THE ZIBBY GARNETT TRAVELLING FELLOWSHIP

Report by Kelly Murray

Stone conservation

Ceglie Messapica, Puglia, Italy

27th August – 13th September 2015

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1. Introduction

My name is Kelly Murray, I'm 28 years old and British. During the past year I have been studying traditional building skills through the Tywi Centre, Llandeilo, Wales. This began with an introductory course learning traditional carpentry, stone masonry and lime plastering skills. After completing this general course I decided to further study stone masonry. I have recently started a NVQ3 in Heritage Masonry which I hope to complete in the autumn of 2016. I hope to expand my stone masonry skills and understanding of building techniques (both dry stone and using lime and earth mortars) to be able to progress into a career working to conserve our built heritage in the UK, and perhaps further afield. I am interested in the skills themselves, as well as traditional buildings and structures, and hope to be able to contribute to keeping the skills alive, as well as buildings conserved.

I have always been interested in the built environment and while studying Fine Art made work that was often architecturally and sculpturally orientated. A desire to work with and understand different materials and create tangible work, along with an interest in how to live in a way that responds sensitively to our environment, led me to vernacular architecture. A few years after graduating I spent some time in Iceland and I was fortunate enough to get firsthand experience of Icelandic vernacular building traditions. I had the opportunity to work alongside landscape architects and turf builders, who built structures (walls, playgrounds, huts and even houses) from earth literally right beneath their feet. This exposure to using what resources are available in your immediate environment was a revelation and really sparked my interest in traditional building techniques. I feel that it is a pertinent issue as we desperately need to live, and build, in more sustainable and resourceful ways, and perhaps looking to vernacular traditions could help solve some of our current environmental and housing problems. I am also interested in the aesthetics of vernacular buildings which let the materials speak for themselves, and are often not concerned with ostentatious decoration. The pared down aesthetic is something which I find intriguing.

I discovered the Zibby Garnett Travelling Fellowship online, while searching for training and opportunities in traditional building projects.

1. Study Trip

My study trip was to the south of Italy, to take part in a project to conserve a *trullo* (plural *trulli*). This is a limestone building with a conical roof, often dry-stone, found specifically in the Italian region of Puglia. The *trulli* are used for a variety of functions such as dwellings, grain stores, ovens and seasonal shelters for agricultural workers. They were often built in clusters to house whole families, with extra cones added as required.

One of the hundreds of abandoned trulli, found on a walk a few kilometres from Ceglie Messapica.

The project took place in rural Puglia, near the town of Ceglie Messapica. Over time the trullo had been damaged by vegetation growing around and into the masonry, reaching into the outer layer of limestone roof shingles (*chianche),*

which had started to slip. The roof of the trullo needed repairing, and this formed the main part of the project. The work required removing and replacing the *chianche,* with a combination of new limestone *chianche* (all of which needed shaping by hand) and reusing those that could be salvaged.

Before the stone workshop started I spent a few days in Florence and Rome. It was my first real experience of Italy and it seemed like a great opportunity to visit more than just the very southern tip of the country.

I left the UK on 27th August, by train, arriving in Florence on the 28th. I spent 2 nights in Florence and 2 nights in Rome. The trullo workshop took place between 1st-12th September and I arrived back into the UK on 13th September.

During the workshop we also had the chance to visit local sites such as the UNESCO town of Alberobello, known for having the highest concentration of trulli, and the cave dwellings of Matera (European City of Culture 2019), which really complimented the practical building work and enhanced our understanding of the region and its architectural heritage.

I particularly enjoyed the contrast of visiting Rome and Florence, and the grandeur of its architecture, against the more humble and vernacular architecture of rural Puglia. This diversity of building heritage was wonderful to experience. I feel that it is just as important that the trulli and cave dwellings are conserved, as the Colosseum and Pantheon are. It is often that vernacular buildings are overlooked and it was a real privilege to have the opportunity to work with people dedicated to conserving the vernacular built environment of Puglia.

2. Aims of the study trip

The main aims for the trip were:

- Gaining experience in stone masonry, including stone dressing – being able to shape the stone- selecting the right stones, laying them correctly (so as to shed water and be structurally sound) and corbelling.

- Understanding the entire construction of the trulli – the different sections from outer skin, inner hearting and foundations (or lack of).

- Understanding the whole process of a conservation project: from evaluating the building's state, dismantling, assessing the damage and how to repair the structure, to physically rebuilding the structure.

