



Life of People and Domestic Animals in Symbiosis under the same Roof: Examples in Bosnia and Herzegovina

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Article Info

ISSN (online): 2582-7138

Volume: 06

Issue: 01

January-February 2025

Received: 06-11-2024

Accepted: 07-12-2024

Page No: 2006-2019

Abstract

The author participated in the scientific conference 15th International Passive House Conference 2011, which was held (May 26-30, 2011) in Innsbruck. The conference program also included visits to several buildings that were built according to Passive House principles, among which was the Agrarzentrum West in Imst, about 50 km from Innsbruck. The author was fascinated by the symbiosis of people and nature, people and domestic animals, which was indicated by the ubiquitous billboards with images of people in 'hugs with domestic animals'. The author first became acquainted with the symbiosis of humans and domestic animals in the Katun settlement of Gradina above the Umoljani village on the plateau of the Bjelasnica Mountain. In 2015-2017, the author worked on the extensive project "Bosnian chardaklija house" when he visited the entire area of Bosnia and Herzegovina and processed about 60 examples of Bosnian chardaklija house. Many of them are presented in published scientific works. In the region of Bosnian Krajina, he encountered specific solutions of the Bosnian chardaklija house, where people and domestic animals live under the same roof. Author was fascinated by these solutions, and especially the reasons that generated them. This paper presents some of these houses.

Keywords: Man, Domestic animals, Bosnian chardaklija house

1. Introduction

In 2008, construction began on the Agrarzentrum West facility in Imst, Austria, which was officially opened in 2010. AZW is the center of the entire livestock trade in the Upper Tyrol region. In 2019, almost 7,500 cattle with an added value of almost seven million euros were marketed through AZW Imst. In addition, 4,000 sheep are sold through AZW and 15,000 kg of sheep's wool is collected. In addition, AZW has made a name for itself as a multifunctional event center. Since October 2017, AZW also relies on renewable energy through a photovoltaic system with a peak power of 290 kw. This means that we are taking on a pioneering role in the Tyrolean mountain region. In AZW, which is owned by Rinderzucht Tirol eGen, there are also important partners Maschinenring Tiroler Oberland, the Chamber of Agriculture of the Imst district, the Lagerhaus and the restaurant I-Kuh with a total of almost 40 employees. It has developed into a multifunctional event center in the Tyrolean highlands. Whether it is animal exhibitions on a regional or national level, as well as concerts or seminars, the AZW offers the perfect infrastructure for almost any occasion with almost 10,000 m² of covered space (Figures 1,2).



Fig 1: Agrarzentrum West in Imst, Austria

Source: Author (May 29, 2011)



Fig 2: Exhibition of dairy cows and other farm animals at the Agrarzentrum West in Imst, Austria

Source: <https://www.agrarheute.com/braunvieh/aktuelles/tierschauen-vermarktung/grosse-schauen-imst-zug-533074>

Accessed: February 12, 2025.

Source: https://www.meinbezirk.at/imst/c-lokales/alle-drei-gesamtsiege-gingen-an-jungzuechterinnen_a5170603#gallery=default&pid=28304728,

Accessed: February 12, 2025.

Source: https://www.schafundziege.tirol/aktuelles/detail?tx_news_pi1%5Baction%5D=detail&tx_news_pi1%5Bcontroller%5D=News&tx_news_pi1%5Bnews%5D=1381&cHash=21d419f82532a21c94d33d68a1f242b1, Accessed: February 12, 2025.

The Bosnian sss house is one of those achievements of non-native architecture that, with its spatial organization, materialization and external appearance, most vividly reflects the nature of the Bosnian and Herzegovinian man, the nature of his family and the general worldview [1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33, 34]. Given its spatial organization, construction, materialization and the equipment of its interior spaces, the Bosnian chardaklija house is the most authentic expression of the natural and social environment of Bosnia and Herzegovina and the complex phenomenon of its man and his primary social community - the family

2. Life

Life is a term we use to distinguish physical entities that have biological processes (living entities) from those that do not (non-living entities). There are various forms of living entities: animals, plants, fungi, algae, protozoa and bacteria. Biology is the science that studies living entities. For philosophy, life is its most important and fundamental question that it deals with, in the way of considering its meaning. Bioethics is a scientific discipline that studies life from the aspect of moral principles. From the point of view of biology, life is a complex event made up of numerous partial processes that take place in a living entity (individual) during its lifetime. One of the basic characteristics of living entities that distinguishes them from non-living entities is the possession of complex compounds with carbon. In this case, the cell is their smallest structural and functional characteristic. The elementary conditions for the realization of life are: water, air, heat and light. Life on Earth is thought

to be about 3.7 billion years old [35], and there are about 300,000 plant and several million animal species living on Earth today. In addition, a huge number of species are extinct. From a biological perspective, life is a characteristic of organisms that exhibit all or most of the following features [35]: 1. Homeostasis: refers to the maintenance of constant conditions in the internal environment of cells. Almost all organs and tissues in the body perform functions that contribute to the maintenance of these constant conditions; 2. Organization: the body of living organisms is built from one or more cells, which are the basic units of life; 3. Metabolism: the set of chemical reactions that occur in a living organism in order to maintain life. Living things need energy to maintain internal organization (homeostasis) and to produce other processes related to life maintenance; 4. Growth: building the body and increasing the volume of the body; 5. Adaptation: the ability to change over time in response to changes in the environment. This ability is fundamental to the process of evolution; 6. Response to stimuli: can be very diverse, from simple contractions of unicellular organisms to external chemicals, to complex reactions involving all the senses of multicellular organisms; 7. Reproduction: The ability to produce new individual organisms, either asexually from a single parent organism or through sexual intercourse between two organisms. Koshland (2002) [36] lists seven characteristics of life: 1. Program (DNA); 2. Improvisation (response to the environment); 3. Compartmentalization (the ability to be divided into parts); 4. Energy; 5. Regeneration; 6. Adaptability; 7. Isolation (chemical control and selectivity). Although the issue of life is also addressed by other scientific disciplines, as well as philosophy and

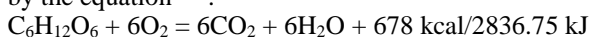
religion. From the perspective of the title of this paper, life can be defined as a material system that undergoes reproduction, mutations and natural selection. Metabolism is a complex process of chemical reactions in which matter is exchanged, exclusively in living beings. These processes are a prerequisite for other functions inherent in living beings. With regard to metabolic reactions, two types of metabolism are distinguished: catabolism and anabolism. Catabolism is the process of breaking down organic substances, which is accompanied by the accumulation of energy through cellular respiration, while anabolism is the process of building cell parts (biosynthesis of organic substances, such as proteins and nucleic acids) using energy. The chemical reactions of metabolism take place in individual metabolic pathways where one chemical compound is converted into another, with the help of enzymes as accelerators (catalysts) of metabolic reactions. The following metabolic pathways are important in humans: water metabolism, amino acid metabolism, carbohydrate metabolism and fat metabolism. The term basal metabolism refers to the amount of energy needed to maintain the basic life functions of a living being. The value of a person's basal metabolic rate is a function of their age, body mass, and gender, and ranges from about 7.56 MJ/d for a man aged 65 years and about 5.98 MJ/d for a woman aged 55 years [37]. In order for metabolism to take place in living beings, it is necessary that they take in certain substances (food, water, oxygen) and that certain conditions prevail in their environment, of which temperature is one of the most important. At the same time, all substances introduced into the body have their own energy potential, i.e. 'caloric value'. Biology distinguishes two types of animals with regard to their ability to maintain metabolism: homeothermic and poikilothermic. Homeothermic animals and humans have a (mostly) constant body temperature (mammals 37 °C - 38 °C, birds 40 °C), even with external temperature fluctuations, while poikilothermic animals have a body temperature depending on the temperature of their environment. Regardless of the ability to maintain a constant temperature, the temperature of its natural environment is extremely important for human comfort. For the title of this paper, it is extremely important to know the values of environmental elements that ensure the normal metabolism of living beings, that is, life as the most complex phenomenon in the Universe. In this sense, it is also necessary to know the amount of heat that living beings emit into their environment, since it is important in the overall energy balance of the observed architecturally defined space (Table 1).

