Architecture
Image Studies
AIS Scientific Journal

Vol.6 , Issue 1, Territories, 2025

Traces of Biophilic Design in Anatolian Seljuk Architecture: Natural Shapes and Forms

Pelin KARAÇAR
İstanbul Medipol University, Faculty of Fine Arts, Architecture and Design , Istanbul, TÜRKİYE; E-Mail: pkaracar@medipol.edu.tr

Abstract
According to Aristotle, the primary source of all human actions and works is nature. When Albert Einstein said, “Look deeper into nature, then you will understand everything better,” he said a key sentence in architecture, which is the field where the human-nature relationship turns into the most concrete products, as in every field of science. Every architectural structure is a historical indicator of the nature-human relationship.

Biophilia is a concept used to describe the innate human tendency and need for a close connection with nature and other life forms. It is a concept that describes man’s innate emotional attachment to other living organisms. Incorporating plants, water, and animals into the design of a space is one way to create a biophilic environment. The first fundamental dimension of biophilic design is an organic or natural dimension, defined as the shapes and forms in the built environment that directly, indirectly or symbolically reflect the human sensitivity inherent in nature. The second fundamental dimension of biophilic design is a place-based or local dimension, defined as buildings and landscapes that connect to the culture and ecology of a place or geographic region.

The two basic dimensions of biophilic design relate to the six biophilic design elements: Environmental features, Natural shapes and forms, Natural patterns and processes, Light and space, and Space-based relationships.

In this study, studies on structures such as mosques, madrasahs, healing houses, tombs, caravanserais, castles and palaces in Seljuk architecture were examined according to the dimension of biophilic design defined as natural shapes and forms in the built environment. Traces of biophilic design have been investigated in interior and exterior facade design, in minaret, mihrab, pulpit, console, arch, iwan, profiles, window arches, vaults and column capitals, as well as in the structural elements of crown doors, niches, windows, wall borders and crown arches. From the qualities of natural shapes and forms; Plant motifs, animal motifs, seashells and spirals, egg oval and cylindrical shapes, arches, vaults, domes, straight and non-right-angled forms were evaluated in terms of traces of biophilic design.

It is thought that the research can contribute to today’s understanding of biophilic design, and the applications made for this purpose, with the features of Seljuk buildings in terms of biophilic design.

Keywords
Seljuk Architecture, Biophilic design principles, Inspiration from nature, Seljuk ornamentation

Introduction

Every architectural structure is a historical indicator of the nature-human relationship. In the past and in today's world, the concept of biophilia, the tendency to be connected to nature, has shown positive results for the physical and mental health and well-being of people in architectural structures (Wilson 1984, Kellert and Wilson 1993). Biophilia is a concept used to describe the innate tendency towards life and life-like processes, and the existence of and need for a relationship with nature and other life forms. It is the innate emotional attachment of humans to other living organisms.

Biophilic design means inherited and part of human nature. It advocates the idea that people's physical and mental well-being depends on their contact with natural systems and processes. Biophilia is not only an aesthetic preference but also an indispensable need for humans like water, food and air (Wilson, 1984).

The concept of biophilia, which is the human tendency to be close to nature, is seen in architecture in the historical process. In architecture, one of the reasons for the interest in and admiration for historical buildings is that both the forms of these buildings and the ornaments on them are designed by taking inspiration from the forms and shapes that exist in nature.

Biophilic architecture is part of an innovative architectural perspective where nature, life and architectural theory combine to create a habitable and livable building that is capable of meeting the demands, constraints and respect for both humans and the environment (Almused, 2011).

In the history of architecture, one of the most important examples of the relationship with nature in the design of buildings is Seljuk architecture. In the Seljuk buildings in the historical process, biomorphic forms and ornaments were used in the built environment, allowing users to establish contact with nature within the building.

In Anatolia, biophilic design traces through the architecture of different traditional Seljuk buildings that have been preserved and survived to the present day, the decoration and ornamentation features in building elements such as facade doors, windows, dome arches, where natural shapes and forms exist, make important contributions to today's architecture.

1. Biophilic Design

The word biophilia, defined in the dictionary as the love for life and living things, is a combination of the prefix "bio", which is used in relation to life and living things, and the word "philia", which means liking and loving (Düzenli et al., 2017). The concept of biophilia, which was first introduced by psychologist Erich Fromm (1964), was defined as "passionate love for life and living things" (Kellert, 1997). Researcher-writer Janine Benyus, who created the concept of biomimesis, was the first to put forward the relationship between nature and form (Benyus, 2002).

In biophilic design, the human-nature relationship is established through criteria such as natural lighting, natural ventilation, use of natural materials, landscape elements, landscapes, natural geometries and space organization. It is stated that the presence of natural or nature-evoking elements in the built environment, directly or indirectly, contributes positively to people's physical and mental health. Biophilic design aims to satisfy these intrinsic adaptations to nature in the modern built environment and, in doing so, to improve people's physical and mental health and well-being (Kellert & Calabrese, 2015). Biophilic design has been defined as "the transfer of an understanding of the inherent human intimacy with natural systems and processes into the design of the built environment" (Kellert, 2008).

Biophilic design is a new, multifaceted and rich approach addressed by many disciplines. One of these disciplines is architecture, and it is interested in shaping the spatial demands of the closeness created by the innate instinctive/emotional bond that humans feel towards nature and the creatures in nature (Olğun, 2021).

The biophilic design principle ensures that the positive effects of nature on the human body and psychology are transferred to people through space. The concept of biophilic design in architecture is defined as the inclusion of nature in the built environment, as the missing link of sustainability, which is necessary for the healthy continuation of human life, which has evolved according to the conditions of nature. This process is illustrated in Figure 1.1 (Kellert, 2018). Color, water, air, daylight, plants, animals, natural materials, landscapes,

facade greening, geology, landscape and ecosystem features affect architecture as environmental features.
The first fundamental dimension of biophilic design is an organic or natural dimension, defined as shapes and forms in the built environment that directly, indirectly or symbolically reflect the human sensibility inherent in nature. The second fundamental dimension of biophilic design is a place-based or local dimension, defined as buildings and landscapes that connect to the culture and ecology of a place or geographical region (Kellert, 2008).

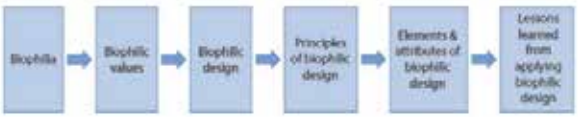

Figure 1.1 The concept of Biophilia in Architecture as a biophilic design process (Kellert, 2008).

Adherence to this process is essential for the effective implementation of biophilic design. Most importantly, biophilic design never happens in a piecemeal or disconnected way, but in an ecological way in which the various practices mutually reinforce and complement each other. Three types of nature experiences represent the basic taxonomy of biophilic design practices (Kellert and Calabrese, 2015).

These are,
1. Qualities for direct experience of nature
2. Qualities for indirect experience of nature
3. Qualities for experiencing space and place.
Direct experience of nature refers to actual contact with environmental features in the built environment, including natural light, air, plants, animals, water, landscapes and others. Indirect experience of nature refers to contact with a representation or image of nature, transformation of nature from its original state, or exposure to certain patterns and processes that are characteristic of the natural world. These include paintings and works of art, natural materials such as wooden furniture and woolen fabrics, ornaments inspired by shapes and forms that occur in nature, or environmental processes that are important in human evolution such as aging and the passage of time, wealth of information, natural geometries. Thirdly, the experience of space and place refers to spatial features that have characteristics of the natural environment that are conducive to human health and well-being (Kellert and Calabrese, 2015).

