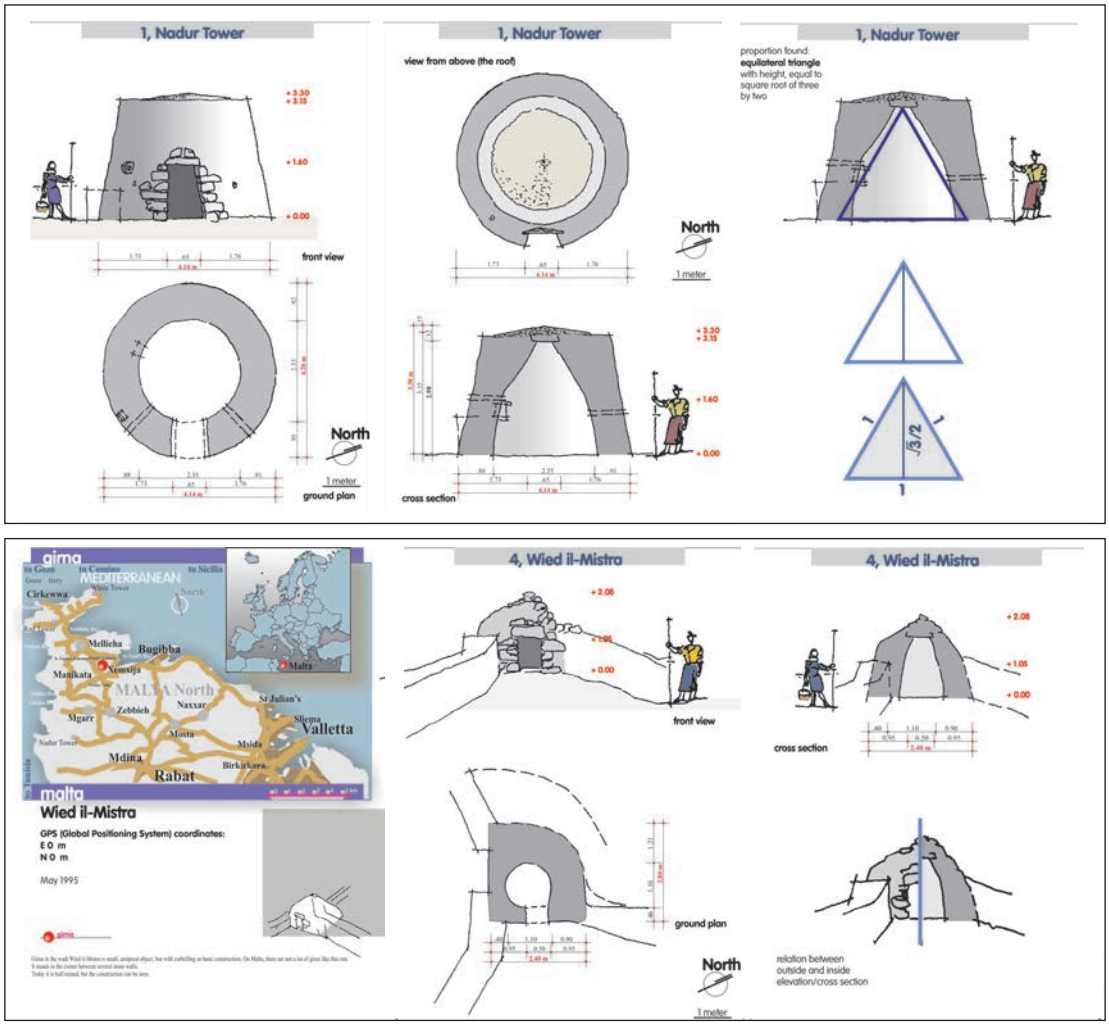

Image 19: A/ 1 Nadur Tower. The typical truncated cone with a height of 3.30 m stands alone on karstic terrain. An extremely good construction in half hewn stone. Near the entrance can be seen the sling for a donkey. a/ elevation and groundplan, b/ view from above and cross section, c/ proportion found: square root of three, divided by two in an equilateral triangle, 1995. B/ Wied il-Mistra. Irregular shape of the girna in the corner of the yard. a/ first page with basic data and map, GPS data, b/elevation and groundplan, c/ cross section and elevation-cross section, 1995.

