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Preface – University of Applied Arts Vienna

The third international conference “Archaeology and Conservation along the Silk Road” took place in Tabriz, the Islamic Republic of Iran, from 14–16 November 2018. After the previous events in Xi’an (2014) and Nanjing (2016), China, the third edition selected the beautiful town of Tabriz as host city and the Iranian Research Institute of Cultural Heritage and Tourism as partner institution and co-organizer.

Looking back to this event, it summons up unforgettable memories, especially from today’s perspective, after two years of the worldwide corona pandemic, when traveling and live meetings are not possible. I remember the many personal gatherings and stimulating talks with all the participants at the great conference site, the Yam Caravanserai, where caravans departed and returned from their endless journey along the Silk Road. I remember the visit to Tabriz with my colleague Tanja Bayerová; we discovered the impressive cultural heritage of this ancient city with its historic buildings and mosques, also life at the bazar with all its products and countless exotic spices – not forgetting the excellent food at receptions and dinners at Yam Caravanserai ... wonderful memories and insights into a culture that was previously unknown to us!

Like the last editions, the conference aimed to bring together international and interdisciplinary experts in the fields of archaeology, conservation, natural sciences, cultural and art history and related disciplines, scholars we name today as heritage scientists, studying, researching and conserving sites along the Silk Road.

This conference format intends from the beginning to serve as platform for scholars, researchers and practitioners to exchange knowledge and ideas, disseminate research results and stimulate international cooperation.

The Austrian delegation included Martin Steskal from the Austrian Academy of Sciences (OeAW)/Austrian Archaeological Institute (OeAI), our PhD students Barbara Rankl and Iulian Ganciu, and Tanja Bayerová and myself from the Institute of Conservation, University of Applied Arts Vienna. Our duty has been to explore relevant researchers and actual projects in Europe linked to the Silk Road topic.

Delegations from Iran, China, Russia and Germany contributed to the program, giving us insight into their Silk Road projects. Numerous participants – really difficult to count all of them – listened to 26 papers and viewed four posters, which, together with the vivid discussions, contributed to making this event a fruitful exchange and learning opportunity.

During the lectures and subsequent debates, we learned a lot about the important role Iran played in the cultural exchange and art technology transfer through the Silk Road. Amin Moradi, whose lecture opened up so many insights into the typology and develop-

ment of Iranian architecture, acted alongside his colleagues as translator, interpreter and manager for us foreigners on many occasions. As Liangren stated in his preface, we were overwhelmed by this opportunity to be confronted with the ocean of Iranian cultural heritage, and the more we heard, the more we were inspired.

On the last day, the programme included a visit to the Tabriz Islamic Art University, Faculty of Applied Arts, with an additional academic panel with four lectures on archaeological research at Tabriz. The following excursion to the nearby archaeological complex Rab'e Rashidi put the icing on the cake!

First of all, let me thank the organizers and the scientific committee under the leadership of Adel Farhangui for all their efforts in making this conference happen, and so successfully, also his colleagues for their assistance, endless help and kindness; Liangen Zhang as initiator of this conference series, father of the Silk Road initiative, and lastly Tanushree Gupta, who prepared the event from our side and who was the driving force in the publication of the postprints of the Nanjing conference.

Tabriz was for me the last significant live conference with opportunities for travel, visits and personal exchange. Kazan in Russia has been selected for the next conference in 2020; because of the pandemic we had to postpone the event, which will now finally take place in November 2021 – unfortunately still online.

Let me conclude with the hope that you will join us at the next conference and that we can soon return to normality, keep well and take care!

Gabriela Krist
Vienna, September 2021

Preface – Nanjing University

It was a great pleasure to see that the Third International Conference “Archaeology and Conservation along the Silk Road” took place at this particular moment at Tabriz in Iran. The conference came in a difficult time. The US sanction had created a good deal of difficulty not only for Iran, but also for many other countries. Many more scholars would like to attend this conference, but they could not. The study on the Silk Road should be carried on, and the study of the cultural heritage of Iran should be carried on.