The first fundamental dimension of biophilic design is the organic or natural dimension. The indirect, direct or symbolic forms in the built environment reflect the innate affinity of human beings.

The second fundamental dimension of biophilic design defines the buildings and the environment in relation to culture and ecology as a place-based or local dimension. The two fundamental dimensions of biophilic design relate to six biophilic design elements:
- Environmental features: Elements that involve the use of basic elements of nature in the built environment.
- Natural shapes and forms: Formal elements that include natural representations and analogies used in the design of interiors and facades of buildings.
- Natural patterns and processes: Elements that emerge from the incorporation of natural patterns and processes into the built environment beyond representation.
- Light and space: Elements that emphasize the use of light in space and spatial relationships.
- Place-based relationships: These are the elements based on the relationship between the geography where the building is located and the culture to which it belongs and the natural environment in which it is located.
- Evolutionary human-nature relations: These are the elements that examine the relationship between man and nature from an evolutionary perspective and reflect the spirit of the place (Kellert, 2008).
In this study, Natural Shapes and Forms, one of the elements of Biophilic Design in Seljuk Architecture, will be discussed. Natural Shapes and Forms are grouped by Kellert in terms of their qualities as in Figure 1.2.

NATURAL SHAPES AND FORMS
Botanical motifs
Tree and columnar supports
Animal (mainly vertebrate) motifs
Shells and spirals
Egg, oval and tubular forms
Arches, vaults and domes
Shapes resisting straight lines and right angles
Simulation of natural features
Biomorphy
Geomorphology
Biomimicry

Figure 1.2 Qualities of Natural Shapes and Forms, elements of biophilic design (Kellert, 2008)

In the decoration of Anatolian Seljuk Architecture, nature-inspired geometric, floral and animal motifs were used and applied with a craftsmanship. For this reason, among the elements of biophilic design in Seljuk architecture; From the qualities of natural shapes and forms; Botanical and tree motifs, Animal motifs, Shells and spirals, Egg oval and cylindrical shapes, arches, vaults, domes, straight and non-right-angled forms were examined in terms of.

2. Anatolian Seljuk Architecture

The Seljuk period is the era when Turkish art was in a great quest with extraordinary creative power (Öney, 1988). The term “Seljuk Art” was used in the context of a geographical scope extending from East Turkistan and Northern India to Anatolia and the Eastern Mediterranean, where Turkish dynasties were dominant during the Seljuk period, not only around Iran (Kuban, 1999).

The Seljuks, who started to live in Anatolia, produced high level works in many branches of art and reached the highest level in crafts and arts by blending their cultures here. They met many of the requirements brought about by the settled order with works they produced themselves and with high craftsmanship (İnalcık, 2001).

When Seljuk architecture is considered why the architectural facade is decorated and what its purpose is, Seljuk architecture is actually to give a message. Within this message, it can be thought to be a show of power, an indicator of wealth or the sublimity of faith. The presence of ornamentation on the plain, mono-block and massive appearance of architectural elements is intended to soften the structure, to direct it to more eye pleasure and emotions (Kuban, 1999).

The architecture of the Anatolian Seljuk period differs from the Islamic architecture of its era and its predecessors in terms of the plan scheme, the materials used and the decoration program. While the Iranian Seljuks used brick as a material, the Anatolian Seljuks used stone (Öney, 2002,1213; Bakırer, 2002).

Since Anatolian Seljuk buildings were not built to be exhibited in squares and could not be walked around due to the urban fabric, the entire narrative was imposed on the façade and the entire narrative was engraved on the façade. It is a characteristic feature of Anatolian Seljuk architecture that they cannot be perceived by walking around like Ottoman buildings (Ögel, 1994).

When the architectural works of the Anatolian Seljuk period are examined, the different spheres of influence of different cultures create a situation of “polycentricity”, and in this case, forms and motifs unique to a single situation are seen as well as common motifs. Another characteristic of the Seljuk architectural structures analyzed is the successful use of elements that are difficult to use together.

The main material of the Seljuks, who showed great building activity in Anatolia, was stone. They created a style unique to Anatolia by decorating stone with great mastery and fine taste, especially in religious and civil architecture examples (Öney and Erginsoy, 1992).

Seljuk stone ornamentation is generally framed by ornamentation as building elements. It emphasized the frames defined by the architecture such as crown doors, niches, windows, wall borders and crown arches (Kuban, 2002).

Although the choice of stone as a building material in the Seljuk era is based on local traditions, it can also be seen as a choice to achieve monumental expression. Mostly the limestone stones of Anatolia were used in various colors and tones, and ornamental effects were created with color contrasts (Kuban, 2002).

Other areas of stone ornamentation other than the examples are the minaret, mihrab, minbar, console, arch, iwan, profiles, window arches, vaults and column capitals. The other facades of the building are generally plain (Öney and Erginsoy, 1992).

After the Crown Doors, the mihrab is the location where the decoration is concentrated. The stylistic development seen in the door compositions is also seen in the mihrabs. After the crown gates and mihrabs, the architectural element where ornaments exhibit various examples and development is the capitals (Ödekan, 2005).

Anatolian Seljuk Architecture can be classified in terms of 5 features;

1- In Anatolian Seljuk buildings, four-cornered legs were generally used instead of columns as carriers, and the arches and vaults forming the upper cover were carried by these legs. Columns were generally used for ornamentation purposes on the sides of crown doors, windows and chambers in the façade layout.

2- In Anatolian Seljuk buildings, unlike Byzantine architecture, pointed forms such as cones were used instead of circular forms in domes and arches, and the heights of these domes, columns and feet are not high.

3- The main materials of Seljuk buildings are stone, brick, wood and plaster in the interior.

4- In Anatolian Seljuk buildings, importance was given to the importance of the front facade layout, the building was built with thick and high walls, and the entrance door of the building was made high and monumental, such as the crown doors of caravanserais.

5- In the decoration of Seljuk Architecture, geometric, botanical and animal motifs inspired by nature were used and applied with a craftsmanship.

Anatolian Seljuk architecture is more innovative than other architectural movements in terms of ornamentation and handicrafts. Especially in stone ornamentation, figured relief and sculpture, tiles, wood, carpets, the material offered opens new pages in Islamic art with new experiments and surprises. In handicraft branches such as plaster brickwork, metals, ceramics and fabrics, the materials are more limited compared to Iranian Seljuk art, yet they are represented with the most excellent examples (Öney, 1988).

3. Biophilic Design Traces in Seljuk Architecture: Natural Shapes and Forms

Studies have proven that people adapt better to environments with more nature. The biophilic design concept has been shaped because we feel better in environments with sunlight, contact with animals, trees, flowers, flowing water, birds and natural processes (Orr, 2002). The first fundamental dimension of biophilic design is an organic or natural dimension, defined as the shapes and forms in the built environment that directly, indirectly or symbolically reflect the human sensitivity that exists in nature. The second fundamental dimension of biophilic design is a place-based or local dimension, defined as buildings and landscapes that connect to the culture and ecology of a place or geographical region (Kellert et al., 2008).

Among the qualities of natural shapes and forms in Seljuk architecture; Herbal motifs, animal motifs, shells and spirals, egg oval and cylindrical shapes, arches, vaults, domes, straight and non-right-angled forms were evaluated.

Geometric and vegetal examples, figures are among the layouts showing common features. These examples are in harmony with Sufi views such as limitlessness, infinity and unity in diversity. The fact that the examples do not accept the area allocated to them as a limit, that they create other images with continuous intersections, that they group around centers, and that they gain meaning through the specific paths they follow, by constantly changing, is described as the expression of the countless variable images of the earth (Sözen and Sözen, 2008).