Table 1. Heat dissipation of the human body during various activities (1 met = 58.15 W/m²)

Activity	Heat dissipation	
	Met	W
Sleeping	0.7	75
Sitting	1.0	105
Walking at a speed of 3.2 km/h	2.0	210
Walking at a speed of 6.4 km/h	3.8	400
Office work	1.0 - 1.4	105 - 150
Cleaning the house	2.0 - 3.4	210 - 355
Dancing	2.4 - 4.4	250 - 460
Basketball	5.0 - 7.6	580 - 800
Maximum (short-term)	11.5	1200

Source: Adapted from *Thermal Comfort* http://www.labee.ufsc.br/antigo/arquivos/publicacoes/Thermal_Booklet.pdf, Accessed: February 11, 2025.

The energy dimension of metabolism in animals is expressed by the equation [38]:



where is:

C₆H₁₂O₆ - hexose (monosaccharide with six carbon atoms),

O₂ - oxygen,

CO₂ - carbon dioxide,

H₂O - water,

678 kcal/2836.75 kJ - the amount of heat generated by the combustion (oxidation) of hexose.

The relationship between an animal's mass and the heat released by their metabolism has been scientifically researched:

$$Q_{mb} = cW^b_{kg}$$

gdje je:

Q_{mb} - basal metabolic energy,

c - constant,

W_{kg} - animal weight (kg),

b - exponent (~ 0.75).

Applying the above equation to individual animals will give the basal metabolic heat output of the animal per kilogram of its mass. Interestingly, smaller animals have a higher heat output per kilogram of their mass (Figure 3).

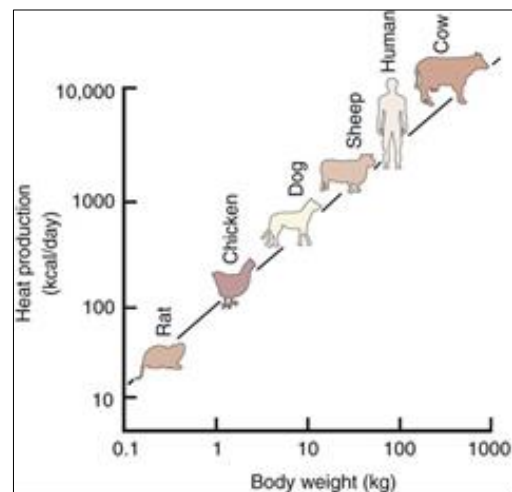
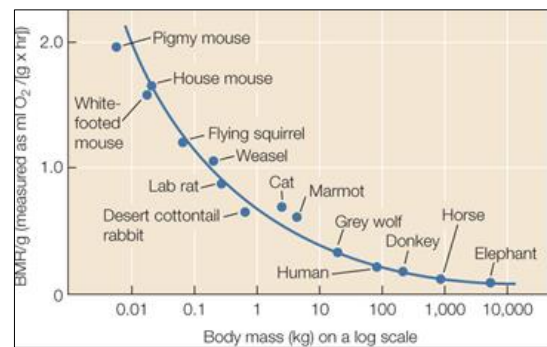


Fig 3: Left: The Mouse-to-Elephant Curve in Basal Metabolic Rate. Basal metabolic rate (measured as the rate of O₂ consumption) per gram of body weight in terrestrial mammals decreases dramatically as body size increases. The x axis is a logarithmic plot of body weight. Right: Relationship between body weight and heat production

Source: https://digfire-published.macmillanusa.com/pol2e/asset/img_ch29/c29_fig03.html, Accessed: February 12, 2025.

Source: <https://veteriankey.com/thermoregulation-2/>, Accessed: February 13, 2025.

Therefore, living beings behave as a kind of transformers of matter into energy. By taking food from their environment, living organisms take one of the assumptions of their life

which, through one of its manifestations, metabolism, emit energy in the form of heat, and other forms of matter resulting from the decomposition of previously ingested food. A cow that milks 54 kg of milk per day generates about 6300 BTU (British Thermal Units) per hour, or 1.85 kilowatt hour (Figure 3, right). It is a powerful heat source. Therefore, a living organism (certainly a human being as one of them) is a typical example of an energy system, and therefore architecture as its framework.

3. Architecture as an energy system

In an architecturally defined space as a system, energy flow is treated by its special subsystems: mechanical installations and electrical installations. Energy flow in an architecturally defined space as a system is related to ensuring those parameters of the architectural space that define the space of human comfort, from its thermal, light and acoustic aspects. The space of human comfort has been researched, determined and prescribed at the level of states, state communities and at the global world level¹. In order to ensure the parameters of human comfort from the thermal aspect, it is necessary to know all forms of energy necessary for life within the architecturally defined space, on the one hand, and all relevant parameters of the environment of architecture as a system. Between the architecturally defined space and its environment, in accordance with the Second Postulate of Thermodynamics, there is a permanent exchange of energy due to the more or less constant change in the intensity of certain parameters, both within the architectural space and in its environment. Sometimes this change is periodic (daily, annual), and sometimes completely stochastic. However, the ideal of comfort within an architecturally defined space is for it to be constant (Figure 4).

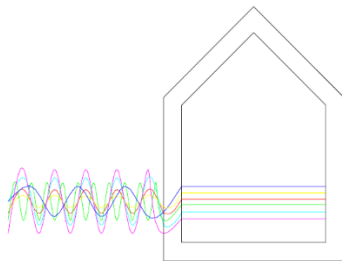


Fig 4: Change in intensity of the environmental parameters of an architecturally defined space

Source: Prof. Ph.D. Ahmet Hadrovic (2017)

The intensity of certain parameters of the environment of an architecturally defined space (air temperature, air humidity, amount of oxygen in the air, amount of carbon dioxide in the air, odor intensity) is sometimes higher and sometimes lower than the optimal intensity of these parameters within the architecturally defined space (Figure 5). Hence, the role of the boundaries of an architecturally defined space is to 'dampen' fluctuations in the intensity of certain parameters in the environment, or to keep the intensities of certain parameters within the architecturally defined space constant [2,3].