I was pleased that this conference took place in Iran, in Tabriz, and in this caravan-serai. The conference is about connectivity between the East and the West, the North and the South, over the land and the sea. It is this connectivity, the exchange of goods, culture, and people, which has enlightened the world. Yet, the world academic community owes a great debt to Iran for not giving proper credit to the country. When we look at the written, epigraphic, and archaeological sources, we will immediately understand that Iran has been a very important player in the history of the Silk Road. From the prehistoric period on, Iran has been linking up the Mediterranean world, the Eurasian steppe, the Indian Subcontinent, and East Asia. The Iranian people have made their way to China, to Europe, to Africa, and to the steppe; and they have disseminated their goods, religions, and culture to the distant places. The fabulous city of Tabriz and the marvellous Yam Hotel, where this conference took place, are quintessential testimonies to the significance of Iran in the development of the Silk Road. In history, endless trains of caravans came to and departed from this caravanserai. And, it was remarkable that scholars from various corners of the world gathered here to commemorate the glorious history of Tabriz and the Yam Caravanserai.

I am proud that I am a part of the ongoing discovery of the history of the Silk Road in Iran. I am now working with Iranian colleagues at a site in Northern Khorasan Province, thanks to the generous support of the Research Institute of Cultural Heritage and Tourism, the Iranian Center for Archaeological Research, the Northern Khorasan Province Office of Cultural Heritage, Handicraft and Tourism. And, I was brought here by a German scholar Berthold Laufer. He was a sinologist, but he published a book called *Sino-Iranica* back in 1919. In this book, he listed many plants that had been transmitted from Iran to China. These include pomegranate, grape, alfalfa, sesame, and flax. Among these Iran-origin products, pomegranate has become the symbol of the city of Xi'an, China. We know that many other things, including Persian music, musical instruments, painting, polo game, face make-up, were brought to China and became fashionable among the aristocrats of the Tang dynasty. Some of them have been absorbed into the

traditional culture of China. Chinese culture is rich because of the connection with Iran, and because of the Silk Road.

I was glad to see scholars from Iran, Austria, Germany, China, and Russia; to see posters of Indian scholars who were unable to come. I would like to congratulate all of those for participating in this conference. We were in the right time and right place to acknowledge the significance of Iran to the Silk Road. We value this opportunity to expose ourselves to the ocean of Iranian cultural heritage. The more we know about the Iranian cultural heritage, the more we are inspired. I would like to thank the organisers, volunteers for making this conference happen, and thank all the distinguished guests for blessing this conference, for making this conference meaningful.

Liangren Zhang
Nanjing, December 2020

Obituary

IN MEMORIAM OF PROF. DR. SEYYED MOHSEN HABIBI (1947–2020)

The academic community of the Iranian architecture and urban planning suffered a great loss: Prof. Seyyed Mohsen Habibi passed away on September 30, 2020. As one of the millions of Iranians who chose to stay in Iran after the Islamic Revolution, he has been instrumental in the development of the study of Iranian architecture and urban planning, both modern and historical.

Prof. Habibi was born in 1947 in the city of Kermanshah in the western part of Iran. After completing his primary education in 1965, he entered the Faculty of Fine Arts of the University of Tehran. He received a master's degree in architecture and urban planning from the same university and completed his doctorate on urban planning in Paris in 1981, with a dissertation on the combination of a traditional city with a modern one. During his subsequent teaching at the Faculty of Fine Arts, he focused his research on the history of architecture and urban planning. From 1989 to 2009, he held various positions from the director of Department of Urban Planning to the dean of the Faculty of Fine Arts. During these years, Prof. Habibi actively ran collaborative projects in the domain of cultural heritage. He also responded positively to the calls of the Ministry of Housing and Urban Development, other governmental organisations, and public institutions.

During and after this period, Prof. Habibi published over 60 articles and several books alone or with the cooperation of other researchers. He translated five books: *What is the region /Reconstructed architecture in France /Urban space and the disabled /Urban planning: reality and utopias /and Dome technology* from 1986 to 2001. He is also the author of 15 volumes of books, which include: *Minimum housing /Housing construction model in the cities of Khuzestan /Housing and the disabled /Principles and criteria for designing areas, villages and housing units /Bonding of Tehran /Per capita urban uses /Urban renovation /Tehran metropolis atlas /Story of the city /Tehran: symbol of the new Iranian city /Description of intellectual currents in architecture and urban planning in contemporary Iran /From city-state to city (historical analysis of the concept of the city and its Kalbadi manifestation) /Isfahan urban design school (style), the language of urban design in ancient cities /Story of the city /Memory of the city /Baharestan square, the experience of innovation in the Iranian urban space.*