3.1. Botanical Motifs

Botanical motifs symbolize a relationship between man and nature. Every design with natural motifs is symbolic (Kuban, 1999). According to a classification in Anatolian Seljuk floral stone ornaments, they are divided into

1. Leaf characters,

2. Flower characters

3. It can be grouped as stem-curved branch (Özbek, 2002).

4. Combined Herbal Motifs

1. Leaf characters are Acanthus, Rumi, Palmette and Tree of Life.

Acanthus

Acanthus This plant, known as 'bear claw,' in Turkish, has large leaves. Acanthus, which is not often seen in borders, is mostly used in the capitals of corner columns in crown gates (Özbek, 2002).

Acanthus/Acanthus is a plant with thick leaves and is the distinguishing element of column capitals, especially in Corinthian and Composite orders (Fig.3.1) (Ödekan, 1997). In Anatolian Seljuks, it is generally seen on column capitals.

The Seljuks used acanthus motifs as an ornamental element mostly on columns or column capitals.

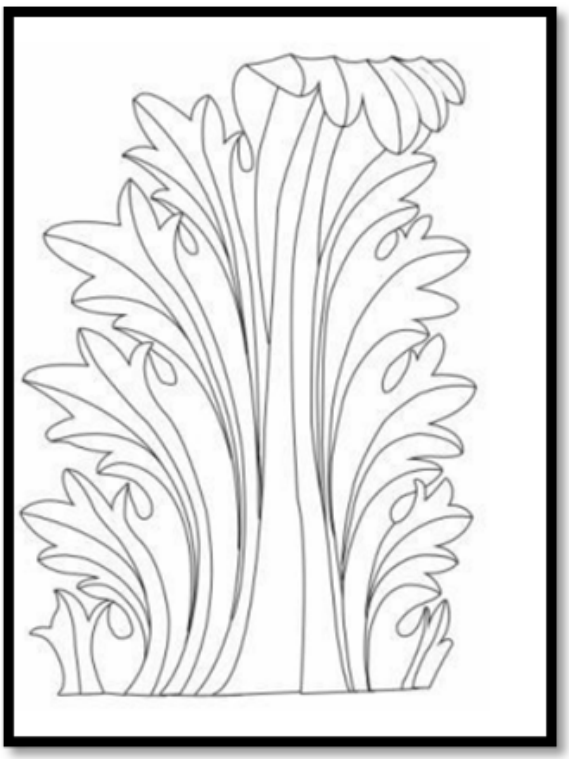

Figure 3.1 Acanthus (Karadaş, 2011)

Rumi

Rumi, the most common leaf-characterized floral motif in Anatolian Turkish Architecture, literally means Anatolian, belonging to Anatolia. The form called Rumi consists of a plump comma-shaped body and a round shape attached to its pointed end. Sometimes it bifurcates into two parts and sometimes it goes beyond the general definition with variations of the body sliced by veins; the rumî motif elongates, shortens and takes strange forms (Mülayim, 2015).

Despite the fact that the rumi motif is completely leaf-originated, it is seen that it differs from the natural state of the leaf to an unrecognizable degree. A chronological examination on the decorative front of Turkish art suggests that the motif may be of zoomorphic origin (Mülayim, 1982).

Rumi is the ornamentation of the Anatolian Seljuks with curled branches composed of shoots, leaves and animal elements. It consists of curled branches with ends ending in half palmettes resembling bird beaks (Sözen and Tanyeli, 1986).

Rumi, which is also included in the herbal motif group, has many variations shaped from the main motif, and the simplest form of the Rumi motif consists of a single leaf or two forms, one long and one short double leaf. In Anatolian Seljuk architecture, rumi is often curved and organic, but in the Sivas Çifte Minareli Madrasa, rumi like an inverted bow is seen in very dynamic patterns (fig. 3.2).The leaves elongate and the rumi deforms. This deformation brings the rumi closer to geometric motifs (Birol and Derman, 2004)

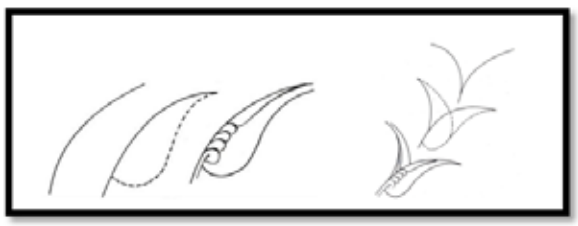

Figure 3.2 Rumi motif (Birol and Derman, 2004)

What is meant to be described by floral ornamentation in Seljuk stone is the arrangements formed by combining floral and leaf motifs, which we can see in nature, and forms that we cannot see in nature as a whole, but which we resemble the floral sample in nature with a part of them, within the framework of certain principles. For example, while it is possible to see the petals of any flower in nature, the vegetal form we call rumi is a form that we cannot see in nature, but has the characteristics of a leaf. The curved branch carrying the rumi is not seen

in nature (Özbek, 2002). Both lotus and palmette motifs appear as variations of the rumi motif.

Palmette

In terms of the general scheme, the motif, which consists of five outlines in the form of a flower bud obtained by filling the gaps on both sides of a central axis with the upper and lower curled plant stems and their upper parts from both sides, is called “palmette” because it resembles a palm tree in terms of scheme. The definition of the palmette motif can be given in its simplest form as “A floral decoration element consisting of leaves arranged symmetrically on both sides of a central axis, standing apart from each other like a fan (Ödekan, 1997). In Seljuk stonework, floral elements, geometric motifs, writing and, to a lesser extent, figural decor are the main decorative elements. The main motif in floral decor is the three-sliced palmette leaves. Sometimes only half a palmette leaf is used. Most of the time, half and full palmettes form an intricate floral network, an arabesque. The knot-like twists (volutes) at the ends of half and full palmettes are the most distinctive feature of Turkish decorative art. Leaf ornaments sometimes form borders in shapes more similar to lotus (Figure 3.3), (Öney and Erginsoy, 1992).

Figure 3.3 Palmette typology table (Mülayim, 1982)

Tree of Life

In ancient times, it was inevitable for people to admire trees by observing nature and to include trees and forests in their lives. The tree of life motif has also emerged as a result of people’s efforts to make sense of this (Fig.3.4).

Although the tree of life motif does not constitute a category within floral motifs, this motif has an important place in Anatolian Seljuk architectural decoration due to the symbolic meanings it represents. The tree of life, which determines the axis of the world in Central Asian beliefs, connects the underground, the earth and the sky (Diler, 2016).

Figure 3.4 Tree of life Rotating Kumbet Kayseri (Diler, 2016)

Since the effects of shamanic beliefs continued in the Anatolian Seljuk period, the bird and eagle seen with the tree of life are thought to be animals accompanying the shaman. The pomegranate fruits on the branches of the tree of life are believed to be symbols of paradise, while the small birds hidden in the branches are believed to be birds of paradise according to Islamic belief, and the spirits of unborn shamans according to shamanic belief. The discs and rosettes accompanying the tree symbolize the sun and planets (Erbek, 2002).

The Anatolian Seljuks used the tree of life motif, which has a symbolic meaning, in architectural ornamentation with a passion. The tree of life, which has abstract

meanings such as the cosmic tree as the pillar of the universe, the symbol of peace, fertility, science, wisdom, power and eternity, is also described as the state tree because it symbolizes the protective power of the state, and is also called the sacred tree, the golden tree and the tree of heaven (Örnek, 1973).