- To broaden my knowledge of the vernacular architecture of the region and understanding its development and context. For several years I have been fascinated with trulli - the design, aesthetic, building methods, and historical reasoning, and I was keen to learn more about these buildings.

- Understanding how a multi-disciplinary and international team work together on a conservation project, with challenges and advantages of different professions, cultures and languages. I was intrigued to work with a diverse team, with masons (both local and visiting masons) and an architect working on site together. I hoped I could learn from this collaborative approach.

3. Costs

The total cost of the trip was £1732.75, of which £1300 was generously awarded from the Zibby Garnett Travel Fellowship. The additional costs were raised through a combination of savings and from working on a stone barn conversion, locally in Wales.

4. Puglia

Puglia is a region in the south east of Italy; it is the heel of the boot shaped country. It borders the Adriatic Sea on the east.

Italy in relation to Europe and Africa. Image courtesy of
http://www.worldatlas.com/webimage/countrys/europe/it.htm

Puglia in relation to Italy, and main towns of the region.
Other places we visited are underlined in green. Image courtesy of
http://pugliavillamartina.com/puglia/

Puglia is largely a rural region with a rich history. It was settled by Ancient Greeks, and conquered by the Romans, the Normans and was once part of the Austrian Empire. This is reflected in the many dialects used across the region, with their origins in many other languages. Italian is often spoken as a second language.

While I was in Puglia it was described by a local person as the 'land of abundance, resilience and resourcefulness' which I think captures the essence of the region perfectly. Despite having a very limited soil profile (see following images) and very dry summers, the area boasts a vast array of produce. The region produces much of Italy's olive oil and the land is scattered with fig, almond, prickly pear and pomegranate trees. Vineyards are common, as well as small vegetable gardens, aiding self sufficiency.

The Murgia and Salento regions, in between which Cegile Messapica lies, is also known as 'the land where stone grows'. A field is rarely seen as clear bare soil; there is always stone. It is within this abundance of limestone that the trulli's origins lie; a readily available building material, sometimes not even requiring quarrying.

'The land where stone grows': recently turned earth around olive trees showing the masses of stone that come to the surface.

Rock bed and very limited soil profile, found throughout the region. It is surprising how much flora thrives on such limited soil.

5. The Team

The workshop was a collaboration between American stone mason Thea Alvin (My Earthwork), local trullaro (the name of a person who builds trulli) Mario Santoro and architect Amanda Roelle (Archistrati). For the practical work Thea Alvin was our main monitor, though the whole project was overseen by Mario. Thea and Amanda translated Mario's instructions from Italian to English. Thea was also assisted by Michael Clookey, a stone carver from the USA.

There were 4 other participants; Lily, a landscape architect from USA; Solange, an architecture student from Switzerland; and Bill and Jackie, who described themselves as 'wall tourists' from Canada. Bill and Jackie's daughter, Emily, also joined for the second week.

It was intended that there would be more people attending the workshop and a second stone mason instructor, Norman Haddow. However, due to the lower numbers Norman did not attend, and Thea acted as the main lead.

6. First few days

On our first day Amanda led a walk around the region, taking us to several different sites with abandoned trulli. This helped us familiarise ourselves with the trulli and its different forms. We saw many variations from single coned trulli in perfect condition to large complexes of trulli at various stages of deterioration.

On a walk, led by Amanda, visiting trulli.

We also visited the work site and had an introduction to the building, the plan for the workshop and proceedings. The trullo which we were to repair dates from the 1870s and this was the first major repair to the structure. It had originally belonged to a doctor from Tuscany (intriguingly we later found old medicine bottles in the stone hearting) and was bought in the 1990s by a local family, Tonino and Maria Grazia Tuma, who now live there, and acted as our hosts for the stay.

The trullo roof had already been removed when we arrived. Originally the plan was for the workshop participants to remove the chianche from the roof, but due to concerns of a smaller team and time, the roof was taken down prior to our arrival.

The trullo before its repair. The chianche had started to slip and vegetation had disturbed the stonework. As a result water had started to ingress and the damage needed halting.

The intense heat of early September, often 35 °c, dictated our working hours. We started work at 7am, with an hour for lunch around 11:30. Depending on the day, progress and other plans, we finished work most days by 3:30pm, with the occasional longer push. This made the working day, essentially out on a roof with limited shade, more manageable, and also left plenty of time for exploring the local area and visiting sites in the late afternoons and early evenings.