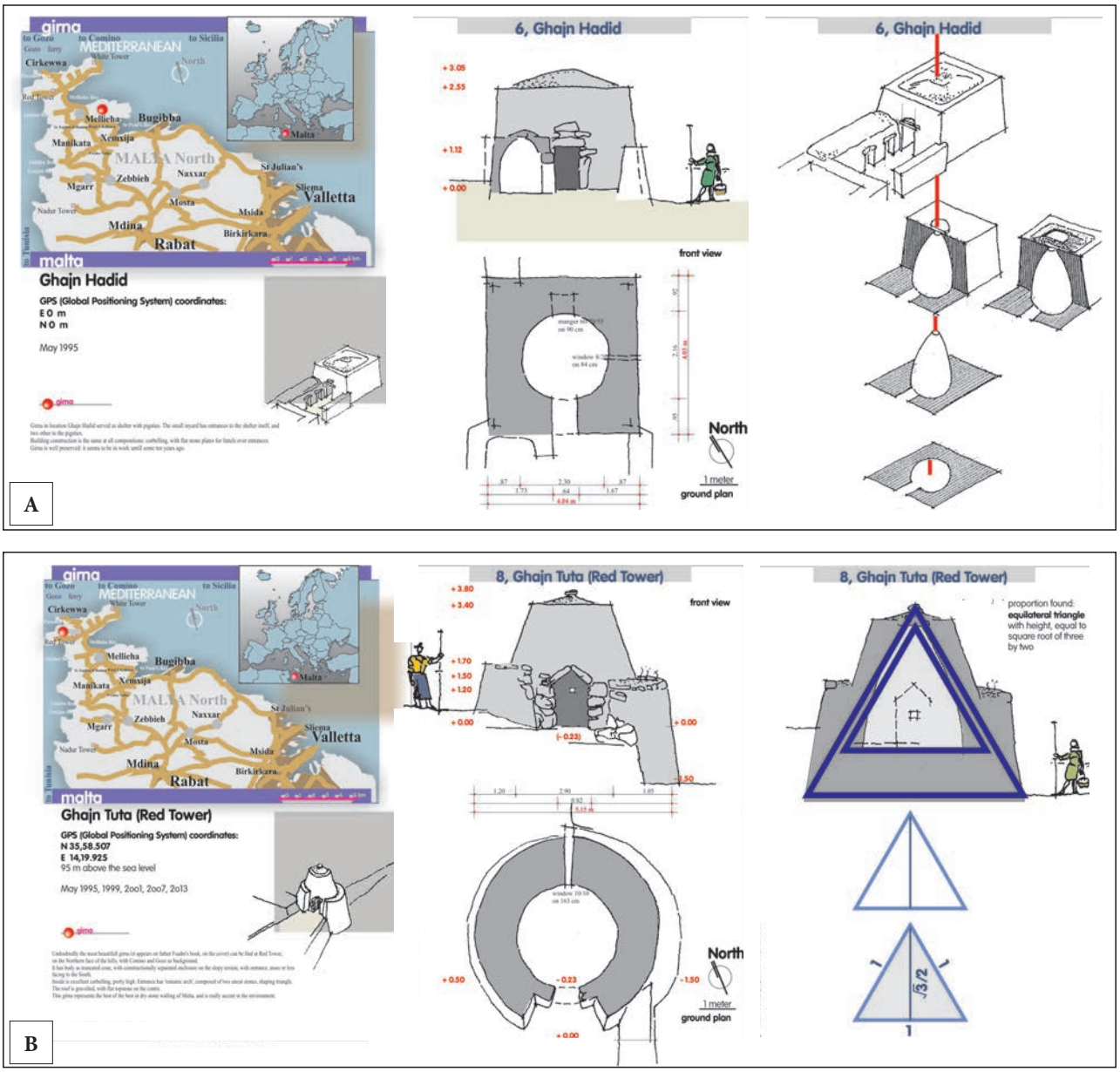

Image 20: A/ 6 Ghajn Hadid. Girna with pigsties (also in corbelling). a/ introductory page with basic data, b/ elevation of the girna and cross section of pigsty. c/ 3D view, 1995. B/ 8 Ghajn Tuta (Red Tower). The most remarkable girna, with double walls. The second wall has been added and is not part of the basic one. a/ basic data, b/ front elevation and groundplan, c/ equilateral triangle in cross section, 1995.

A circular girna – today stands connected to a utility building in concrete – there are both a spiral on the left and a staircase on the right side.

Details

A lot of details appear on giren. The most interesting are the entrances: they are normally covered by a lintel, but in some places there is a small window over the door opening. It is used for light if the door is shut.

Some in-built fittings in herdsmen's shelters are added as needed. The simplest object for this purpose is a niche or a shelf. Animal shelters are without those elements.

Documentation of giren

Documentation, including architectural plans with all dimensions and details, photos, plans of action, all data about the location and testimony of local people – owners, builders and users - are of extreme importance.

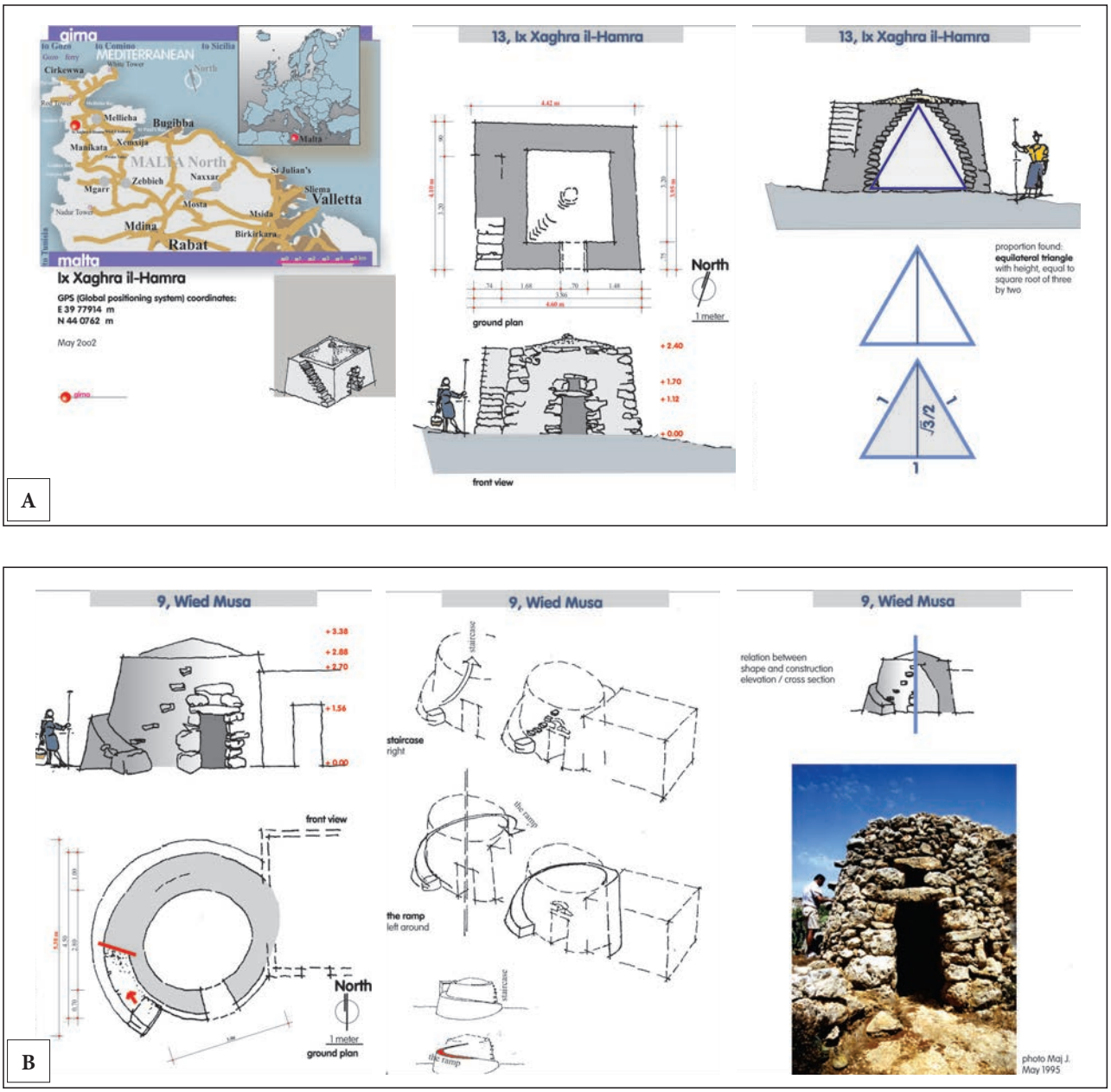

Image 21: A/ 9 Wied Musa (toward Cirkewwa). A girna with flat roof for drying figs. a/ front elevation, b/ principles of the spiral and staircase, c/ elevation – cross section and photo, 1995. B/ 10 Ix-Xaghra il-Hamra 1. A girna with square groundplan outside and inside. a/ elevation shows the entrance by the right wall, b/ view from above and cross section, c/ 3D cross section and photo, 1995.

Jaccarini wrote in better English than I can do that this knowledge is needed for increasing public awareness of these long-forsaken vestiges of our agricultural past, and it would help to respect and safeguard the unique natural and constructed heritage of the beautiful locality (Jaccarini, 2002).