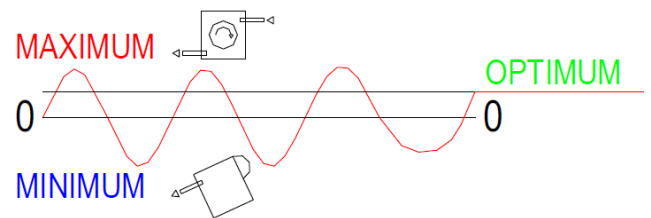


Fig 5: Fluctuations in the intensity of certain parameters in the environment of an architecturally defined space

Source: Prof. Ph.D. Ahmet Hadrovic (2017)

We are fully aware of the properties of the boundaries of an architecturally defined space, which ensure the stability of internal comfort parameters: these are the heat transfer coefficient (k , or U -value, W/m^2K), the damping factor of external temperature oscillations (v , -), the stationary flow of water vapor in the process of vapor diffusion (adequate arrangement of boundary layers and the size of their relative resistances to water vapor diffusion...). Methods for calculating heat flow and water vapor flow through the boundaries of an architecturally defined space are also known, which allow us to arrive at valid solutions for their materialization (Figure 6).

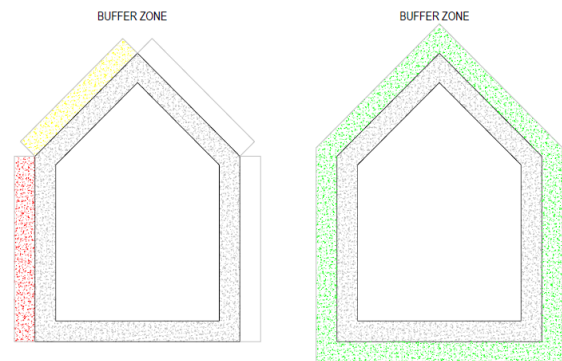


Fig 6: The materialization of the boundaries of an architecturally defined space is a complex empirical and creative process

Source: Prof. Ph.D. Ahmet Hadrovic (2017)

The process of calculating the heat flow and water vapor flow through the boundaries of an architecturally defined space is not abstract, but is always linked to a concrete concept and the materialization of its boundary. This is where the complexity and contradiction of architecture is reflected, where architecture should be realized as a work of art with strict adherence to empirical requirements. Similar to the heat and water vapor flow through the boundary of an architecturally defined space, it is possible to empirically monitor the behavior of light and sound, or to determine the necessary boundary performance for a comfortable feeling for a person within an architectural space [2,3].

4. Examples of people and domestic animals living under the same roof in Bosnia and Herzegovina

Above the Umoljani village is the Gradina katun settlement.

¹ Thermal comfort:
Standard in the European Union:
- EN ISO 7730 PMV/PPD,
Global world level standards:
- ISO 7730 PMV/PPD,

- ISO 10551 Subjective methods,
- ISO 14415 – People with special requirements,
- ISO 14505, Parts 1-3, Vehicles,
- ISO 13732, Part 2, Contact with surfaces of moderate temperature.

The settlement got its name from the archaeological site of the castle dating back to the time of the Illyrians, 2500 years ago. Next to the Katun settlement are extensive meadows, arable fields and pastures that continue to Dugi Polje and the southern slopes of the Bjelašnica mountain. An extremely important resource is the plain where the Studeni stream meanders, which falls into the canyon of the Rakitnica river

through the Badnji waterfall (Figures 7, 8, 9). This plain with Studeni potok is used as a meadow where many types of medicinal plants grow. At the foot of the peak of Obalj is a forest where the inhabitants of the village of Umoljani are traditionally supplied with firewood and wood for the construction of some of the structures of their houses, stables and auxiliary buildings



Fig 7: Studeni stream above the Umoljani village

Source: Author (August 28, 2016)



Fig 8: View from the top of Obalj to the Umoljani village and the Gradina katun settlement

Source: Author (October 17, 2015)



Fig 9: House-stand in the Gradina katun settlement on the Bjelasnica Mountain plateau

Source: Author (October 26, 2014)

The Kasumovic family house in Vrnograc was built at the end of the 19th century, northwest of the medieval fortress and the present-day town of Vrnograc, on a flat slope with a southeast exposure (Geographic coordinates: 45°09'52.85"N, 15°56'57.89"E, Elevation: 221 m). The house offers wide and beautiful 180° views. The house belongs to the distinguished Kasumovic family, who traditionally had a shoemaking shop in Vrnograc. According to the characteristics of the horizontal ground floor plan, the Kasumovic family house in Vrnograc belongs to the type of two-aisle Bosnian chardaklija house with the specific features of a house from Bosnian Krajina. The house is developed vertically through the ground floor and the first floor. The specific features of the house from Bosnian Krajina relate to the arrangement of the ground floor as a stable, and the arrangement of the first floor as a living space. Another specific feature is the cantilevered projection of the first floor into the space outside the ground floor contour (in the case of this house by about 50 cm). The ground floor of the house has an entrance area for the living space on the first floor, and a stable for livestock. It is interesting that this house has two entrances to the apartment, on the sides of the ground floor that form an angle of 90°. The door to the stable is located away from the door to the living space, but they are placed on the same side of the ground floor. A single-flight staircase leads from the entrance area on the ground floor (hayat) to the floor where the apartment is located. First, the staircase leads to a relatively large area of the 'house' with a fireplace, on which four čardaks are oriented, and the area of the annex with a toilet, on the northwest side of the first floor. In the wall of the 'house' towards the annex, there is a console for the 'water tank' where clean water for drinking and preparing food was kept, and a cupboard-dulaf. Four verandas and the space of a 'house' in one residential building was a rare case in Bosanska Krajina. In this case, it is a house of an economically well-off and numerous family. The Kasumovic family house in Vrnograc is not used for its primary purpose today, but as a space for servicing secondary housing needs (storage of various household equipment, tools, etc.). The physical structure of the building is relatively well preserved. The current owners of the house installed a new roof covering (galvanized sheet metal) over the existing wooden shingles, thus protecting the roof from adverse weather conditions for a longer period of time. The current owners of the house recently built a new building, but still preserve the old house

as a confirmation of the continuity of their family and as a 'guardian of its future'. During the war, the house was a refuge for many people who were driven from their homes by the war (1992-1995). And that is one of the reasons why the current owners preserve this house (Figures 10,11).