In Sivas Gökmedrese, there are two identical trees of life on the right and left sides of the crown gate and on the minaret bases. In these sections, under the eight-pointed star symbolizing the globe in the center, there is the tree of life in panels with pointed arches. It is a stylized tree motif in the form of plant bundles consisting of birds, leaves, flowers and pomegranates with roots, trunks and branches emerging symmetrically from the triangular stem. There is a pomegranate between the relief of a bundle of compound leaves, pomegranates and birds on the other leaves, and at the top of this motif there is a single-headed eagle figure depicted from the front, as if it will fly with its wings. This double-layered ornamentation of the tree of life in the Sivas Gökmedrese is very spectacular because it causes shadow and light effects, the detail and care in its processing, and its material is marble (Ögel, 1966).

2. Flower characters Lotus flower, Rosebud

Lotus flower

Water plants resembling the Nile are called Lotus. It means rebirth, resurrection, creation, and the model of the universe (Çoruhlu, 1989),(Fig.3.5).

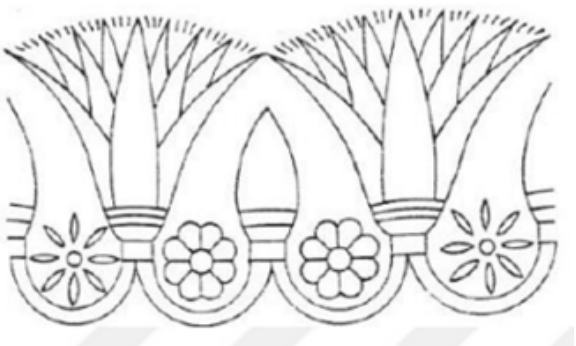

Figure 3.5 Lotus motif (Çoruhlu, 1989)

Gulbezek (Badge)

Doğan Hasol defines these elements in his architectural dictionary; Gülbezek: “The name given to those whose surfaces resemble a stylized rose with carved and embossed leaves”. A group of rosettes that are directly carved into the building stone and protrude outward are called gülbezek or gülçe by researchers (Hasol, 1995).

Rosette: It is described as “a circular and usually stylized floral decoration pattern”. In terms of architectural decoration, rosettes are analyzed in terms of their structural features and geometric forms in terms of straight and non-right-angled forms (Sözen and Tanyeli, 1992).

Rosettes are defined by researchers as circular plates decorated with flowers, without mentioning their construction. Most of the rosettes were carved directly on the building stone in a planar/ face-to-face or protruding form, while very few were concave/inverted (Ögel, 1966). The increase in the number of sides of polygons, their small inward and outward breaks and the emergence of rosette-like shapes are the beginnings of a tendency towards naturalism (Mülayim, 1982). The rosette is called a medallion in some sources. They are flat and embroidered, sometimes in the shape of a sphere. They are covered with floral patterns (fig.3.6). Most of the patterns that we call medallions also appear to be centralized, but they can be sustained indefinitely (Demiriz, 2000). Badges are generally accepted to be planetary symbols. The large double rosette symbolizes the moon and the sun (Öney and Erginsoy, 1992).

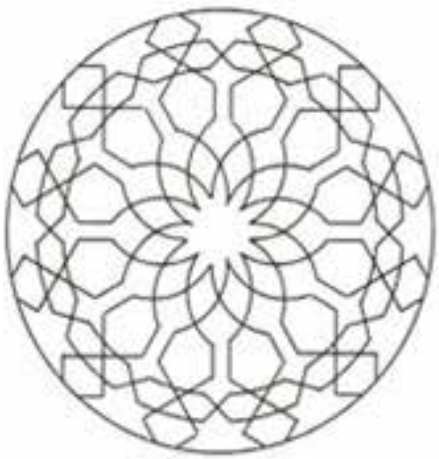

Figure 3.6 Rosette example (Demiriz, 2000)

Stem curl and branches

Stem-Curved Branch; Stem and curved branches, of which there are no examples alone, constitute the basis of many compositions. Especially in palmette-rumi and palmette-lotus compositions, the motifs are connected to curved branches. The curved branches, whose surfaces are grooved, are mostly in S lines, but also draw spirals in intricate compositions.(Dursun. 2009).

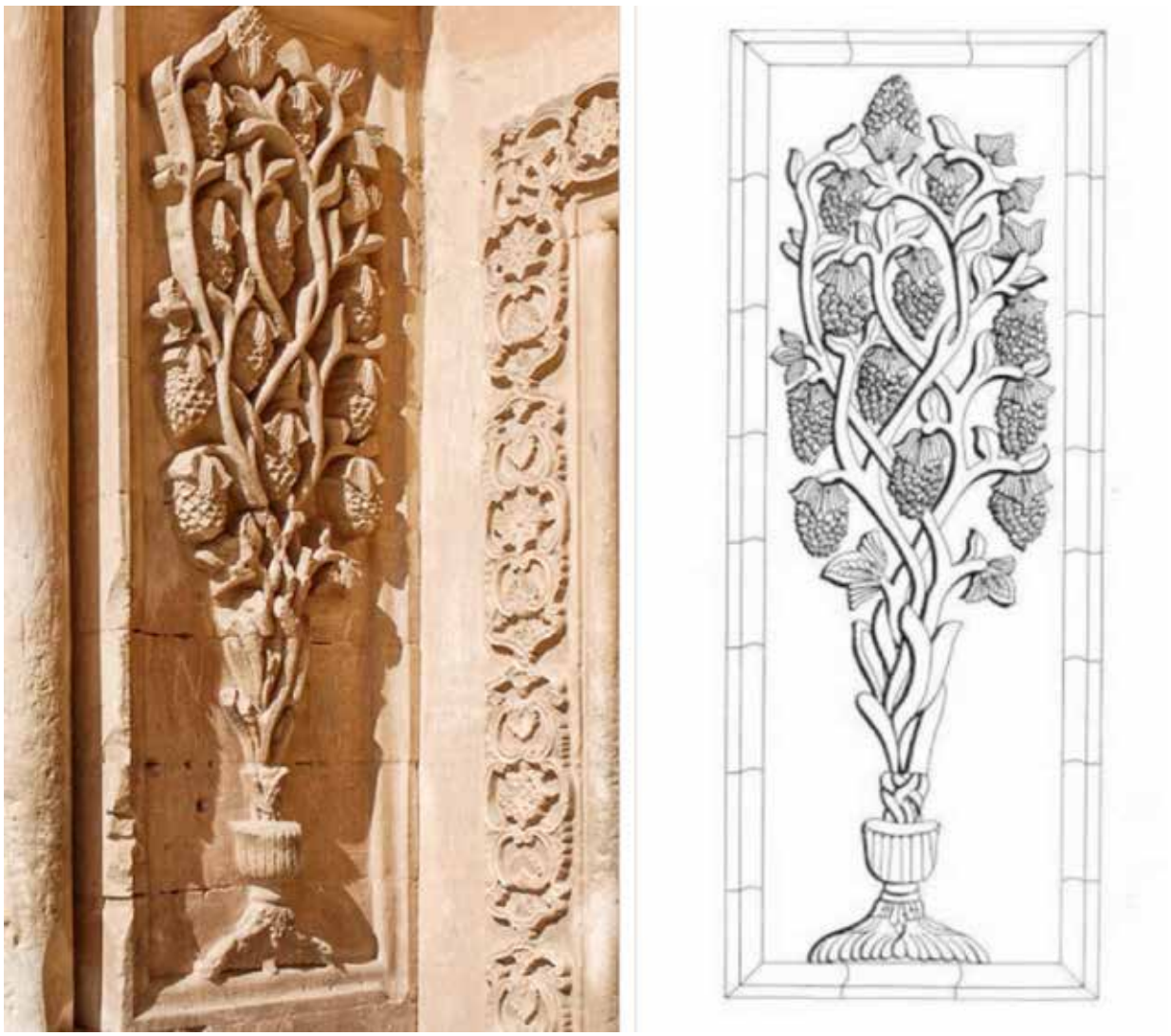

Figure 3.7 İshak paşa palace Folds and branches (Bulat, 2013)

Combined Botanical Motifs

Most of them consist of compositions created by using botanical motifs together. The vegetal compositions are evaluated in twelve groups as rumî, half palmette, palmette, lotus, rumî-palmette, half palmette-palmette, palmette-lotus, rumî-half palmette-palmette, rumî-palmette-lotus, peony, hatayi, gülbezek (Görür, 1999).