7. The Trullo

Shaping the chianche

The first main task and challenge was getting to grips with shaping the stone. This was mainly shaping new chianche for the trullo roof, with a little bit of work shaping some of the old chianche to be reused.

Limestone from a local quarry was used for the new chianche. This arrived in very large slabs, as pictured on the following page. The first task was to cut these

into smaller pieces, and then shape the chianche from them. All this was carried out with a small number of basic hand tools, which are still made locally.

The large trullo roof on the right is without its chianche. On the floor (left) are old chianche which have been sorted into size and thicknesses. Mario is pictured on the right, behind the new limestone, showing us how to cut the large slabs.

With the exception of a bucket and ladders, these are all the hand tools required for rebuilding a trullo roof. The main tool, a 'trullaro hammer' is pictured third from the right.

The tools required were: a trullaro hammer, scutch hammer, hoe, shovel, pick axe and a mason's breaker hammer. I really loved the simplicity of only needing a few hand tools. The main tool was a trullaro hammer which we would become quite familiar with over the course of the workshop. Mario was adamant that the chianche had to be shaped with the trullaro hammer, and would not accept the use of other masons' or bricklayers hammers (such as those I am more familiar with back home). I found this quite an interesting position, with the tools themselves being fiercely protected by the trullaro craftsmen. It left me wondering if these tools have adapted over time to become the most efficient for their specific job of dressing chianche (and thus any new user must adapt to the tool) or whether there was some reluctance to adopt other (suitable) hand tools. It would be interesting to know of other trullaro's views on this.

The trullo roof, once completed, measured approximately 3.4m high, and had a base circumference of 12.5m. It requires a fair amount of stone to cover a roof of this size, thus it meant there was a lot of stone to shape and technique to hone.

Mario explained to us the requirements of the chianche, and how to achieve this. The pieces of limestone varied in thickness and this affected the difficulty of the stone dressing. The first step was to create a tapered shape, with the chianche tapering to a smaller edge at its rear, and having a slightly rounded front edge. It was recommended to draw out the shape first with a pencil, to help as a guide. It is common to make the front edge too rounded, and drawing out the shape helps avoid this, and as a result avoids wasting material.

Once the chianche is cut to its required shape, the front edge has to be dressed so that water will shed off the roof tile. This is extremely important to stop water ingress which would damage the trullo. A bevelled face is cut into the front edge using the trullaro hammer.

Mario demonstrated the technique for dressing the stone and how to use the trullaro hammer, which at first felt unwieldy. The hammer has two sides: one with a square edge and the other with a pointed edge. The square edge is used to shape the stone, with particular importance paid to the angle at which you strike

the stone. This sounds perfectly simple, but in reality was quite a challenge. Mario swung the hammer very freely with one hand, which I struggled with at first and resulted in using two hands for a while. I felt repetition was really important for grasping and improving technique, and despite sore hands (blistering little fingers after the first day) I felt it was necessary to persevere. Like any craft only by doing and feeling can you really understand and tweak your technique. The trullaro hammer is quite weighty and started off feeling very cumbersome, yet over time I started to feel more at ease with the tool and started yielding better results. I also experimented using my left hand, trying to improve its dexterity.

There was a surprising metallic sound when striking the stone with the trullaro hammer. With time my ears tuned to the variations in the sound, which could be heard to change before the stone would break.

Mario demonstrating how to shape the chianche with the trullaro hammer.

Shaping the chianche with the trullaro hammer

A measuring tape against a chianche, for scale. Some as large as this could take up to 30 minutes to shape.

The majority of the first few days were spent shaping chianche. We needed quite a lot of new pieces for the roof and this was the first priority. It was a revelation to discover how time intensive the stone dressing was, and really made me appreciate the workmanship of these buildings.

There were some difficulties shaping the stone, and all of us experienced the limestone splitting into two pieces at times. At first I expected this to be down to our inexperience, but after talking with Mario we learned that he also shared similar challenges. Mario said that the limestone was not as easy to shape, as other limestone he had used from the same quarry. This unpredictable cracking of the stone meant that we had to order some additional material from the quarry.

New chianche starting to accumulate. They are ordered into different thicknesses.

Not to plan: when the limestone splits along a weakness. If the piece was large enough then two smaller chianche could be made.