Keen to capture the obvious and hidden concepts of Iranian architecture and urban planning, Prof. Habibi was invited to sit in various scientific committees and councils. During the last three decades, it is impossible to find a major publication on the history

of Iranian architecture and urban planning without mentioning his name. His meekness, humility, commitment to accountability, dedication to findings, intimacy, and a great appetite for learning and teaching are some of his intellectual talents. His creativity in finding expressions appropriate to new concepts from the depths of history, along with his understanding of the architectural and urban planning principles of Iran, earned him the reputation “Father of Iranian Urban Planning”. As the title of his doctoral dissertation suggests, he firmly believed in the balance and interaction between the life from the past and the expected life in the future, and remained faithful to it in his teaching and writing.

Prof. Habibi’s active participation in conferences and seminars, such as the Conference on the “History of Architecture and Urban Planning of Iran”, inspired the organisers of the Third International Conference on “Archaeology and Conservation along the Silk Road” to invite him to the scientific committee of this conference. As usual, he accepted this invitation, and spared no effort attending the formation of the third conference and reviewing the submitted papers. He will be remembered by us, his colleagues, his students, and other associates.

Adel Farhangui

Development of Transition Zone in Seljuq Architecture

AMIN MORADI

Abstract: During the Seljuq period, Iranian architecture underwent a significant shift from the Pre-Islamic Sassanid squinch into the sophisticated transitional zone, which effected the change of a square chamber to an octagonal base for dome and gave rise to a new construction technology. Previous studies consider the transition zone of this period to be a makeshift strategy, rather than a deliberate innovation for future architectural experiments in creating larger structures. Although a cursory survey of the transition zones of Seljuq dome chambers may give one a fairly homogeneous picture, it does not mean the lack of architectural creativity in the Seljuq period. A comprehensive typological study of local schools, however, has not been done. For a better understanding of the standardisation of various techniques during the 11th and 12th centuries AD, this paper attempts to extrapolate three schools of transition zone designing of the Seljuq dome chambers along the Silk Road.

KEYWORDS: dome chamber, Islamic architecture, North-west Iran, Seljuq architecture, Transition zone

INTRODUCTION

After defeating the Ghaznavid dynasty (977–1186 AD) in Khorasan in the battle of Dandagan (1040 AD) and demolishing the Buyid dynasty (934–1063 AD) in Baghdad in 1055 AD, the Seljuqs established themselves as the new protector of Abbasid Caliphate in 1055 AD. Within fifty years, they created a vast empire, encompassing all of Iran, and much of Anatolia. Under the Seljuq sultanate, Iran experienced a period of material and cultural prosperity as well as artistic and architectural creativity (Bosworth 2007: 280).

Ever since the 1930s AD, when medieval architecture of Iran began to be studied in depth, attempts have been made to define the characteristics of typical Seljuq mosques in Iran (Hillenbrand 1976). Although domes and vaults were prevalent already in the Sassanian architecture (Woolley 1961; Reber 1882: 131), a great change, the use of a sophisticated device in the Seljuq architecture, took place. The major problem of erecting a round dome upon a square chamber challenging Iranian architects of the early Islamic period was ingeniously solved by adding a component that serves to bridge the square chamber below and the round dome above. Dubbed as “transition zone” in many studies



Figure 1 Distribution of Seljuq Dome Chambers in Iran with Attention to the Construction Technique of Transition Zone. A: Urmia Mosque; B: Marand Mosque; C: Qazvin Mosque; D: Sojas Mosque; F: Qorva Mosque; J: Nizam- al Mulk Mosque; H: Taj- al Mulk Dome; I: Zavara Mosque; K: Ardestan Mosque; L: Golpayegan Mosque; M: Barsian Mosque, ©/drawing by: Amin Moradi; Base image: adapted from: <https://www.ecoi.net/en/countries/islamic-republic-of-iran/maps/?page=3>.

of Iranian architectural history, it nevertheless has been less seriously studied in its own right (Golchin/Kakhki/Jabalameli 2018).