The Gök Madrasa is also noteworthy for the scarcity of geometric motifs and their use in the same proportion and in combination with floral motifs. As can be seen in the example of the mixed ornamentation surrounding the window frame of the Sivas Gök Madrasa floral ornaments take place within a geometric grid.(Fig.3.8). Within the geometric arrangement that integrates with the outer frame, the botanical ornaments are rendered in a different code (Algan, 2008).

Figure 3.8 Mixed Ornament, Sivas Gök Medrese Window Frame (Algan, 2008)

Figure 3.9 shows an example of combined floral motifs on the crown gate of Ishak pasha palace selamlık (Bulat, 2013)

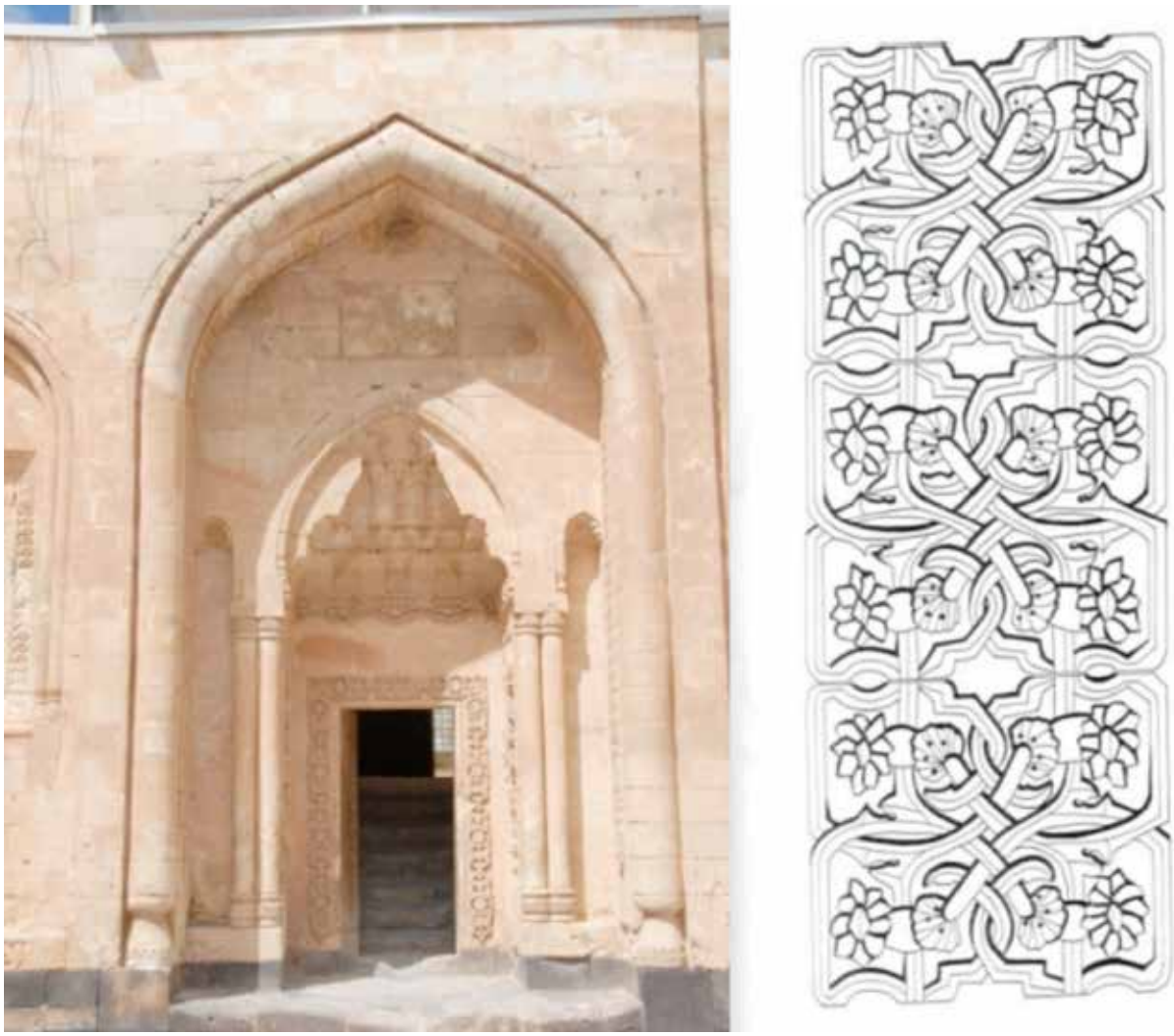

Figure 3.9 İshak paşa palace selamlık crown gate combined floral motifs (Bulat, 2013)

3.2. Animals Motifs

One-to-one or symbolic interaction with animals reminds us that we are a part of nature and helps to maintain the relationship with nature. Since the beginning of human history, the presence of animal life has been an integral part of humans (Kellert, 2008).

The figured stone decorations of the Seljuk period are generally stylized, often combining parts of one animal with another animal or parts of a different animal. The tradition of blending animal and human figures with plant folds and combining figures dates back to Central Asia (Öney, 1988).

In the rich Anatolian Seljuk figure art, bull reliefs occupy a large place. It is typical that the bull is not seen alone, but is portrayed as a bull-human, bull-lion (Fig.3.10), bull-eagle, bull-eagle, bull-dragon, bull-rhino duo or as a zodiac sign or calendar animal. There are also rare examples in Seljuk stonemasonry, such as fish, rabbits, deer, wolves, foxes, wolves, foxes, etc., which we have not described in detail (Öney and Erginsoy, 1992).

Figure 3.10 The struggle between bull and lion on the portal of the Great Mosque of Diyarbakır (Öney, 1988)

The eagle figure is known as the ruler of the heavens and represents power and strength (Çaycı, 2008). Since the eagle generally symbolizes the victory of rulers, goodness, and elements related to the sky, the animal is always depicted as the winner in the scenes of struggle (Fig. 3.11), (Özkul, 2018). Arslan is the sun, the symbol of light (Öney and Erginsoy, 1992).

Figure 3.11 Sivas Divriği Great Mosque (Özkul, 2018)

Widely used in Anatolian Seljuk art, the dragon figure has been a symbol of the universe, water, rain, fertility and the fight against evil. It was also believed to protect from all kinds of diseases and epidemics, to symbolize the continuity of the soul and the planets, to represent the universe and the world, and to carry various meanings such as good, evil, light and darkness (Öney,1969). Dragon-tailed lions also combine two opposite principles on the same animal. Arslan is the symbol of light, the sun; dragon-moon is the symbol of underground, darkness (Fig.3.12), (Çelik, 2008).