Architectural documentation consists of technical drawings (groundplans, cross sections, elevations, details), photos and videos, written oral presentations). A description and GPS data must be included. Architectural documentation is the work of several professional disciplines, devoted to different users.

The documentation of the Institute of Vernacular Architecture, Ljubljana Slovenia (Borut Juvanec) from 1995, 2006 and 2013 consists of 15 architectural plans of giren on Malta, 2 on Gozo, 2 wells, 1 dura and 1 ruffjana. Eleven plans from 1995 were supervised by Father Mikiel Fsadni, author of the book The Girna.

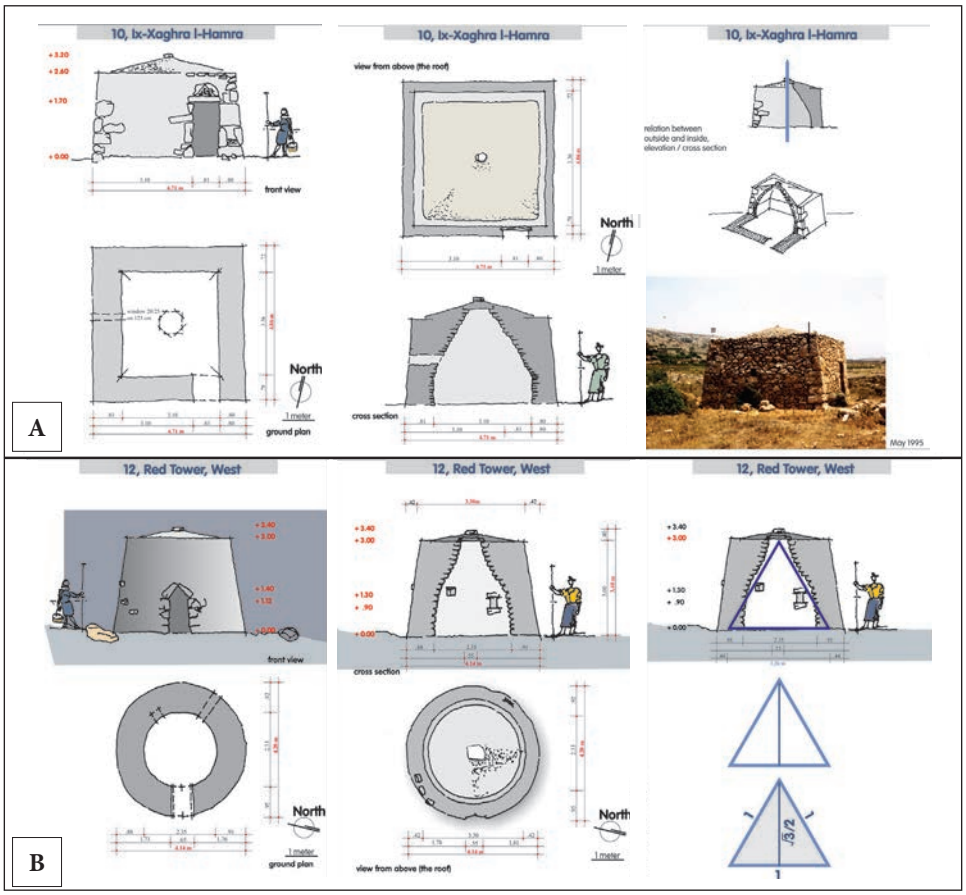

Image 22: A/ 13 Ix-Xaghra il-Hamra 2. A girna with a straight staircase on the left side. a/ basic data, b/ groundplan and front elevation, c/ cross section and proportion system (equilateral triangle), 2006. B/ 12 Red Tower. A girna in the shape of a truncated cone with two stone plates instead of a lintel. a/ elevation and groundplan, b/ cross section and view from above, c/ cross section with proportion system, 2006.

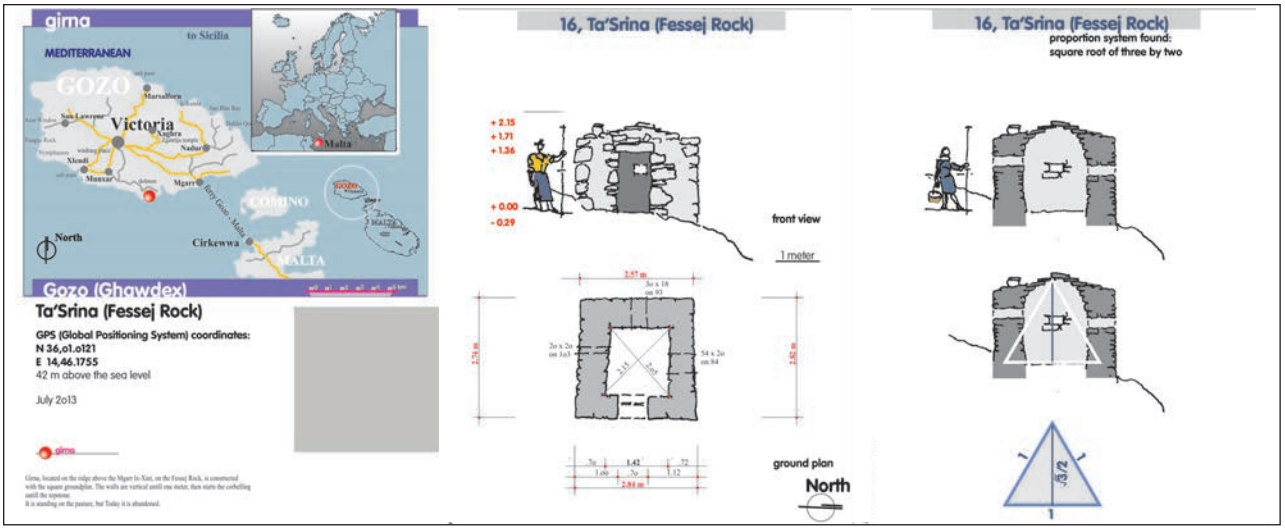

Image 23: 16 Ta'Srina (Fessej Rock), Gozo. A girna on steep terrain with windows on all three sides, for monitoring the flock. a/basic data and map, b/ elevation and groundplan, c/ cross section and equilateral triangle, documentation 2013.