Laying the chianche

Once we had a considerable number of new chianche shaped we started to lay them and rebuild the roof. There were several things that needed to be considered for this process:

Size and thickness of the chianche

The chianche were sorted into different thicknesses, and it was important to lay the thicker (i.e. 10cm thick) and larger pieces first, so that they sat at the base of the roof. As we progressed with the courses we moved to chianche of 8cm thickness, and then 6cm. Sometimes we needed to use larger or smaller pieces to bridge gaps and jump courses, such as around the door arch or stitching into the chimney (which was left standing as much as possible). As the roof progressed and the circumference became smaller the shape of the chianche needed to be more triangular. This is because there needs to be a maximum overlap between the courses of chianche, and the smaller pieces at the top need to reach far back into the centre of the circular roof.

Old or new

For specific parts, such as around the chimney, old pieces which stitched tightly into the chimney structure were used as they worked well in their original place. Only those that needed to be were replaced. Attention was paid to interspersing new pieces among the old chianche so that visually it was more pleasing. There is an obvious difference in the appearance of the new and old limestone, and we avoided clumping lots of new limestone chianche in one area.

An old chianche on the left and newly cut piece on the right.

With time the new chianche will also change and blend in with the older, but this might take tens of years, as it slowly reacts with the air and becomes a host for lichen.

First few courses of chianche have been laid. View of the arched doorway.

Angle and position of the stone

To ensure that the shape of the roof followed its original contours a string line was used. This ran from the centre of the top of the cone. However, despite its circular appearance, like many other trulli, the cone is not actually a circular shape. It has flatter edges, particularly around the chimney, and is more of a square with rounded corners at its base. The shape here has to be laid by eye. The string line was used to also guide the overlap of each course.

Additionally each stone had to be positioned at an ever so slight angle to aid water shedding, with the rear of each chianche being slightly higher than the front edge. This was done using small pinning stones at the back and sometimes with a bit of mortar.

Particular attention needed to be paid with regards to joints. It is important, as with all building, not to have running joints. When a chianche is laid there has to be a minimum of two courses between any running joints. Selecting the right

stone requires it to fit tightly next to its neighbouring stones, and also to sit well in relation to the previous courses and existing joints.

Each course appears to sit horizontally, however the chianche are laid so that they sit sloping away from the chimney at a slight angle. This is to direct water away from the chimney. Despite being an arid region in the summer, there is high rainfall in the winter months, and it is therefore essential.

View from above. Here you can see that the base of the trullo is not actually circular. The new chianche can be recognised by their lighter colour.

Laying old chianche that can be reused and pinning them at the back.

Hearting

As each course was laid smaller pieces of stone, *scalie*, were packed around the back and in between the chianche. This helps to consolidate the whole structure and add strength. It was explained that the hearting also aids with air exchange within the building.

Tightly fitting chianche packed with hearting to strengthen the structure.

Mario and Thea using the string line as a guide for laying the chianche.

Materials and Mortar

Many trulli were built using dry stone methods and others used lime mortars. While rebuilding the trullo roof we used some mortar, which was lime based, but with an addition of cement. The mortar was mixed by hand and consisted of lime putty, aggregate (made from limestone, finely graded) and cement. Following conservation principles it is not best practice to use a material which would not have been originally used and I didn't quite understand why cement was used in the lime mortar. When I asked it was said that the lime used locally is very pure and therefore the cement helps it set, as otherwise setting would be considerably slow. From previous studies and working with lime mortars in the UK I had understood that it would be better to use a pozzolan (silica or alumina material) to aid the setting, as the addition of cement can compromise the flexibility and permeability of the mortar and make it too brittle. Though the ratio of cement to lime was low, and use of mortar fairly sparing (not every chianche was mortared, perhaps 1 in 4) I wasn't convinced that the addition of cement to the lime mortar was appropriate.

It was striking how few materials are used to build a trullo. Limestone is used for the chianche, aggregate and (after burning and slaking) for the lime mortar. It is essentially a one material building, with the exception of the recent addition of cement. In a land of predominately limestone, it is understandable how these buildings came to be. Edward Allen describes this in his book *Stone Shelters* (p.189) as representing "a way of building which was or is cheapest and most flexible under a certain set of conditions... basically a single material, monochromatic technique."

Throughout the workshop it was often asked why these buildings took the shape they did. One of the reasons understood to have contributed to the trullo developing using corbelled rings (an inner structural cone and outer water shedding layer) is that it requires no wooden formwork. It is thought that timber would have been extremely costly (for large structural pieces) and perhaps there was a shortage of supply. Puglia is filled with olive trees, which grow slowly, and for many are a valuable source of income, and hence not a building material.