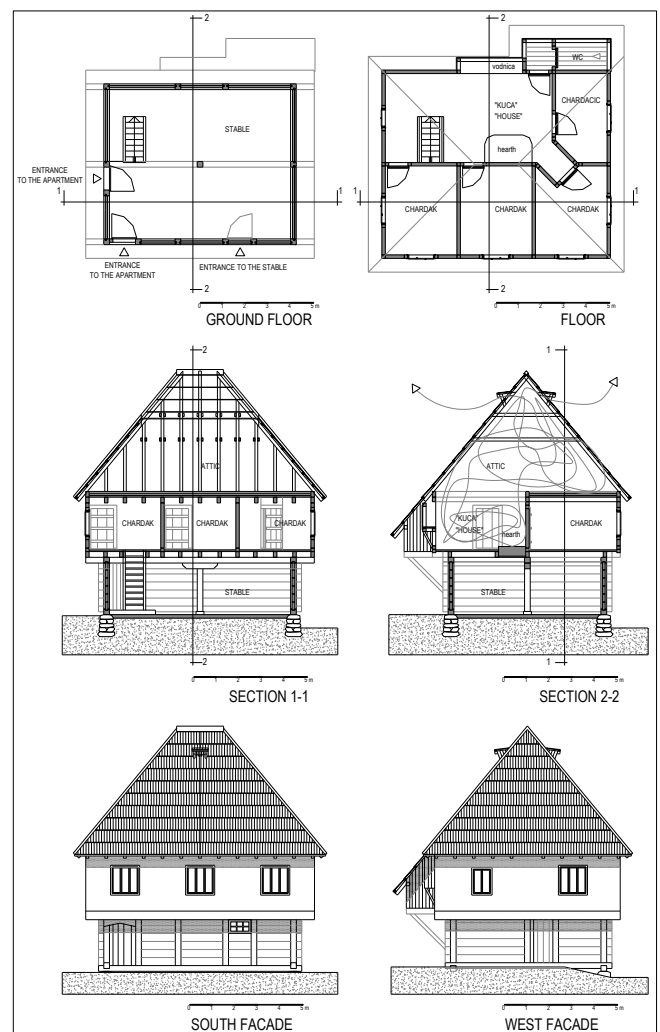


Fig 10: The Kasumovic family house in Vrnograc. Layout

Source: Author (drawing, 2016.)



Fig 11: The Kasumovic family house in Vrnoegrac. The ground floor is arranged as a stable. A column in the middle of the barn is a typical solution in the Krajina chardaklija house

Source: Author (July 25, 2026)

The Kantarevic family house is located in the Klupe village near Velika Kladusa (Geographic coordinates: 45°12'07.75"N, 15°52'02.22"E, Elevation: 183 m). The house is situated on flat terrain, on the Kantarevic family estate, 3 km from the Vrnoegrac-Velika Kladusa road, in the local community of Podzvizd. The house is 1.65 km from the border of Bosnia and Herzegovina and Croatia. Mr. Mehmed (Mehmed) Kantarevic (born 1932)² lives in the house, built at the beginning of the 20th century, as a single person. Although it is about a hundred years old and is an extremely neglected area, the Kantarevic family house in the Klupe village near Velika Kladusa still has a completely preserved physical structure in all its elements. The house is not inhabited, but is under the constant supervision of the owner. Kantarevic's family house in the Klupe village near Velika Kladusa, according to the layout of the horizontal plan, belongs to the type of two-track Bosnian chardaklija house

² The author visited this house on July 25, 2016. The author's guide and assistant in filming the object was Mr. Spaho (Resid) Husidić (born 1958). The house was littered with various things, both inside and out, which made filming difficult for the author. It seems that the owner of the house intentionally intended to make the object 'untidy' so that its pristine beauty would not 'attract' anything that could harm the object.

³ During a visit to this house (July 25, 2016), the author and his guide, Mr. Spaho Husidić, found the owner of the house, Mr. Mehmed Kantarevic, lying on his back in the shade of a huge tree canopy. Since Mr. Mehmed knew Mr. Spaho, he was pleased with his visit, which helped the author quickly get down to business of photographing the property and talking to Mr. Kantarevic about the history of the Kantarevic family and their house. The author was most interested in why the elderly man (Mr. Kantarevic was 84 at the time) was lying outside, under a tree, near the old house of the Kantarevic family (and not in the new house built next to the old one), and what he was thinking about. Mr. Kantarevic replied that when he was near this house, he was not alone, but in the company of all the people who were

with the specific features of houses in the Bosnian Krajina. These specifics refer to the arrangement of the ground floor of the house as a barn and the first floor as a living space, the existence of a cantilevered annex on the main part of the house in which the water tank/'vodnica' and the sanitary unit are located, and the cantilevered letting of the residential level of the floor into the space, outside the contour of the ground floor, on all sides of the horizontal plan. This house, however, also has its own specifics: a cantilever sofa on the front of the house (which in the horizontal plan of the house stands symmetrically with the usual annex of a Krajina house, in relation to the central plane of symmetry), and one entrance to the house, for the apartment and for the barn. On the ground floor of the house, as already mentioned, there is a stable, and single-legged wooden stairs that lead to the floor where the living rooms are located. One-legged wooden stairs from the ground floor lead to the area of the first floor, to the first part where the area of the 'house' with a fireplace, i.e. the living room, is arranged. From this space, you can access a relatively large room that occupies the entire tract of horizontal plan, to the room area, on one side, and to the annex area with the 'water' and toilet, on the other side of the house. Although of modest basic dimensions, the divanhana built in this house testifies to the need of people to 'have a divanhana in the house', which always symbolizes a higher level of human needs, i.e. a richer housing culture. It should be emphasized that in the tract where the living room area ('house'/'kuca') is arranged, in its mezzanine construction ground-floor, a relatively thick layer of packed clay with shavings of straw and chaff is used as a floor covering, which ensures the fire safety of the wooden elements of the mezzanine structure and the house as a whole. From the area of the 'house', communication with the attic area was achieved using a permanently installed ladder. In one wall of wooden logs in the area of the 'house', a special opening (similar to a counter) was made through which food was taken, first onto a wooden console on the outside of the wall, and then lowered to the ground outside with a rope. This 'service elevator' solution is unique in Bosnia and Herzegovina. Although it is about a hundred years old and is an extremely neglected space, the Kantarevic family house in the Klupe village near Velika Kladusa still has a completely preserved physical structure in all its elements. The house is not inhabited, but is under the constant supervision of the owner. After a detailed inspection of the space and construction of the house, one gets the impression that it only needs to be cleaned, which can lead to a proctor of wide utility. This house has exceptional architectural-constructive and historical-ambient values, and the professional public and all levels of government in Bosnia and Herzegovina must not lose sight of this building, so that it does not disappear³

born in it, where they lived and died, and in the company of all those people who were in this house during the time he remembers. It seemed to the author that this answer from Mr. Kantarević also gave meaning to writing a book about the Bosnian chardaklija house, which he, at the beginning of work on the book, could not define so clearly. In addition, the author recalled the reflection on the 'essence of the house' that the writer Mehmed-Meša Selimović (through his literary character Ahmet Sabo) presented in the novel *Tvrđjava (The Fortress)*: „A dilapidated family house burned down, the Gypsies set it on fire when they took shelter from the winter, set it on fire unintentionally, carelessly, because it was not theirs. I would go and see the blackened walls and dead eyes, in which I could not imagine the former inhabitants. I could not even imagine myself in my memories. As if I were someone else. Dried fruits I hoped that the memories would return, maybe I would need them... (p. 27) ...That dead past and no present, those black ruins of everything that was, on which I don't intend to build anything, are still somehow connected to something... (p. 37) ...We finished the job, agreed on the sale, all in a hurry, as if I was getting ready to run away. Because I

(Figures 12, 13, 14).