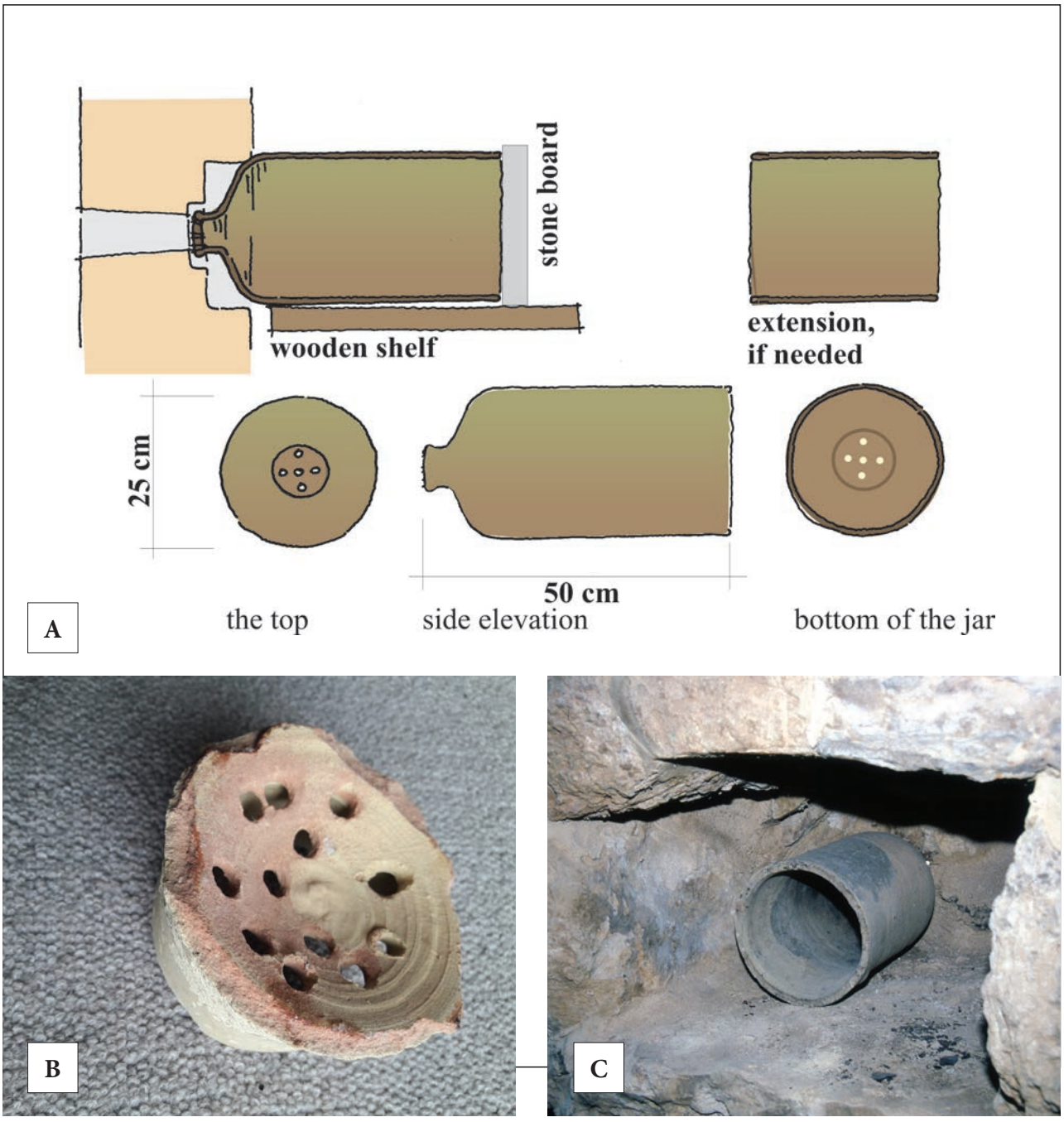

Image 24: A/ Beehive as a clay jar in Malta, technical drawing (Red Tower, 2002). B/ A beehive mouth with 12 holes. C/ beehive from behind, Red Tower (2002).

A selection of typical types of giren follows, with the numbers of documentation from 1995, 2006 and 2013:

The public visibility of the documentation is very important, in the form of articles and books, also TV and social networks, and in scientific, professional and popular treatments. Special treatments are needed for younger generations, with a simplification of problems for education.

MIGBHA, MGIEBAH (APIARY)

The Roman name of Malta was derived from 'meli', the Greek word for honey. The existence of beehive huts on the islands thus has a long tradition. The oldest documents mentioning honey production are from 1472 and 1579 (Jaccarini, 2002).

Image 25: Northern part of Malta with beehive caves.

Today, swarms of bees are provided with hive-boxes, which can be arranged in rows. This is practical, but historically, beehives have been made of wattle, cork (Spain) and clay (as a tube). Such beehives are well known from Assyrian times and are still in use in Yemen (Juvanec, 2010).

Circular clay tubes can be found in beehive caves in Malta, and their construction is strong enough for heavy and brittle beehives made of fired clay. The clay beehive has entrances on one side as several small openings in the mouth (every opening is big enough for one bee only).

There are several types of beehives. The simplest is spreading wooden hives on the ground – with no proper structure. This type is used in the 'transport beehive craft', also today, especially in the Mediterranean.

The second type is a beehive wall, whereby the hives are placed in holes. These walls can be arranged on terraces – for instance in the island of Brač, Croatia, where 240 beehives can be found around a monastery (Juvanec, 2010).

The third system is a stone beehive hut, made from a single piece of stone, hewn for several beehives (Apulia).

The modern beehive hut is more or less in wood. The most interesting is the beehive hut in Slovenia, in which all the dimensions are the same: the object is contained in a cube. It is divided into three parts: one is covered, but with an open space for the bees, the second part contains the beehives, and the third is for the beehive keeper (Juvanec, 2010).

In Malta, beehives objects in stone can be found.

Rarely, objects are built with smaller stones, on the ground.

Beehive caves are more often hewn into the rock directly.

The most interesting is the system in which the cave is hewn into steep rock is the most interesting. The stone prisms, as 'collateral material', are built back into the vertical wall, shutting the cave. Beside the door, there are only openings for the beehive mouths, which is only visible on the elevation.

Inside are built small cells, covered with an inverted v-pointed 'arch' with shelves. The beehives can be elongated – if necessary, or they are shut with a flat stone.

A very interesting thing happens over the course of time: water leaks from the upper positions downwards and a calcareous sinter forms a bond between the stones. The compound wall becomes naturally a single piece with the object again. It looks like natural rock. Nature is a really wonderful thing.