Figure 3.12 Lion figure with dragon tail (Çelik, 2008)

3.3. Seashells and Spirals

In terms of biophilic design, oyster shapes as seashells are seen in Seljuk architecture. It is known that the oyster motif, which has been used as an element of decoration in different beliefs and cultures since ancient times, symbolizes “rebirth, a second life”.

Decorations in the form of oyster shells appear on mihrabs and doors in Anatolian Turkish art, and as a transition element to the dome in Seljuk and Principalities period tomb structures. Most of the above-mentioned octagonal or polygonal trees of the Seljuk and Principalities periods in medieval Anatolia were provided (Karamağaralı 1992).

Figure 3.13 Seashell Ornament Detail of the Entrance Space Masjid of Ak Han (İnal, 1971).

Spirals are seen differently in many decorations. For example, the upper and lower leaves of the lotus, arranged in the form of segmented leaves, extend to the sides and make spiral curves. The sepals of the palmette are made with spirals connected to each other, and a petal is added on top. On the surface of the siege arch of the side niche of the crown gate, there are two dragon figures whose bodies form heart-shaped spirals (İnal, 1971), (Fig.3.13).

The spiral was used in Seljuk architecture together with water as a symbol of growth and development in nature (Ögel, 1994), (Fig.3.14).

Figure 3.14 Ince Minareli Madrasa, spiral channel of the pool under the central dome (Ögel, 1994)

3.4. Egg, oval and tubular forms

Seljuk architectural decoration and ornamentation elements should be analyzed according to their structural features and geometric forms in terms of sphere, sphere and cone sections / kabaras, egg oval and tubular shapes from the qualities of natural shapes and forms in biophilic design.

Kabara: “Some of the kabaras, which we always see as hemispherical, are enclosed in a circular or square frame. These frames are composed of twisted kaytan (Ünal, 1982).

Kabaras The convex-looking sections of a sphere or cone are called kabaras in architectural decoration (Ögel, 1994). Geometric ornaments were generally utilized in the decorations of the spheres. Herbal ornamentation is very rare (Figure 3.15), (Algan, 2008). In terms of appearance, cabaras are more raised and rounded than medallions.

Figure 3.15 Spheres, Divriği Great Mosque West Taçkapı (Algan, 2008)

The most important feature of the muqarnas ornament is that its construction is structural. Its function is to provide a transition from one geometric form to a different geometric form. Due to its geometric structure, muqarnas decoration develops in harmony with the architectural concept and integrates with the building (Ödekan, 2002).

Muqarnas The Anatolian Seljuk Tajkapı became three-dimensional, and with their intricate geometric structures and their arrangement in semicircular rows (Fig.3.16), they enriched the time dimension by expressing the characteristics of the star system with deep spatial values. This motif, which brings the depth of space to the facade even before reaching the building, emphasizes special meanings in the interior doors of caravanserais (Ögel, 1994).

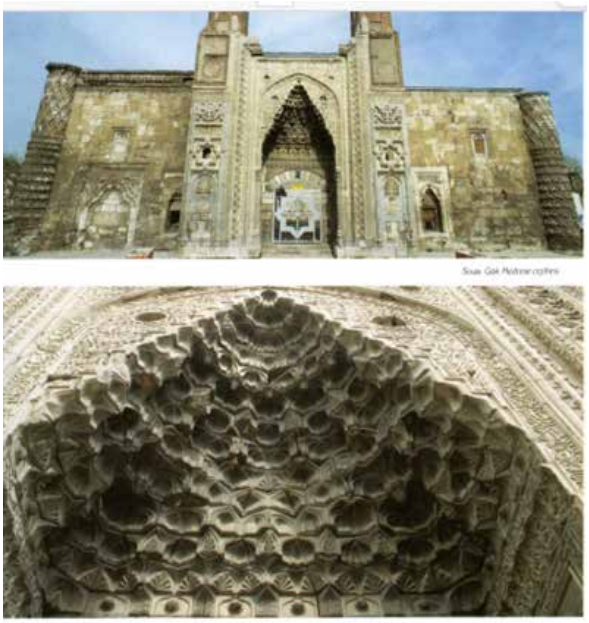

Figure 3.16 Sivas Gök Madrasa, muqarnas niche of the crown gate (Ögel, 1994)

3.5 Arches Vaults Domes

In most of the building types such as mosques, madrasahs, baths, tombs, caravanserais, fountains and in the most striking parts of the buildings, they were applied in many areas such as mihrabs, windows, crown doors, mihrabiyas, corner vaults, corner vaults in the transition areas to the dome (Turan, 2013).

Caravanserai construction does not differ from mosques and madrasahs in terms of wall technique, vault covering system and roof covering, and they were built as rubble filling between the cut stone cladding seen in mosques or madrasahs (Kuban, 2002).

The definition of the kavsara arch can be made as a mitigation arch, which transfers the load coming to the kavsara to the side wings of the crown door in Anatolian Seljuk crown doors, whose sections under the stirrup stone are crossed with moldings and protrude very little from the surface of the crown door. “Kavsara is a kind of space cover and the way the muqarnas cover the niche can be characterized as a half dome (Ögel, 1966). Anatolian Seljuk Period crown gates as geometric schemes. It consists of a rectangular frame with a deep jamb recess. The outer surface of the door is decorated with rich floral or geometric compositions in ornamental bands. The junction is mostly decorated with muqarnas (Fig.3.17) (Önkol, 2020).

The area covering the main niche of the crown gate is called kavsara and is usually surrounded by a pointed arch. Keeping the main niche deep increases the depth of this section and these sections are covered with a vaulted (fig.3.18) or muqarnas cover. The arches are the elements that allow the deep entrance to take on a three-dimensional shape. They are located above windows and doors (Ertunç, 2020).

Figure 3.17 Kavsara muqarnaslı (Önkol, 2020)

Figure 3.18 Kavsara vaulted (Önkol, 2020)

In Seljuk architecture, barrel vault mirror vaults are seen in tombs, madrasahs, darülşifahane caravanserais. There are examples of domes with octagonal pulleys and pyramid cones.

The construction inscriptions that we are accustomed to see on the crown gate can sometimes be placed in a different part of the building. For example; in Kırşehir Âşık Paşa Tomb, the construction inscription is not placed on the crown door, but in a plate on the dome pulley on the façade. Apart from this, most of the inscriptions placed anywhere in the interior or exterior of the building are repair inscriptions (Ünal,1982),(Fig. 3.19).

Fig. 3.19 Kırşehir Aşık Pasha Tomb (Ünal, 1982)

3.6 Shapes resisting straight lines and right angles

Geometric forms constitute one of the most characteristic features of Seljuk art, and the basic texture of geometric decoration is the mesh. These are the strips that form the mesh obtained from the intersection of horizontal, vertical and diagonal strips (Kuban, 2002).

Geometric forms symbolize the infinity of the universe in terms of meaning. Towards the end of the 13th century in Anatolia, the pulley was formed with triangular

prismatic elements called the Turkish triangle. In brick construction, the cover is adorned with strings such as wheel of fortune and zigzag. In stone construction, it is shaped with star vault and muqarnas elements (Berktay, 2005). The circle is the main element in the creation of all geometric shapes. Geometric forms consist of the combination of many simple forms such as square, rectangle, circle, polygon, diamond and stars and symbolize the infinity of the universe in terms of meaning (Akar and Keskiner, 1978). Geometric motifs show the harmony, order and rhythm of the universe (Demiriz, 2000). Star motifs and geometric compositions, which are the most commonly used elements of architectural ornamentation, are rich and harmonious enough to remind the sky (Çam, 1999).