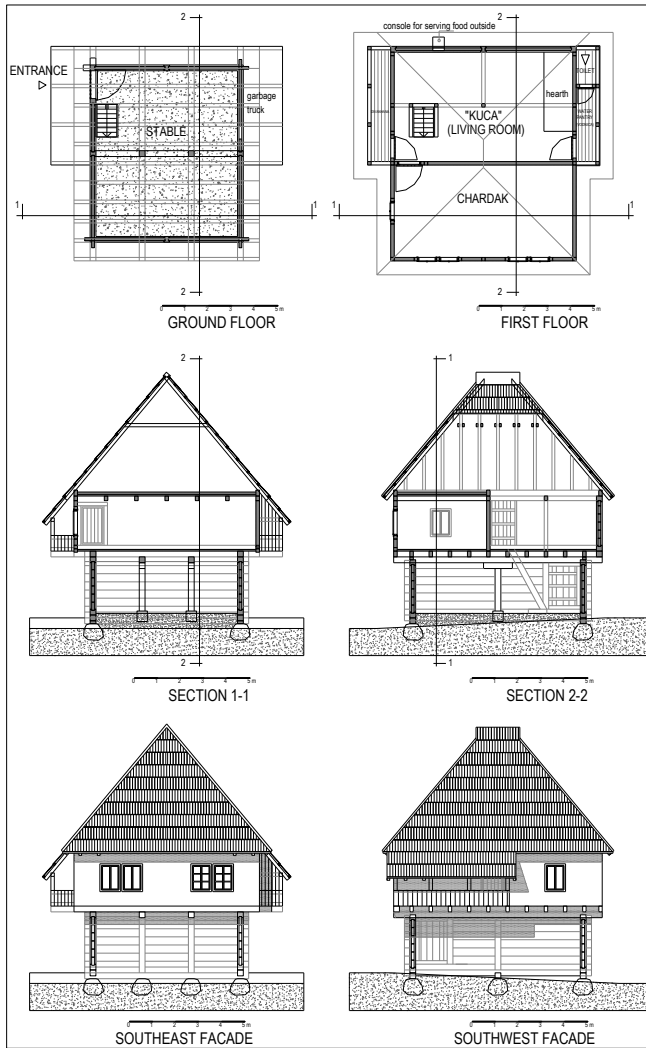


Fig 12: The Kantarevic family house in the Klupe village near Velika Kladusa. Layout

Source: Author (Drawing, 2016)



Fig 14: The Kantarevic family house in the Klupe village near Velika Kladusa. The house's current appearance

Source: Author (July 25, 2016.)



Fig 13: The Kantarevic family house in the Klupe village near Velika Kladusa. The barn on the ground floor of the house

Source: Author (July 25, 2016.)

The Bosnian chardaklia house in the area of Bosnian Krajina is specific in that it is also the habitat of man and his 'treasure'/'blago'. This fact largely determined its disposition, that is, the way of use. One of the consequences of a house arranged in this way is the area of the 'waterhouse' arranged as a water storage (on the first floor) and a toilet, always located above the stable next to the barn (on the ground floor). The existence of a toilet inside the house is a rare phenomenon in the disposition of the Bosnian čardaklija house (even town houses) in other parts of Bosnia and Herzegovina since the time of its original creation. The Abazovic family house is located in the Donja Koprivna village, about 6 km from the center of Cazin (geographic coordinates: 44°59' 32.13" N, 15°58' 48.15" E, Altitude: 396 m). The house was built (1937) by Bajram Abazovic (1892-?), a native of Buzim, who was appointed as the local imam in Donja Koprivna. It is interesting that this house was 'transported' from the Hodzici village near Krzalic, where it was built and used for several years. The house he designed and built, in which he lives in the complexity of his entire being, is the most concrete objectified image of a man, his family, and the wider and wider community in which he lives. By getting to know the Bosnian chardaklia house, we will also get to know those dimensions of the Bosnian man's being that have not been directly written about. According to the

suddenly felt regret, for no reason, I don't need that adventure, it tied me to my childhood, to the life from which mine came. I had to preserve the shadows, so that no empty thought would remain, without a trace and a

foothold and sadness for the lost past. Mine and theirs. Now I'm starting over"^[39].

horizontal plan of the ground floor, the Abazovic's house is two-story, while on the first floor the house is planned to be three- tracts. The house is developed vertically through the ground floor and first floor, where the entire contour of the outer walls of the ground floor is cantilevered into the space. The house has all the characteristics of a čardaklija in the Bosnian Krajina: a ground floor arranged as a stable (where the 'treasure' is kept), an upper floor with four rooms (chardaks), a 'divanhana' and a space with toilets cantilevered into the space (usually above the stable behind the garbage chute), a high voluminous roof made of shingles. On the ground floor of the house there is an entrance hajat for the living space on the first floor and a stable for livestock. To the left of the entrance to the house there is (traditionally for a Krajina house) a woodshed, while in its hinterland there is a garbage chute. The first floor is a living space, which is given a particularly festive appearance by a wooden staircase with a railing. In this house this is particularly emphasized by the 'divanhana' which has an emphasized cantilevered access to the open space, a polygonal contour of the floor plan and emphasized transparent and bright external walls. Four spacious rooms on the residential floor with a characteristic bathroom solution give this house a particularly rich appearance. It reflects the high housing needs and rich housing culture of its owners. Some elements of the house's construction have the value of some archaic solutions. Thus, the foundation walls are reduced to a single stone over which the foundation beams (wedding bands) of the house run. This solution has its own well-considered values in the bioclimatic approach to construction. Namely, the space between the ground floor and the basement floor is closed with dry fern in winter (and becomes a warm, protected zone of closed air that protects the space from low outdoor temperatures), while in summer this space is open (and thus ensures the necessary ventilation of the barn space). The walls of the ground floor are made of massive chestnut logs, while the walls of the first floor are made in the bondruk system, a wooden skeleton with a wicker filling filled with earth. The horizontal construction of the ground floor-first floor and first floor-attic is made of wooden beams (chestnut wood) with a floor made of thick, hand-hewn wooden planks. The roof is relatively high and extremely voluminous in relation to the total volume of the house. It is structurally designed as 'horns with a crucifix'. The roof covering is made of wooden shingles. The Abazovic

family house in Donja Koprivna near Cazin is still in relatively good physical condition. In order to preserve its physical structure, it is urgently necessary to make a new roof covering, which would 'preserve' the building until it is put into full residential capacity or for some new purpose (Figure 15,16).