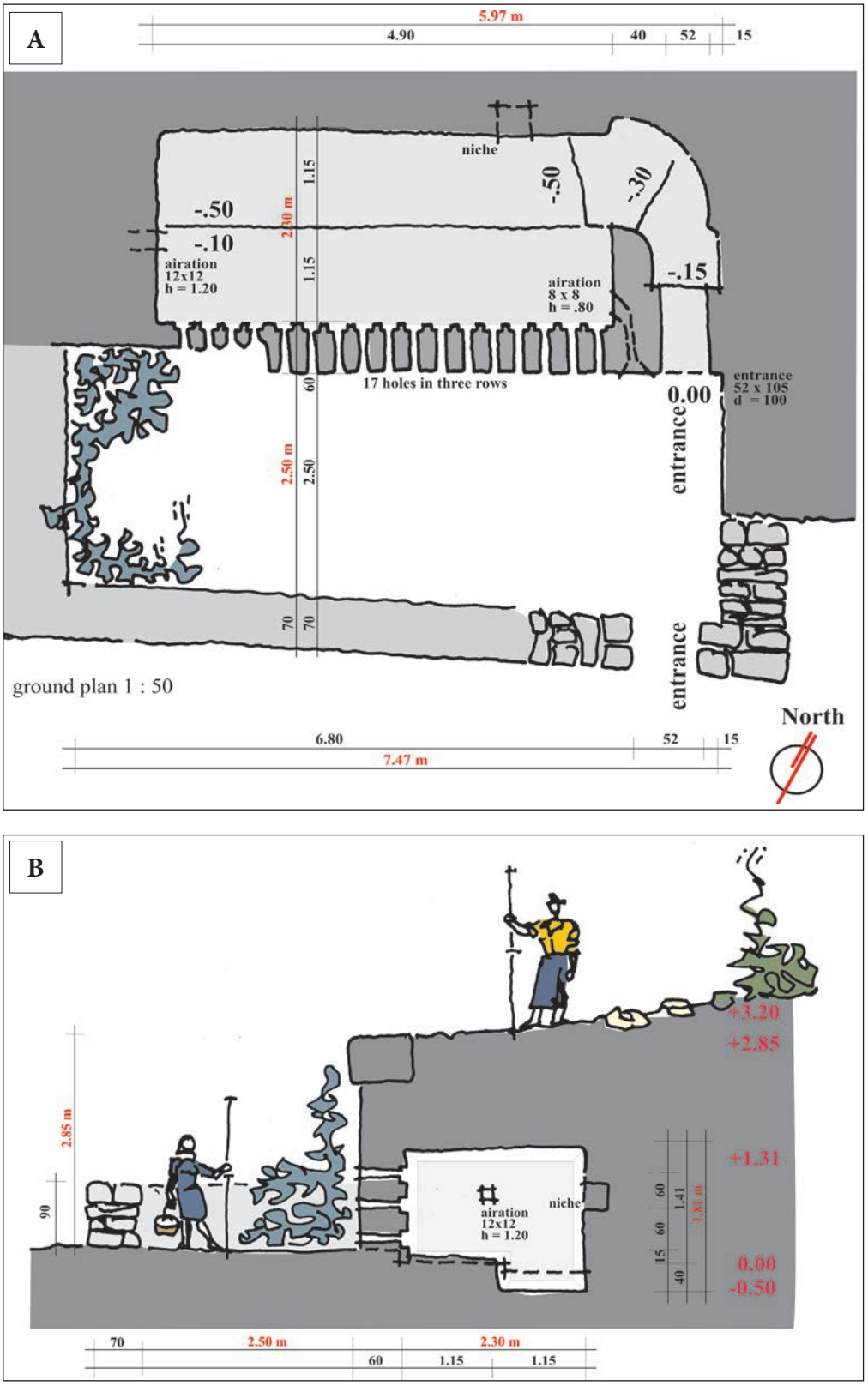

Image 26: A/ The beehive cave with yard faces southeast on steep terrain. Over the 'roof' is a green pasture, around it grow meadow plants – as far as possible on stony terrain. B/ Cross section of the beehive cave shows the natural calcination of the built wall.

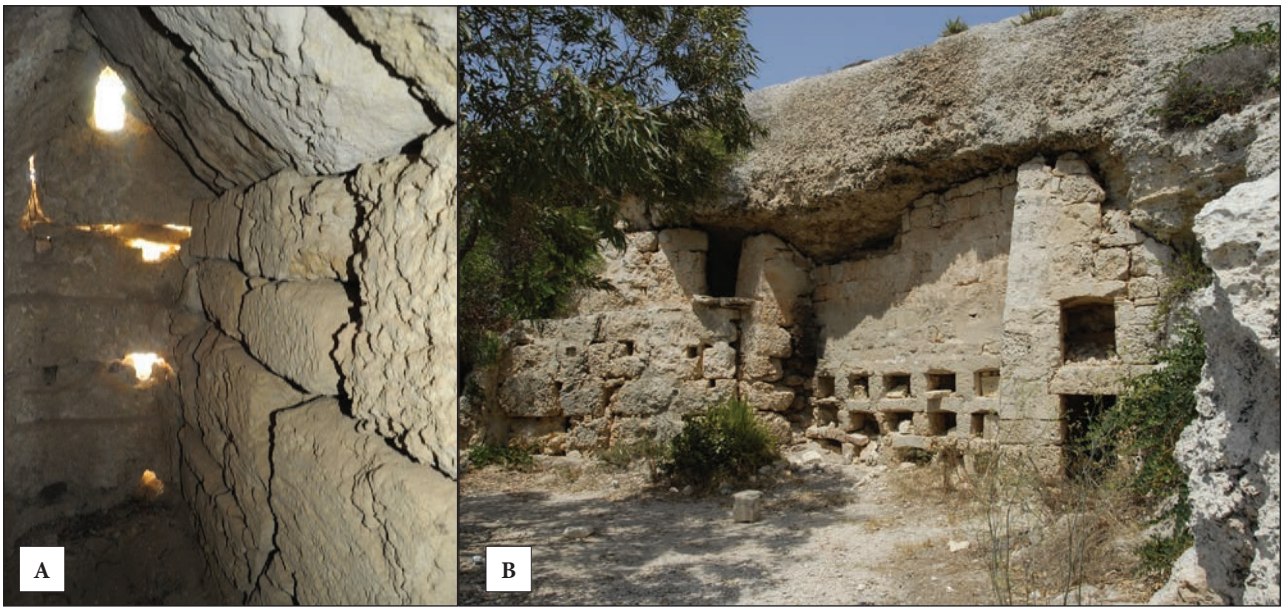

Image 27: A/ Inside can be seen the cell, the shelves are missing (Red Tower). B/ It is hard to get a real view of the beehive caves. They are certainly invisible from the plateau, in front of them is a hundred-metre drop to the sea (Red Tower 2).

The documentation of the Institute of Vernacular Architecture consists of seven objects: Mgiebah Valley 1, 2 and 3; Mellieha, Zejtuna and Red Tower 1 and 2.

Three of them are preserved and in more or less good condition: Mellieha Valley (Zejtuna) and two of them near Red Tower.

The abandoned beehive cave in the Mellieha Valley, by the road to Zejtuna, has an 11.27 m2 main room and three rows of 17 beehives, all together 51. The room has two aeration holes, the floor is 0.5 m lower than the yard.

This beehive cave had wooden shelves, but in the objects near Red Tower there are stone shelves, which are covered by an inverted v-pointed 'arch'.

The second beehive cave near Red Tower lies under a plateau, hidden in steep terrain, looking out over the sea. It has a typical construction and only the entrances for the beekeeper and the bees can be seen.