The search for the initial employment of the transition zone in the history of Iranian architecture, however, is a complex task, since it is not easy to pinpoint the place and time in which this mechanism was invented. The Sassanid royal architecture, which was equipped with a series of rounded arches to support domes, was an obvious pioneer in this regard (Godard 1965: 90). What is relevant here is squinch, which served to join semi-domes, occurred in the Sassanid architecture in Kiz, Bozpar, Negar, and Sarvestan (Dietrich/O’Kane 1990). The cutting-edge technology of domes on squinches has been suggested to originate in north-eastern Iran (Safaeipour/Memarian/Bemarian 2014), where the change from the Sassanid squinch, which was rehabilitated due to an added rib in Samanid mausoleum (301–331/914–943 AD), was dictated by utilitarian reasons rather than by fashion. Here, each squinch is composed of two concave niches separated by a kind of buttress (Carrillo 2016: 40), and this segmentation of the traditional squinch was intended to be a new method of strengthening the structure. Since this technology

first flourished in the north-eastern Iran, it has long been held that this area was the cradle, from which it was spread by travelling architects along with the Seljuqs' invasion along the Silk Road.

The dome chamber of the Seljuq period, mounted on a rehabilitated pre-Islamic transition zone, is an issue that has merely invited some general explanations. The corner corbels of square chamber had created different forms of "squinchs", which together with intermediate parts constituted the zone of transition. In some studies, they have been described as the corbelled form of squinchs. Various forms of squinchs such as "stalactite squinch", "conical squinch", "squinch net" have been identified in terms of material, ornament, and constructional style (Golchin/Kakhki/Jabalameli 2018). Although these studies have enlightened some aspects of transitional zone such as historic, structure, and form, a complete evolution of it through different architectural periods has rarely been approached. The ground-breaking study of Hillenbrand is confined to north-western Iran. Although a homogeneous local school of the Seljuq domed mosques is identified there, it is virtually impossible to build any hypothesis about its developmental path during the Seljuq period (Hillenbrand 1976).

It is not surprising that no clear boundary has been found between the load-bearing *shouldered arch* and the decorative component of *muqarnas*, a honeycomb transition zone, because all the transition zones of dome chambers have concave niches encompassing several lobes, which are corbelled to create a stalactite shape.¹ From this point of view, many historians have used these terms counterintuitively (Creswell 1952: 159; Grabar 1986: 230; Ettinghausen/Grabar 1987: 200; Bloom 1988: 168); others have even considered the transition zone as a result of the fragmentation of squinch, stating that it ceased to be architectural support, but became a recurring ornamental device in Islamic architecture (Carrillo 2016: 41). Thus, misunderstanding of the contrast between *muqarnas* and *shouldered arch* has led to the complicated and sometimes contradictory interpretation. In a study, Pirniya proposed the theory of architectural unity for all Seljuq buildings in Iran, in which the composition of transition zone followed the same language (Pirniya 2008). After about half a century, the author challenged the authenticity of this theory; then he conducted a structural analysis of Seljuq dome chambers so as to define geographical variations as well as static behaviours (Moradi/Omrani 2019). The purpose of this paper is to discuss local approaches towards the transition zones in different regions in Iran.

¹ Structurally speaking, *muqarnas* needs to be hanged with a series of connections to the structure during the construction process. In other words, in comparison with other similar elements like *shouldered arch*, which has the capability of transferring forces from transition zone to the load-bearing units, *muqarnas* is more decorative rather than constructive.

PRE-SELJUQ TRANSITION ZONES

The transition zone was a critical component of Sassanid architecture (Huerta 2012). Among the available architectural evidence, one of the most incontrovertible mechanisms of forming an octagonal base for a dome is found in Baz-e-Hour, which should be one of the earliest remnants of the Sassanids' Chahar-Tagi archetype, located in Khorasan, north-eastern Iran (Pope 1982). Here a series of wooden beams are set in the corbelled manner in the corners of the square structure (Fig. 2). A continuous sequence of concentric arches in the Ardashir palace (224–240 AD), as well as the Sarvestan royal building (420–438 AD), reveals that this technique was widely employed during the Sassanid era due to the scarcity of wood in central Iran. Although the earliest employment of the conic squinch in Iran is a subject of debate, without any doubt it was prevalent until the early Islamic age (Fig. 2).