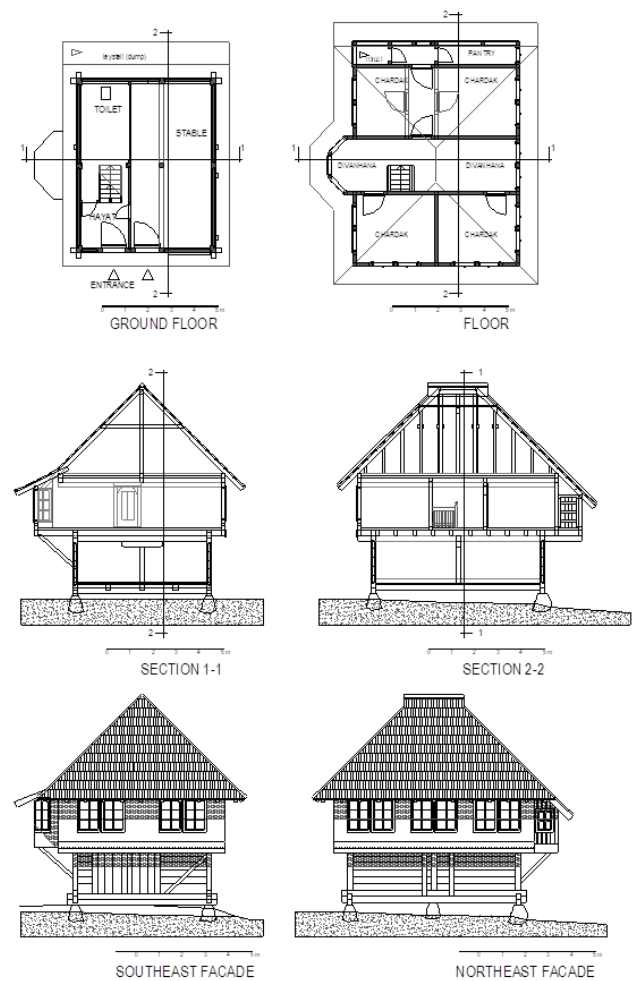


Fig 15: Abazović family house in Donja Koprivna near Cazin. Layout

Source: Author (drawing, 2016)



Fig 16: Left: The author in front of the Abazovic family house in Donja Koprivna near Cazin. Right: archaic solutions of house elements with universal and timeless values

Source: Lejla Hadrovic (July 25, 2016)

Source: Author (July 25, 2016)

The Aganovic family house is located on the left bank of the Sana river, not far from the new Hamzibeg Mosque, in the center of Sanski Most (geographic coordinates: 44°45'48.18"N, 16°39'55.96"E, Altitude: 158 m). The building was built by Husein ef. Aganovic in the first half of the 20th century. The Aganovic family house in Sanski Most belongs to the type of three-tracts house, which is vertically developed through the ground floor and the first floor. Until the 1990s, part of the ground floor was a stable, while part of the ground floor and the first floor were used for living. The solution in which part of the ground floor is a stable and part is a living space is common for Bosanska Krajina (and also for Sanski Most), where the entire ground floor is a stable, with a staircase to the first floor. The ground floor of the house has a living room (the former 'house'), an entrance hall for the residential part of the house with a staircase to the first floor, and a stable with two entrances, from the hajat of the house and from the courtyard in the back of the house. On the first floor, in the central section of the house, there is a spacious divan from which one can access four chardaks, two in each of the other two sections of the house, and the toilets that are jutting out above the garbage can in the courtyard. The two chardaks have separate hamamdžik areas, which is a characteristic of an oriental-style town house, and which in this example confirms the high culture of the homeowners. The Aganovic family house in Sanski Most is an extremely valuable example of a preserved Bosnian chardaklija house. Its value is reflected in the fact that this is both a town and a country house at the same time, which required a thoughtful and creative solution to its horizontal and vertical plan, as well as its design and materialization as a whole. Today, the house is in relatively good condition, and given its location in the very center of Sanski Most, it has great value as a real estate. The future of this house depends on its owners, their economic situation, and a valid assessment of the house's utility value (Figures 17-20).



Fig 18: View of the Aganovic family house from the southwest (left) and from the east (right)

Source: Author (July 22, 2016)

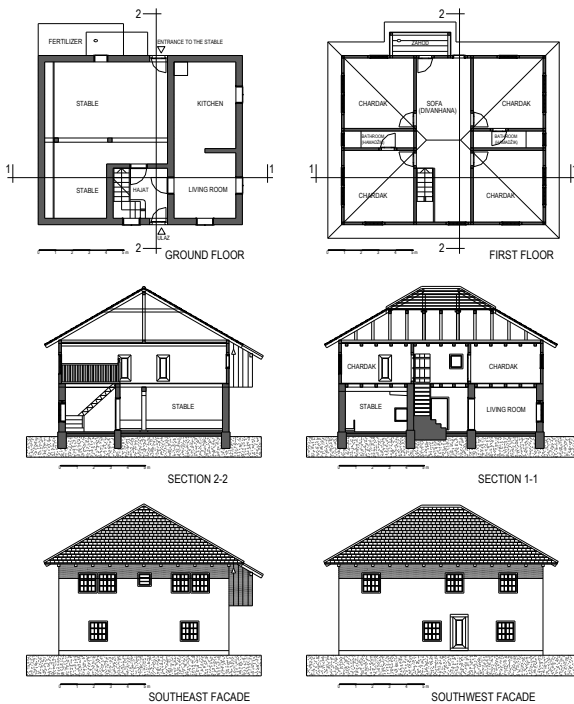


Fig 17: The Aganovic family house in Sanski Most. Layout

Source: Author (drawing, 2016)



Fig 19: Toilet in the space of the 'vodnica' with access from the sofa area on the first floor

Source: Author (July 22, 2016)



Fig 20: Former barn (ground floor), now large pantry

Source: Author (July 22,2016)

The Mujagic family house in Sanski Most is located in the very center of Sanski Most, in the residential district of Mahala, on the left bank of the Sana river⁴ (44°45'30.24"N, 16°40'04.96"E, Elevation: 158 m). The house was built (1928) by Mr. Ferhat Mujagic, and the main master builder was Fehim Bilajbegovic. The stone for the construction of the ground floor was brought from the Brda quarry. According to the characteristics of its horizontal plans, the Mujagic family house in Sanski Most belongs to the type of two-aisle (on the ground floor) and three-aisle (on the first floor) Bosnian čardaklija house with the specifics of the house of Bosnian Krajina. The spatially unique ground floor base is structurally divided into two sections, where a strong wooden column, placed at the center of gravity of the ground floor base, carries a strong wooden beam (via a wooden saddle) which is the central support for the wooden beams (transverse to the direction of this beam) of the ground floor-first floor interfloor structure, while the other two supports for the beams of the interfloor structure are the mutually incompatible stone walls of the ground floor. The horizontal floor plan is divided into three sections, with the central

section being reduced to a corridor between the rooms, two on each side of the corridor, arranged in the other two sections. The specific features of the Bosnian Krajina house are evident in the purpose of the ground floor as a stable, and in the annex to the main body of the house, which consists of a staircase that leads from the ground floor level to the first floor, first to the divanhana, where the 'vodnica' space and toilet are located, and then to the corridor of the residential floor of the first floor with separate entrances to four čardaks. Two examples of houses in Sanski Most (the Aganovic family house and the Mujagic family house) are examples of the traditional Bosnian chardaklija house and examples of bioclimatic architecture. In accordance with the natural and social environment, these houses are examples of a more modest variant of the Bosnian čardaklija house, which, compared to the more developed type of this house, is smaller and does not have semi-open spaces – divanhanas (Figures 21,22,23). Here, the divanhana is a closed space with the function of a hall. The features of the bioclimatic architecture of these houses can be read in:

- Construction and materialization of the building, where traditional construction methods based on many years of experience and the use of all materials from the immediate natural environment are used. In this way, this house looks like a 'natural environment created by man',
- Ensuring comfort in the house (in all seasons) is achieved by adequately designing the house, materializing its envelope and using energy from the immediate environment (firewood, beeswax candles or sheep fat - before the introduction of electricity into the house),
- Recycling the waste generated in the house. All leftovers of human food are given to domestic animals, while other types of waste are used as fuel (wood leftovers from making household tools, for example),
- Using rainwater to maintain the hygiene of people and rooms,
- The 'embodied spiritual energy of the house' (memories of childhood, parents and relatives, fond events) relaxes people and makes them especially confident in their attachment to their ancestors.