Today, wooden beehives are in the shape of a box, standing alone in the terrain, without any structures like beehive huts in other countries. Both the history and the architecture of beehive caves in Malta are important, not only for the local culture, but because they are unique objects in beekeeping. Their protection in practice and in law are strongly needed, especially at a time when this architecture is disappearing. Publishing the problem is just a first step.

WELLS AND WATERWAYS

There are several types of waterwells: for humans and animals, irrigation and as religious objects. The Nuraghe culture in Sardinia consists of very important wells (Juvanec, 2014). There are two types of water systems in Malta: individual underground systems and the public irrigation system.

Individual underground well

Malta has a very dry climate and water is needed for the rare fertile tilled ground between the stones.

Image 28: A basic object for watering small gardens and fields is a basin. a/ It seems there is a natural water source: there is not. The hole is visible, big enough for a man and for maintenance. An open basin has strong evaporation – this means loss of precious water (1995). The basin is today covered, the inspection hole is surrounded by concrete bricks (2013).

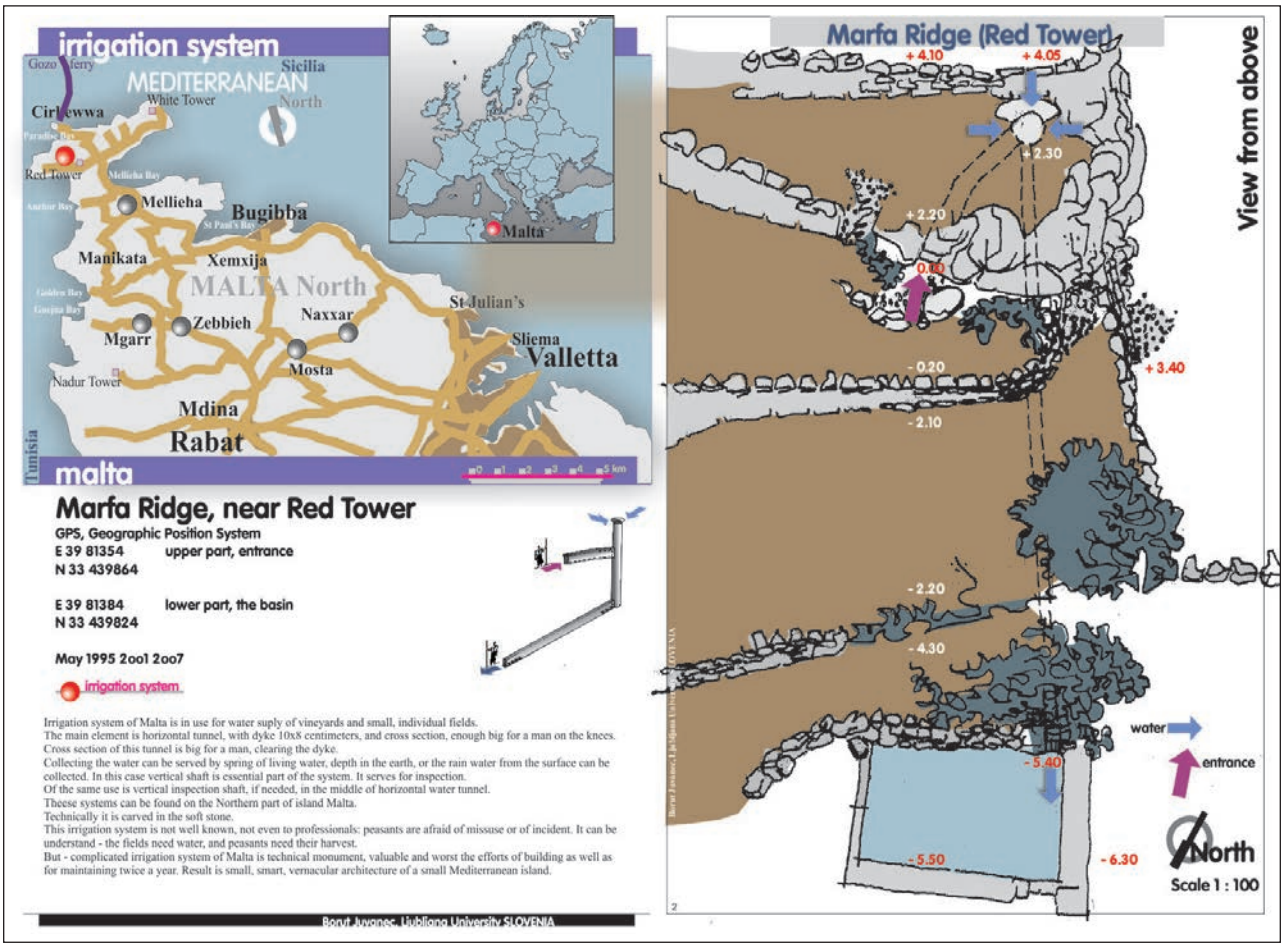

Image 29: The collecting holes are hard to find, they are covered with stones, and only the owner knows where they are (Marfa Ridge behind Red Tower).

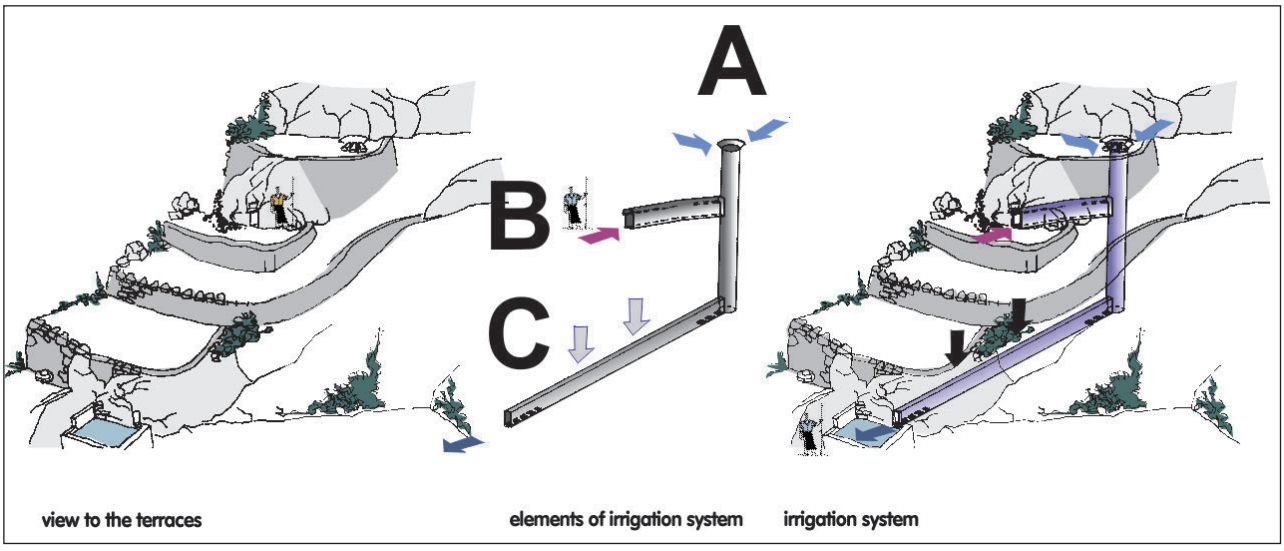

Image 30: The system consists of a vertical shaft, horizontal channel and a basin. Inspection openings are on the top A, with horizontal tunnel B and holes in the terrain C.