One of the geometric ornaments that reached perfection in Anatolian Seljuk art is the star system (Figure 3.20). Stars, which experienced their golden age in Seljuk art, draw attention among geometric motifs (Demiriz, 2000)

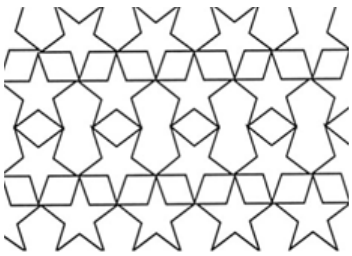

Fig. 3.20 Five Stars, Divriği Shifahane Gate Pediment (Demiriz, 2000)

Interlacing (Zencirek), the uninterrupted continuation of chained rings is the characteristic of this motif type. In interlacings, there are two basic principles: continuity and the continuous crossing of the strips above and below each other (Figure 3.21), (Demiriz;2000).

Fig. 3.21 Interlacing (Zencirek), (Demiriz;2000)

In the Seljuks, geometric ornaments were created with balance and proportion in mind within the grift lines. Different chain interlaces and geometric interlaces with polygonal and star motifs were widely used in the borders of stone decorations (Öney, 1988). In Anatolian Seljuk crown gates, geometric ornamentation was largely made with pentagons-tongues, hexagons, octagons and dodecagons (Figure 3.22) (Bulut, 2020).

It is seen that most of the other geometric ornaments in these buildings are also pentagonal-congene. The geometric compositions have a “V” shape and are quite superficially rendered (Mülayim, 1982).

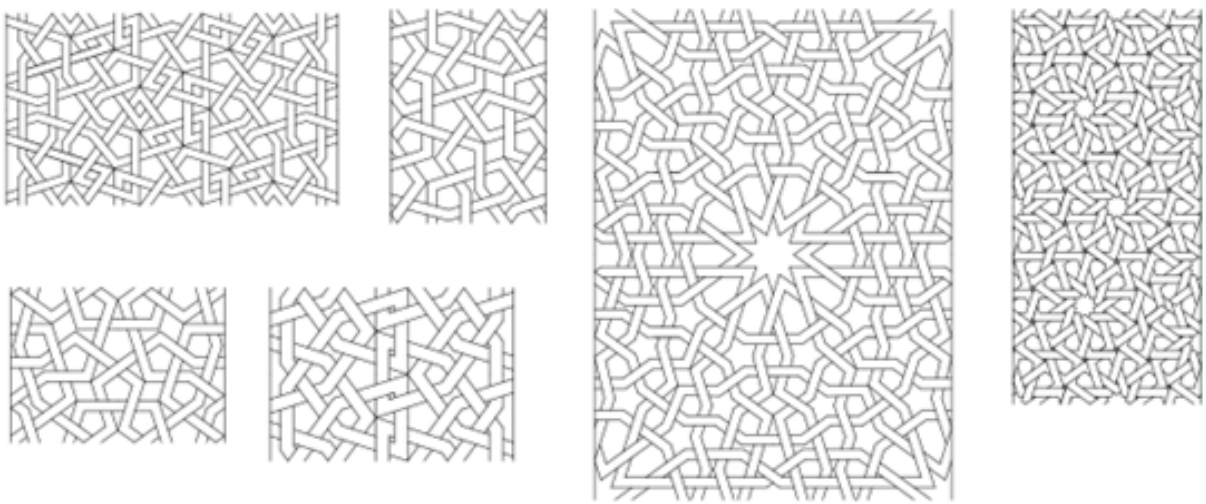

Fig. 3.22 Pentagonal - Decagonal Compositions on Anatolian Seljuk Period Crown Doors (Bulut, 2020).

4. Discussion

The evaluation of Seljuk architecture in terms of biophilic design traces has been examined in terms of natural shapes and forms, Herbal motifs, Animal motifs, Sea Shell and spirals, Egg oval and cylindrical shapes, arches, vaults, domes, straight and non-right angled forms. Biophilic Design traces of natural shapes and forms in the facade elements of natural shapes and forms in the building components of the facade elements, natural materials such as stone, plaster and brick were used in the building components and it was determined that master designs inspired by nature were made.

5. Conclusions

Through biophilic design, we not only promote a sense of sustainable design while remembering our past architectural roots, our connection to the environment, but also a sense of respect and care for nature.

Nature is a limitless, simple, balanced force that we cannot resist. When viewed on the scale of the universe, all living things in nature act in a certain order and in harmony with nature and continue their lives. Considering the effects of architecture on the artificial environment, its effects on humans, its effects on living creatures and its effects on nature, it makes its positive and negative reflections felt in every age over time. When we examine the results obtained from the researches, it is seen that acting together with nature, not against nature, positively affects human life. Biophilic design principles should not only be applied to our architecture, which is a cultural heritage from the past to the present, but also to the architecture we will design now and in the future, which we will pass on to the next generations with a love of nature and a sense of commitment. Settlements with unique regional identities in relation to the natural and cultural context in which they are located are archives that contain all the abstract and concrete traces of human and natural history.

In Seljuk architecture, efforts to integrate with nature and to be inspired by nature were designed with the infinite possibilities of ornamentation, ornamentation and geometry in building components. The natural shapes and forms inspired by nature, rendered on natural materials, are cultural heritage treasures left to the present day.

References

Akar, A. And Keskiner, C,. 1978. Türk Süsleme Sanatlarında Motifler, T.C. Kültür Bakanlığı Yayınları.

Algan, N., 2008. Anadolu Selçuklu Dönemi Mimarisi Taş Yüzey Süslemelerinin İncelenmesi ve Seramik Yorumları, Sanatta Yeterlilik Tezi, Dokuz Eylül Üniversitesi Güzel Sanatlar Enstitüsü Seramik Anasanat Dalı, İzmir.

Almusaed, A., 2011. Biophilic and bioclimatic architecture: Analytical therapy for the next generation of passive sustainable architecture, Biophilic and Bioclimatic Architecture, Springer-Verlag, London.

Bakırer, Ö., 2002. Anadolu Selçuklu Mimarisinde Süreklilik ve Değişim, Türkler Ansiklopedisi (Cilt 7), Ankara: Yeni Türkiye Yayınları.

Benyus, J., 2002, Biomimicry: Innovation inspired by nature, Perrenial/Harper.

Berktay, H.,Hassan, Ü., and Ödekan, A., 2005., Türkiye Tarihi 1, Osmanlı Devletine Kadar Türkler, Cem Yayınevi, İstanbul, 2005.

Birol, İ. ve Derman, Ç., 2004. Türk Tezyini Sanatlarında Motifler, Kubbealtı Yay. İstanbul.

Bulut, M. 2020. Selçuklu Çizgileri: Anadolu Selçuklu Geometrik Kompozisyonları. İstanbul: İnkilab Yayınları.

Bulat, S., 2013. İshak Paşa Sarayı Taçkapılarının Bezemeleri Açısından Değerlendirilmesi, Güzel Sanatlar Enstitüsü Dergisi, S. 30, s. 19-43.

Çam, N., 1999. İslamda Sanat Sanatta İslam, Akçağ, 3. Baskı, Ankara.

Çaycı, A., 2008. Selçuklularda Egemenlik Sembolleri, İz Yayıncılık, İstanbul.

Çelik, Y., 2008. Diyarbakır Surlarında Hayvan Figürleri, Yüksek lisans tezi, Dicle Üniversitesi, Sosyal Bilimler Enstitüsü.

Çoruhlu, Y.,1989. Lotus İkonografisi ve Uygur Sanatında Lotus. 4-7 Eylül Uluslar Arası Osmanlı Öncesi Türk Kültür Kongresi (s. 155-168). Ankara.