Fig 21: Mujagic family house in Sanski Most. View of the house from the northeast and from the north

Source: AuthSSor (July 22,2016)

⁴ The author visited this house on July 22, 2016. The author received information about this house from its current owner, Mr. Ismet (Ferhat

Mujagic (1941). According to Mr. Mujagic, his family immigrated from Lika (Croatia).

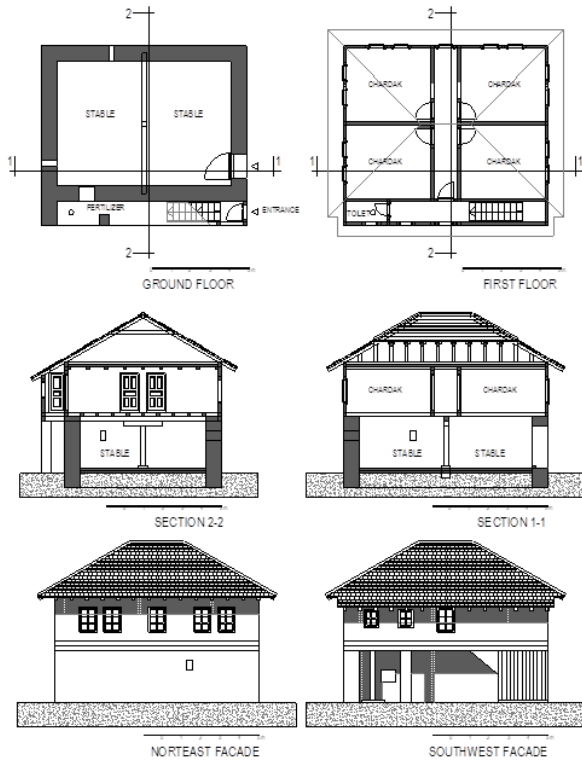


Fig 22: The Mujagic family house in Sanski Most. Layout

Source: Author (drawing, 2016)



Fig 23: Former barn on the ground floor (left) and staircase (basamaci) ground floor-floor (right)

Source: Author (July 22, 2016).

The Kajtazović family house in the Donja Lucka settlement near Cazin is located on a slope with western insolation, right next to the Cazin-Velika Kladusa road (Geographic coordinates: 45°04'54.36"N, 15°53'19.83"E, Elevation: 190 m). The house was built in the first half of the 20th century. As its current owner built a new house in the immediate vicinity, this house is now used as a utility room for various aspects of the home economy⁵. According to the layout of the horizontal plans, the house of the Kajtazović family in the Donja Lucka settlement near Cazin belongs to the type of two-tracts Bosnian chardaklija house, with the specifics of the house of Bosnian Krajina. In the vertical plan, the house is developed through a ground floor and an upper floor. In addition, the ground floor is arranged as a stable for livestock, while the upper floor is a living space. Similar to most Krajina houses of the Bosnian chardaklija type, in this house, the entrance to the apartment on the upper floor is placed next to the entrance to the stable. This is an indicator of the importance of livestock to the lives of people in the Bosnian Krajina (During fieldwork, the Author never heard the term 'livestock' from people in the Bosnian Krajina for domestic animals (cattle and sheep), but always the term 'treasure'/'blago'). Right next to the entrance to the stable, along its wall, there is a fountain with a trough, which further confirms the impression of the people's relationship with their domestic animals. Both entrances are protected by an extremely modest, but exceptionally functional porch. The ground floor space is structurally divided into two tracts by placing a strong wooden pillar on a stone foot in its center, on which (with an additional saddle) a massive wooden beam is placed, which at its ends rests on mutually opposing massive stone walls, the thickness of which is about 70 cm. In the continuation of the entrance to the living space, a single-flight wooden staircase ('basamaci') is arranged, which connects the entrance area on the ground floor with the space of the modest divanhana on the first floor. In fact, the entire segment of the spatial structure of the house, which connects the entrance on the ground floor, the staircase and the surface to which it is accessed, visually looks like an annex of the house constructed in wood. The stone wall on the ground floor is plastered and painted in the upper half of its height like the first floor, so that the 'whiteness' of the house (that is, its residential function) comes to the fore. The narrow area of the divanhana continues into the area of the sanitary facilities ('vodnica'), which are always arranged so that there is a manure bin from the barn under them. The roof of the house is hipped, with a relatively large volume, due to the large slope. The roof covering is wooden shingles. Over time, the open space under the staircase to the first floor, the 'waterhouse' and the sanitary facilities on the first floor was fenced off and converted into a storage room and poultry habitat. The house of the Kajtazovic family in the Donja Lucka settlement near Cazin has today lost each of its two primary functions, housing and cattle stable. However, the owner still looks after and maintains this house, the way an old person is cared for. The house here is treated as the 'cradle of a series of generations in one family', so new generations maintain and protect it, using it only for some secondary housing needs (Figures 24,25,26).

⁵ The author visited this house on July 25, 2016.



Fig 24: The house of the Kajtazovic family in the Donja Lucka settlement near Cazin. Layout

Source: Author (drawing, 2016)



Fig 26: The Kajtazovic family house in the Donja Lucka settlement near Cazin. Left: view of the house from the northwest. Right: the once open space under the staircase was later fenced off and converted into a storage room and poultry house
Source: Author (July 25,2016)



Fig 25: The Kajtazovic family house in the Donja Lucka settlement near Cazin. Left: view of the house from the southwest. Right: view of the house from the southeast

Source: Author (July 25,2016).

5. Conclusion

The life of people and livestock in synergy 'under the same roof' at first glance seems like 'living in low comfort and low culture. However, by looking into the spatial and constructive organization of the house, and especially by looking into the reasons for creating such solutions, we come to a completely opposite conclusion. Namely, the Bosnian chardaklija house is conceived and built and decorated in all respects according to the principles of bioclimatic architecture, where keeping livestock on the lower floor makes the house energy efficient. In the case of houses in Bosnian Krajina, the decisive influence on such solutions was the social environment determined by the geographical position of this region. Namely, here, during the rule of the Ottoman Empire, and then the Austro-Hungarian rule, there were frequent border conflicts, so people were permanently in fear, ready to move from their homes to some natural shelters (caves, for example). That is why these people kept and guarded their livestock, their 'treasure'/'blago', 'with an eye', as their most important life resource. When the example shown of the Agrarzentrum West center in Imst, Austria, is compared to the Bosnian čardaklije houses in Bosanska Krajina, we come to the conclusion that the life of people and domestic animals under the same roof is also a subtle philosophical theme about the relationship between man and nature.