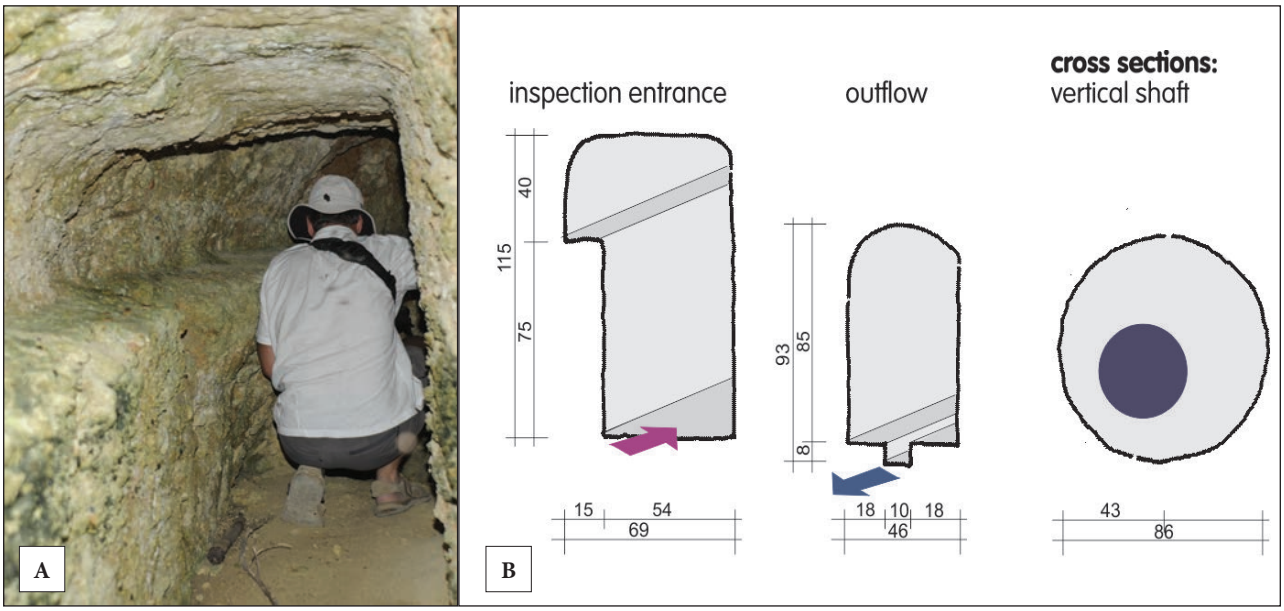

Image 31: A/ The horizontal tunnel to the vertical shaft is hewn in the rock. Its profile shows a tight fit for a farmer with tools in his left hand. B/ Details show their well-considered shapes: the tunnel, horizontal channels and the shaft. The tunnel is tight, but 'comfortable' for a man with his tool; the channel is only big enough for the farmer on his knees, with the waterway below (which has to be cleaned every year); the shaft is circular with steps inside.

Maltese farmers have small parcels of soil, needed for cultivating vegetables, far from their homes – wherever it is possible. A girna is understood there as a field shelter. Where possible, every piece of field is equipped with a basin. It seems that the source of water is next to it. This is not true – or only on very rare occasions.

The source of water is a very complicated underground system. Hard to see, there are several openings for inspection and maintenance. There are three types of such holes: the top hole is covered by stone plates, indicating its position. An intermediate horizontal tunnel enables entrance to the vertical shaft in the middle. There are also holes located over the horizontal channel, for maintenance.

These well-considered water systems for precious water are hidden in the natural stony terrain. Only the owners now where they are. The system shows all the intelligence of our predecessors. We have to preserve it carefully as our precious heritage.

Image 32: The dikes are open for cleaning and for monitoring.

Image 33: A stone container with water and fish can be seen. The water is drinkable (it was tested in 2013 by the author's team).