Trullo taking shape.

Addition of scaffolding to reach the final courses. On the right the newly installed stairs improving access to the roof.

8. Other projects

Stairs and drain

It was also decided that a staircase would be added to improve access to the roof of the trullo. This has been important historically with roofs used to dry produce, such as figs, or for adding grain to those acting as grain stores. The main steps

were constructed from large new blocks of limestone, and the base support of the stairway constructed from old limestone found on the land. As is common in Puglia, everyone has piles of stone waiting to be used.

There had been a drain in the corner where the stairs were to be installed so it was important to keep the water directed away from the building. The top step was carved into a drain to address this.

Solange and Bill shaping the drain for the top step.

A few of us also spent an afternoon repairing some boundary walls, when space was limited on the roof of the trullo. The walls consume an incredible amount of stone, at places measuring 2m deep, and it is believed that they were constructed to such a size due to the excess of stone laying around. In areas with olive trees growing the ground is kept clear so that when harvest comes the olives can be collected easily, and thus stone has to be constantly cleared. The walls are often not coursed and this was a new way of working to me. As with the trullo you could see colour variations between the limestone that had been exposed to the air, and the inner hearting that hadn't.

Repairing parts of a collapsed boundary wall

9. The completed trullo

Mario lime washing the pinnacle and the rendered capping.

The finished trullo cone, complete with a newly carved ball pinnacle on the top, and stairs.

View from the entrance side to the trullo. On the left is the old chapel with a cross shaped pinnacle.

10. Wider experience

There was a definite warmth to Italy, Puglia and the team we worked with. This made the experience all the more enjoyable. Tonino and Maria Grazia, our hosts, were extremely welcoming and hospitable, as were the instructors, Thea, Amanda and Mike, and fellow participants. It probably goes without saying that, being in Italy, we were incredibly well fed! We stayed in a trullo about a five minute walk from the one we were working on and it was an honour to have the opportunity to spend time staying in these intriguing and visceral dwellings.

Lunch in the shade under the olive trees.

The workshop was organised well so that we had time in the evenings to visit places of interest. We visited Alberobello, which has the highest concentration of trulli and was granted UNESCO status in 1996. There are some beautiful examples of trulli here and many older roofs were built with thinner chianche and are more delicate than most trulli you see. There were also many variations and detail that I hadn't see elsewhere, and many trulli that didn't have a conical roof.

Varying shapes and sizes of trulli, in Alberobello.

We also visited the town of Matera, which lies in a canyon and is home to hundreds of cave dwellings carved into calcareous rock. The centre, known as Sassi di Matera, is a UNESCO site and considered the most intact example of a troglodyte settlement in the Mediterranean. The area was first inhabited during Palaeolithic times. It was an incredible and moving experience to see such ancient homes. There were details such a troughs, alcoves and hooks still visible.

A small section of Matera's cave dwellings.

On our day off we were invited to Amanda's friend's house to witness and help out with the grape harvest and pressing to make wine.

The team. From back left: Solange, Mike, Thea, (front left) Emily, Bill, me, Lilly, Mario, Jackie and Amanda.

11. Conclusion

The workshop was an invaluable experience which I feel struck a great balance of practical work, theory, and visits helping to broaden my knowledge of the built heritage of the Puglia region.

My main reason for attending was to gain hands on experience in stone masonry, getting to grips with shaping stone and laying it correctly, which I feel was achieved. It was a great lesson to learn to persevere with a process (dressing the chianche) which was at first difficult, and learn the subtleties of the technique. This is something which I look forward to building upon in the future.

I was also interested in understanding how the trulli structure came about and their entire construction from foundations to roof. The course covered this well by including discussions, well thought out trips and open and informative instructors.

Since returning to the UK I have started working on construction sites, as part of my NVQ 3 in Heritage Masonry, and I am already feeling the benefits of the skills I learnt during the trullo project. I feel more confident when dressing stone and when faced with tasks of rebuilding stone sections of traditional buildings. I can definitely say that it has helped increase my confidence: I feel more able to tackle problems and take initiative, suggesting ideas to supervisors.

I would like to thank ZGTF, Thea Alvin, Amanda Roelle and Mario Santoro and all the team in Ceglie Messapica for the wonderful opportunity, their warmth and support, and for their dedicated work in organising and running the workshop.