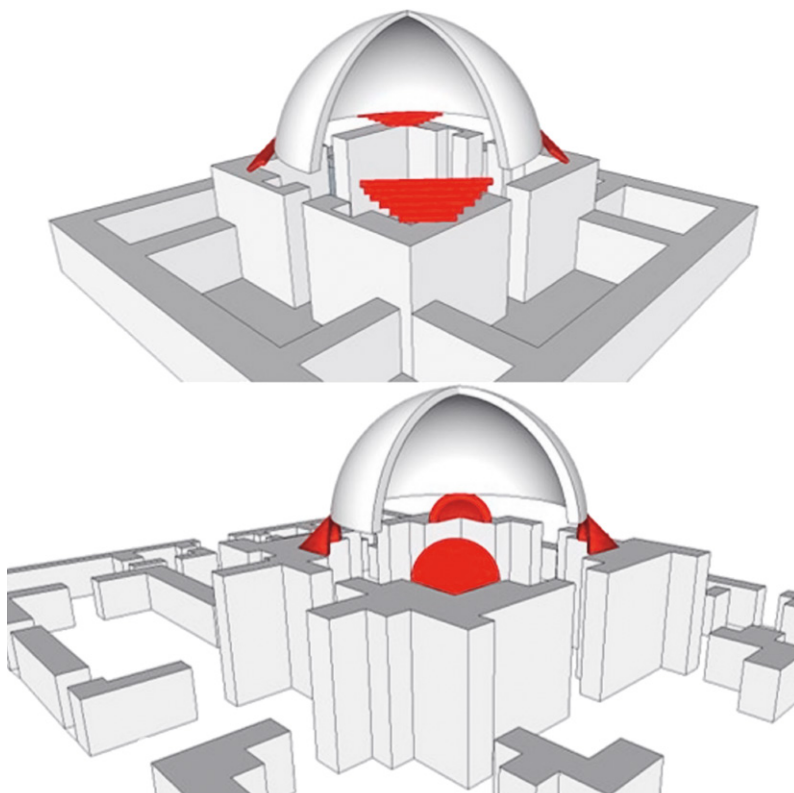
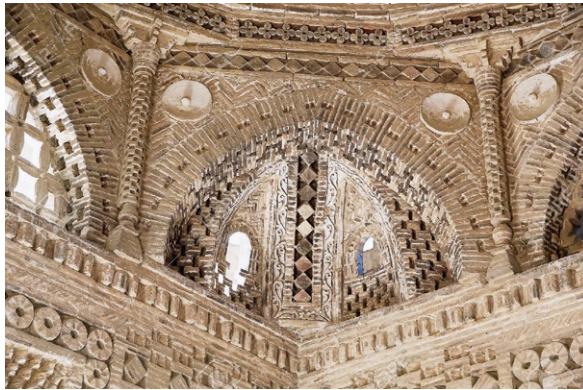
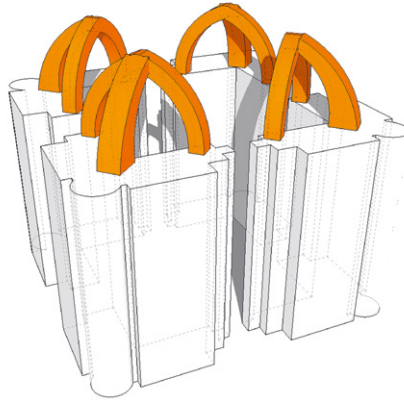


Figure 2 Transition Zone of Pre-Seljuq Structures. Up: Baz-e-Hour, Down: Sarvestan Palace, ©/drawing by: Amin Moradi.

As a result of the building practice, the mechanism how the thrust line affects the transition zone was understood: Installing a conic squinch will not only distribute the thrust line through the conic geometry, but also transfer it along a line from the apex of the squinch to the edge, where the two load-bearing walls meet. Ancient architects thus carried the construction technology into the next phase, developing the rib-shaped buttresses, which became the most conspicuous element of the Samanid mausoleum (301–331/914–943 AD), to replace the semi-conic squinch. The rib unit became an indispensable device to support the dome, following an arithmetical procedure (Figs. 3a, 3b). Although it is difficult to interpret why and when ancient architects decided to assemble a reinforced squinch system, this is the earliest example of a new approach towards the transition zone (Safaeipour/Memarian/Bemarian 2014).



Figures 3a, 3b The Transition Zone of Samanid Mausoleum, Reinforced with a Rib-shaped Buttress. ©/drawing and photo by: Amin Moradi.