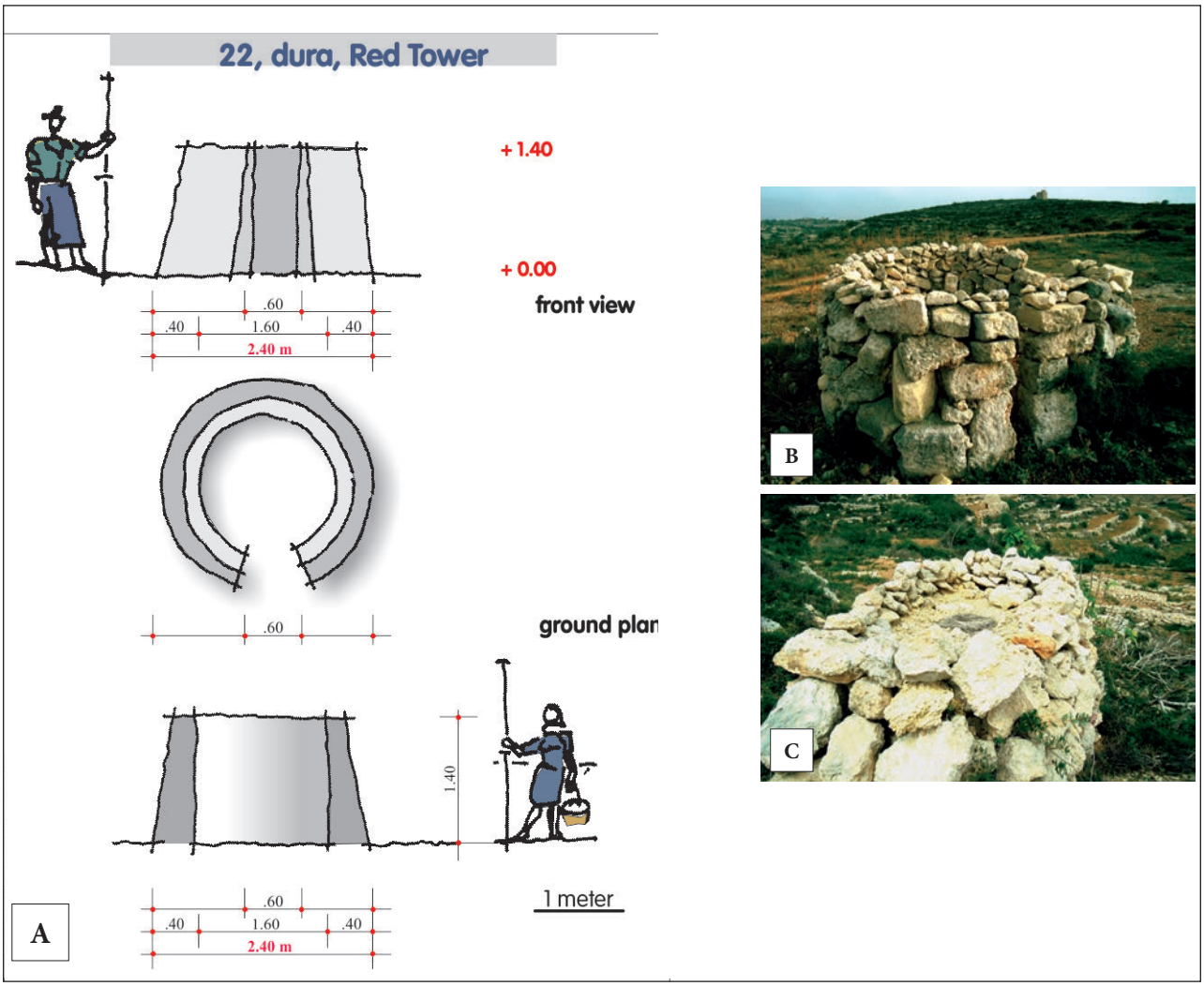

Image 34: Dura, A/ drawing, B/ photo, C/ A ruffjana seems to be a heap of stones to people, but is easily noticed by birds of the bait.

Public pipelines and irrigation system

There are numerous individual gardens for vegetable under the vertical ridges of northern Gozo. The sunny position in the morning and shade in the afternoon are prefect conditions for this natural agronomy. Water is needed for this rural economy. A communal pipeline leads from the upper plateau to the seashore by pipes, and individual dikes in stone are made from the general pipeline.

There is not enough pipeline for all customers: each farmer can use water only every second day, and water has to be stored for further use. Basins are needed.

The simplest basin is an open circular tub. Fresh water is needed and an open object can also easily be poisoned. The idea of using fish to test it is brilliant. If they are alive, the water is not poisoned and can be used for watering the gardens, also for drinking.

HUNTERS' ARCHITECTURE

Hunters' structures can be used for active or passive hunting. Such structures are needed because the terrain is not overgrown, and because of the large number of small wild animals, mostly rabbits.

Dura

A dura is just a hunter's screen, for hiding from animals. It is constructed as a wall at approximately one meter, normally with a circular groundplan. The hidden hunters wait there for rabbits and birds. Today the duras are normally covered with a canvas roof, because of the hot sun.

Ruffjana

A ruffjana is passive bird trap. It has an oval groundplan, with a height suited to man. Small branches are put in, with some food as a bait, and glue. The birds try to catch the bait, but the quicker hunter can catch entangled animals.

Xbiek

A xbiek is an active bird trap. The hunters, hidden in a dura, spread a net of hemp rope and sticks. They set bait inside, and catch the feeding bird with a sudden pull.

PROBLEMATICS

Drystone architecture in Malta exists today as an important monument to our heritage. Giren, mgiebah, well systems, as well as hunters' structures still stand, but only a few of them are vital, in use. The stone compositions are hidden in the stony environment, and of interest only to a few professionals. Those phenomena, as important architectural heritage, need more actions for raising pride in the local culture.

The problem of Maltese culture can be found in its self--sufficiency – in both geography and in the history. It seems as closed, introverted culture, but is not. The rich vernacular architecture is especially insufficient scientific elaborated, in contrary to some other fields. There can be found impressive baroque studies in the Universita ta Malta with professor De Lucca, some important archaeological works exist and besides this plays Xpeditions an important role. Xpeditions, as international anthropological workshops started in 1985 with Dr. Marc Vanlangendonck and works till today, connecting theory and practice on international level. The stone architecture, as the most visible part of the culture, seems to be hidden in the landscape, forgotten in the mind of local people and missing in the scientific circles.

CONCLUSIONS

Malta contains enormous number of architectural monuments – from the pre-history till today in all the fields of architecture: from religious objects to vernacular architecture in drystone.

Local people know about the objects and the ruins. Their recognition with the help of professionals is the first step, an inventory is the second. Valorisation and documentation of all objects must be done by professionals. Their task is renovation, reconstruction and protection in practice and by law.

A book with documented drystone architecture of this type would also be welcome. To start with, it is possible to create a folder with basic data, a map and graphic material – of course with a professional description of the construction system and the typology. Boards with short texts would be encouraging for both the local people and visitors from abroad. Tourists in particular are very interested in this knowledge.

Education has no limits. The simple constructions in stone, composing a false dome, are a good example of using local material and a wise brain, especially in comparison to classical architecture from prehistory. This is important not only for schoolchildren and students, but for the wider public, also for professionals. Entry into the UNESCO List of the Intangible Heritage in 2018 is of great importance for this purpose.

Image 35: Girna at Ghajn Tuta, one of the most beautiful giren on Malta.

VERNAKUALRNA ARHITEKTURA MALTE

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POVZETEK

Osnovni namen članka je razkrivanje skrite, pozabljene in neznane arhitekture Malte v kamnu. Kamen je imeniten gradbeni material. Najpreprosteje ga je sestavljati drugega ob drugega, zgornje plasti pa lahko previsevajo spodnje. Korbeling je prostorski sistem previsevanja okrog navpične osi in tvori nepravo kupolo. Vernakularna arhitektura Malte je namenjena občasni zaščiti človeka, živali ali orodja. Članek predstavlja avtorjevo dokumentacijo in desetletja terenskih raziskav ter uporablja pregledno, primerjalno in zgodovinsko metodo za razkrivanje vezi s predzgodovinskimi spomeniki iz 4. tisočletja. Malteško otočje je predvsem kamniti svet, mehak kamen, imenovan globerigina, tam žagajo v zidake, obstojnejši in trši kamen s površja pa sestavljajo v korbelingu in tvori prostor. Girna je zatočišče za pastirje in živali, mighba je čebelnjak, vklesan v podzemne jame, zanimiv je sistem namakanja, lovcem pa so namenjeni zakloni kot dura in ruffjana. Vsi ti objekti še kar stojijo, a le redki še vedno služijo svojemu namenu. Kamnite strukture so skrite v okolju, žal tudi v spominu ljudi, celo profesionalcev. Kamnite konstrukcije so pomemben del arhitekturne dediščine in si zaslužijo več pozornosti, skrbi in predstavitev prebivalcem, predvsem za dvig vedenja in ponosa lokalne kulture.

Ključne besede: Malta, vernakularna arhitektura, suhozid, konstrukcija, korbeling, girna, migbha

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