Demiriz,Y., 2000. İslam Sanatında Geometrik Süsleme, İstanbul: Lebib Yalkın Yayınevi, İstanbul.

Diler, A., 2016. Anadolu Selçuklu Ve Beylikler Dönemi Mimarisinde Görülen Kozmik Anlamli Figür Ve Motifler, Yüksek Lisans Tezi, Atatürk Üniversitesi Sosyal Bilimler Enstitüsü, Erzurum.

Dursun, Ş.,2009. Selçukluları Dönemi Kayseri Türbelerinde Taş Süslemeciliği şükrü Dursun Yüksek Lisans Tezi T.C. Selçuk Üniversitesi Sosyal Bilimler Enstitüsü Sanat Tarih Anabilim Dalı Anadolu Konya.

Düzenli, T., Tarakçı Eren, E. ve Akyol, D., 2017. Peyzaj Mimarlığında Sürdürülebilirlik ve Biyofilik Tasarım Kavramı Concept of Sustainability and Biophilic Design in Landscape Architecture), The Journal of Academic Social Science. (Asos Journal).

Erbek, M., 2002. Çatalhöyük'ten Günümüze Anadolu Motifleri, Kültür Bakanlığı Yayınları, Ankara.

Fromm, E. O., 1964. The Heart of Man. Harper & Row Paperback Edition Publisher.

Görür, M.,1999. Beylikler Dönemi Mimarisinde Taş Süsleme (1300-1435)", Doktora tezi, Hacettepe Üniversitesi, Ankara.

Hasol, D., 1995. Ansiklopedik Mimarlık Sözlüğü, İstanbul.

İnal, G., 1971. Susuz Han'daki Ejderli Kabartmanın Asya Kültür Çevresi içindeki Yeri , Sanat Tarihi Yıllığı, IV, 153-182.

İnalcık,H., 2001. "Anadolu Selçuklu Devletinden Osmanlı Devletine", I. Uluslar arası Selçuklu Kültür ve Medeniyet Kongresi Bildiriler-I. I. Cilt, (Konya: S. Ü. Selçuklu Araştırmaları Merkezi).

Karadaş, Ş., 2011, Anadolu Selçuklu Dönemi Mimarisinde Bitkisel Bezeme Unsûrları, Doktora Tezi, Atatürk Üniversitesi/Sosyal Bilimler Enstitüsü, Erzurum.

Karamağarali, B., 1992. Ahlat Mezar Taşları, TC. K.B.Y. Ankara, 236 S.

Kellert, S.R, Wilson, E.O.,1993. The Biophilia Hypothesis, first ed., Washington DC: Island Press.

Kellert, S.R., 1997. Kinship to Mastery: Biophilia in Human Evolution and Development. Island Press, Washington, DC.

Kellert S.R., 2008. Dimensions, elements and attributes of biophilic design. In: Kellert, S. (Ed.), Biophilic Design. John Wiley & Sons, New Jersey.

Kellert, S.R, Heerwagen, J.H, Mador, M.L., 2008. Biophilic Design: The Theory, Science, and Practice of Bringing Building to Life. (John Wiley & Sons ed.). Hoboken, New Jersey.

Kellert, Stephen R, Calabrese EF., 2015. The Practice of Biophilic Design. biophilic-design.com.

Kellert, S.R., 2018. Nature by Design:The Practice of Biophilic Design. (1st ed.). New Haven & London: Yale University Press.

Kuban, D., 1999. Divriği Mucizesi: Selçuklular Çağında İslam Bezeme Sanatı Üzerine Bir Deneme. İstanbul: Yapı Kredi Yayınları.

Kuban, D., 2002. Selçuklu Çağında Anadolu Sanatı. İstanbul: Yapı Kredi Yayınları.

Mülayim, S.,1982. ,AnadoluTürk Mimarisinde Geometrik Süslemeler (Selçuklu Çağı), Kültür ve Turizm Bakanlığı Yayınları, Ankara.

Mülayim, S., 2015. Türk Sanatında İkonografik Dönüşümler Değişimin Tanıkları, Kaknüs Yayınları, İstanbul.

Olğun, T. N., 2021. Malatya Yöresi Kırsal Kerpiç Mimari Mirasın Nitelikleri, Koruma Sorunları ve Öneriler. Doktora Tezi, Dokuz Eylül Üniversitesi Fen Bilimleri Enstitüsü, İzmir.

Ödekan, A., 2002. Anadolu Selçuklu Çağında Mukarnas Bezeme, Selçuklu Çağında Anadolu Sanatı, Anadolu'da İlk Türk Mimarisi Başlangıç ve Gelişmesi.

Ödekan, A., 2005. Türkiye Tarihi 1 Osmanlı Devletine Kadar Türkler, Cem Yayınları, İstanbul.

Ögel, S., 1966. Anadolu Selçukluları'nın Taş Tezyinatı. Ankara: Türk Tarih Kurumu.

Ögel, S., 1994. Anadolu'nun Selçuklu Çehresi. İstanbul: Akbank Yayınları.

Öney, G., 1969. Anadolu Selçuklularında Heykel, Figürlü Kabartma ve Kaynakları Hakkında Notlar. Selçuklu Araştırmaları Dergisi ,.Ankara: Türk Tarih Kurumu.

Öney, G., 1988. Anadolu Selçuklu Mimarisi Süslemesi ve El Sanatları, Türkiye İş Bankası Kültür Yayınları, Ankara.

Öney, G. and Erginsoy, Ü.,1992. Anadolu Selçuklu Mimarisinde Süsleme ve El Sanatları. Ankara: Türkiye İş Bankası Kültür Yayınları.

Öney, G., 2002. Anadolu Selçuklu Sanatı, Türkler Ansiklopedisi, Cilt 7, Ankara: Yeni Türkiye Yayınları.

Önkol E.Ç., 2020. Anadolu Selçuklu Taçkapılarında Kavsara Sistemleri, Yıl 2020, Cilt: 1 Sayı: 1, 74 – 83, Lale Kültür, Sanat Ve Medeniyet Dergisi.

Örnek,S.V., 1973. Budunbilimleri Terimleri Sözlüğü, TDK Yayınları, Ankara.

Özbek, Y., 2002. Osmanlı Beyliği Mimarisinde Taş Süsleme (1300-1453), Kültür Bakanlığı Yayınları 423, Ankara.

Özkul, K., 2018. Anadolu Selçuklu Dönemi Taş İşlemeciliğinde Çift Başlı Kartal Figürü, Uluslararası Güzel Sanatlar Sempozyumu, Alanya.

Sözen, M. ve Tanyeli, U., 1999. Sanat Kavram ve Terimleri Sözlüğü, Remzi Kitabevi, İstanbul.

Sözen,G. ve Sözen, Z., 2008. Anadolu Topraklarında Güzeli Arayış, İstanbul Modern Kütüphanesi, Mas Matbaacılık, İstanbul.

Turan B., 2013. Osmanlı Öncesi Anadolu Türk Mimarisinde Kullanılan İstiridye Motifi Yüksek Lisans Tezi Mimarlık Tarihi Anabilim Dalı Mimarlık Tarihi Ve Kuramı Programı, T.C. Yıldız Teknik Üniversitesi Fen Bilimleri Enstitüsü İstanbul.

Ünal, H. R., 1982. Osmanlı Öncesi Anadolu Türk mimarisinde Taçkapılar. İzmir: Ege Üniversitesi Edebiyat Fakültesi Yayınları.

Wilson, E.O. 1984. Biophilia: the Human Bond with Other Species, Cambridge: Harvard University Press.