6. References

1. Hadrovic A. Defining Architectural Space on the Model of the Oriental Style City House in Bosnia and

- Herzegovina, Serbia, Montenegro, Kosovo and Macedonia. North Charleston (SC): Booksurge, LLC; 2007. p. 9, 14–15, 16–18.
2. Hadrovic A. *Architectural Physics*. Sarajevo: Acta Architectonica et Urbanistica, Faculty of Architecture, University of Sarajevo; 2010. p. 16–18, 97–112, 350.
 3. Hadrovic A. *Architecture as an Energy System*. Sarajevo: Faculty of Architecture, University of Sarajevo; 2017. p. 54–58.
 4. Hadrovic A. *Structural Systems in Architecture*. North Charleston (SC): Booksurge, LLC; 2009. p. 138–140, 251, 269.
 5. Hadrovic A. Bosnian chardaklia house: the Ahmic family house in Brizdje near Zepce. *Acta Geographica Bosniae et Herzegovinae*. 2024;11(22):59–69.
 6. Hadrovic A. Bosnian chardaklia house (the Hasanbasic family house in Trepce near Tesanj). *Acta Geographica Bosniae et Herzegovinae*. 2024;21:35–47.
 7. Hadrovic A. Bosnian chardaklia house: The Kantarevic family house in Klupe village near Velika Kladusa. *Int J Multidiscip Res Growth Eval*. 2023;4(5).
 8. Hadrovic A. Bosnian chardaklia house: The Smajlovic family house in Cehaje near Srebrenik. *Int J Multidiscip Res Growth Eval*. 2023;4(4).
 9. Hadrovic A. Bosnian chardaklia house: The Misilo family house in Kresevo. *Int J Multidiscip Res Growth Eval*. 2023;4(4).
 10. Hadrovic A. Bosnian Chardaklia House: The Gradasevic Family House in Gradacac. *Int J Multidiscip Res Publ (IJMRAP)*. 2023;6(1):96–101.
 11. Hadrovic A. The Kozic Family House in Jasenik Near Konjic. *Int J Multidiscip Res Growth Eval*. 2023;4(3).
 12. Hadrovic A. Tensegrity Structures. *Int J Multidiscip Res Publ (IJMRAP)*. 2023;5(11):97–104.
 13. Hadrovic A. Musafirhana in Fojnica. *Int J Adv Multidiscip Res Stud*. 2023;3(1):648–654.
 14. Hadrovic A. The Bosnian Chardaklia House: The Suljagic Family House in Spionica Near Srebrenik. *Int J Adv Multidiscip Res Stud*. 2023;3(1).
 15. Hadrovic A. Bosnian chardaklia house: The Kovacevic family house in Vrazici near Celic. *Int J Multidiscip Res Growth Eval*. 2023;4(1).
 16. Hadrovic A. Bosnian chardaklia house: The Mulalic family house in Doboj. *Int J Multidiscip Res Growth Eval*. 2022;3(6).
 17. Hadrovic A. Bosnian Chardaklia House: The Korkut Family House in Travnik. *Int J Adv Multidiscip Res Stud*. 2022;2(6).
 18. Hadrovic A. Bosnian Chardaklia House: The Kapetanovic Family House 01 in Jajce. *Int J Multidiscip Res Publ (IJMRAP)*. 2022;5(6):51–56.
 19. Hadrovic A. The Bosnian Chardaklia House: The Ejubovic Family House in the Poljice Village Near Tuzla. *Int J Adv Multidiscip Res Stud*. 2022;2(6):346–353.
 20. Hadrovic A. Bosnian chardaklia house: The Kasumovic family house in Vrnograc. *Int J Multidiscip Res Growth Eval*. 2022;3(6).
 21. Hadrovic A. Bosnian Chardaklia House: Brkovic Family House in Vares. *Int J Adv Multidiscip Res Stud*. 2022;2(5):755–765.
 22. Hadrovic A. The Bosnian Chardaklia House: The Hamidovic Family House in Dzafici Near Kalesija. *Int J Sci Res Dev*. 2022;1(2):32–38.
 23. Hadrovic A. Bosnian Chardaklia House: The Bugilovic Family House in Gornja Tuzla. *Int J Multidiscip Res Publ (IJMRAP)*. 2022;5(2):25–30.
 24. Hadrovic A. Bosnian Chardaklia House: Abazovic Family House in Donja Koprivna Near Cazin. *J Smart Build Constr Technol*. 2022;4(1).
 25. Hadrovic A. Two Examples of the Bosnian Chardaklia House in Sanski Most. *Int J Multidiscip Res Publ (IJMRAP)*. 2022;4(11):115–122.
 26. Hadrovic A. Bosnian Chardaklia House: House of the Korajlic Family in Hrvatinojci Near Tesanj. *Int J Sci Eng Sci*. 2022;6(3):26–37.
 27. Hadrovic A. Bosnian Chardaklia House: The Colic Family's House in Vares. *SEE J Archit Des*. 2022;10062:1–6.
 28. Hadrovic A. Bosnian Chardaklia House: Mara Popovic's House in Gracanica. *SEE J Archit Des*. 2022:1–7.
 29. Hadrovic A. Two Examples of the Bosnian Chardaklia House in the Lukomir Village on Bjelasnica. *Int J Sci Eng Sci*. 2022;6(3):1–9.
 30. Hadrovic A. Bosnian Chardaklia House: Smajic Family House In The Starposle Village Near Kakanj. *Int J Arts Humanit Soc Stud*. 2022;4(1):96–106.
 31. Hadrovic A. The Zaimovic Family House in Gornji Zovik Near Brcko - The Oldest House In Bosnia And Herzegovina. *Int J Arts Humanit Soc Stud*. 2021;3(6):121–137.
 32. Hadrovic A. The Bosnian Chardaklia House in the Cuhovici Village Near the Konjic. *Int J Archit Arts Appl*. 2021;7(2):45–55.
 33. Hadrovic A. Bosnian Chardaklia House: The Dzider Family's House in The Crnoc Village Near Kakanj. *SEE J Archit Des*. 2021;10051:1–6.
 34. Hadrovic A. Bosnian Cardaklia House: The Osmic Family's House in Mala Brijesnica near Gračanica. *SEE J Archit Des*. 2020;10050:1–7.
 35. Hadrovic A. The House of the Dusper Family in the Kraljeva Sutjeska near Kakanj. *SEE J Archit Des*. 2020:1–5.
 36. McKay CP. What Is Life—and How Do We Search for It in Other Worlds? *PLoS Biol*. 2004;2(9):e302.
 37. Koshland DE. The seven pillars of life. *Science*. 2002;295:2215–2216.
 38. Garrow JS, James WPT. *Human Nutrition and Dietetics*. New York: Churchill Livingstone; 1993.
 39. Brody S. *Bioenergetics and Growth*. New York: Reinhold; 1945. Available from: https://www.d.umn.edu/~rmoen/docs/WE/WE_Ch_7.pdf. Accessed 2025 Feb 11.
 40. Selimovic MM. *Fortress (novel)*. Sarajevo: Svjetlost; 1977. p. 27, 37, 151.