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***Forms of sacred buildings inspired by mountain sculpture.
References to geological forms in the design
of small contemporary mountain chapels***

Abstract

For centuries, architects have been inspired by nature, mimicking forms or observing phenomena and translating the principles of the natural environment into the structure of a building. The conscious mimicking of nature is mainly based on biological forms, but architects also draw on patterns derived from geomorphic features. Important sources of architectural inspiration among the inanimate elements of nature are mountains as models of beauty, stones and rocks as “indestructible” elements, and rock crystals as symbols of perfection and light.

The aim of the study is to attempt to analyse and interpret the building lumps of selected small chapels from the Alpine region in terms of their reference to the motif of mountains or rock crystals and the means of architectural expression used for this purpose.

The article discusses the principles of form, colours, materials used, the relationship to the natural landscape and the symbolic meanings of the buildings. It has been shown that the buildings analysed bear the characteristics of organic architecture and reflect the relationship between human spirituality and nature. In them, architecture becomes a means of expression that is accentuated by the spiritual element of art.

Key words: mountain chapels, geological forms, rock crystal, the Alps, sacred architecture

Introduction

The evolution of the relationship between nature and anthropogenic forms (including architecture) has been an important part of scientific research and design studies for centuries (Banasik-Petri 2019), and the consolidation of the unique status of nature in architecture has been achieved, among other things, through religion (Juchniewicz 2009). The fascination with nature as an ideal of beauty is noticeable in both mono- and polytheistic religions. Nature symbolising the power of the divine (both gentle and as a source of fear) has inspired sacred architecture all over the world. The conscious imitation of nature’s genius biomimicry¹

mains an analogue of natural form but does not take into account knowledge of its biological functions. This type of imitation of nature has been particularly evident in historical styles such as Art Nouveau and in more recent buildings by, for example, Frank Gehry. This approach is form-based and offers only a decorative, stylistic, metaphorical effect. It is merely a formal imitation of nature. This architecture can be called ‘biomorphic’ (Yedekci 2014). Another form of biomimicry is defined by Pawlyn as [...] *mimicking the functional basis of biological forms, processes and systems to produce sustainable solutions* (Pawlyn 2019, 2). The idea behind this approach is to learn from and imitate nature in an ecological sense (Yedekci 2014). A third approach to integrating biology and architecture is bio-design or bio-utilisation. It involves the direct use of nature to achieve beneficial effects in a building. Unlike biomimicry or biomorphism, bio-design refers to the incorporation of living organisms as necessary components to enhance the function of the finished work. The use of new technologies and tools such as parametric, algorithmic and generative design methods over the last two decades has allowed us to “go beyond” the basic mimicry of geometry and order and improve environmental, structural and material performance by analysing mechanisms and properties found in nature. New terms such as zoomorphism, geomorphism and anthropomorphism have emerged to describe the source of inspiration or mimicry for each of the above cases (animals, geology and humans) (Agkathidis 2016).

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¹ Biomimicry manifests itself in contemporary architecture in three different ways. The first is biomimicry as an architectural style that re-



Fig. 1. Sketch by Bruno Taut from *Alpine Architektur* (1919) (source: <https://artvee.com/dl/alpine-architektur-pl-2/>)

Il. 1. Szkic Bruno Tauta z *Alpine Architektur* (1919) (źródło: <https://artvee.com/dl/alpine-architektur-pl-2/>)

(Benyus 1997) is primarily based on biological (animate) forms, although architects also draw on patterns derived from geomorphic² (inorganic) forms. One of the most important sources of architectural inspiration among the inanimate elements of nature are the mountains, seen as a model of majestic beauty (Gnatiuk 2021). Their influence on architecture is global both geographically and ideologically. Poetically referred to as the “Cathedrals of the Earth” (Mathieu 2006), mountains have been identified as places of sacred power since the dawn of time. They have been associated with the embodiment of the highest human ideals and aspirations both in the past (by followers of various religions) and today (in a much more secularised reality) (Bernbaum 2022). Mircea Eliade considered the mountain to be among the symbols expressing the connection between heaven and earth, the axis mundi, the axis and point of contact marking the centre of the world (Eliade 2017).

The sacredness of mountains is manifested in architectural forms in two distinct ways (Geva 2015). The first

² Architecture is sometimes seen as a transitional form between the biological (animate) and the geological (inanimate), the idea being based on the adaptability of construction objects over time. In fact, architecture is less adaptable than biological forms, but more adaptable than geological forms. Buildings, like earth and rock, are hard and relatively resistant to transformations dictated by current needs, making them closer to geological forms (Allen 2011). The permanence of structures accounts for their value and influences their perception as elements of identity and cultural continuity.

approach uses the symbolism of the mountain as a natural sacred place. The mountain is closest to the sky and this fact gives it a double meaning. On the one hand, it participates in the spatial symbolism of transcendence and, on the other, it constitutes an area reserved for atmospheric hierophanies (Jackowski, Sołjan 2001). The temple (church) located on the mountain (an anthropogenic creation) thus gains direct contact with a place that symbolises the spiritual, divine factor. Mankind thus attempts to build a link between earth and heaven.

The second approach is based on referring to the mountain motif by shaping the structure of the construction object (e.g. body of the building). Temples, mimicking mountains, also become the “centre” (in Eliade’s terms) with the symbolic meanings attributed to the mountain (Jackowski, Sołjan 2001).

Supernatural and divine qualities are attributed to the mountain (as a form of landform) and to stones or rocks (in the sense of geological forms) because they appear to have an indestructible nature. According to Jackowski and Sołjan, much of the symbolism of rocks derives from the fact that they accumulate heat, cold and, in the case of diamonds, also light. The cohesiveness of rocks is not without significance. In addition, some stones or rocks acquire the value of a symbol associated with a particular community (Jackowski, Sołjan 2001). It is also worth noting the symbolism of the rock crystal. Like the diamond, it is a metaphor for perfection born of nature. It symbolises light and energy, innocence, purity and clarity.

In 20th-century architecture, references to the mountain motif and crystal are clearly evident. At the turn of the 20th century, the symbolic significance of crystal made it an important source of inspiration for architectural form and a harbinger of social and technological change. The revolutionary nature of the motif was best exemplified by Paxton’s Crystal Palace (1851) and the activities of the Glass Chain group (otherwise Crystal Chain, German: Die Gläserne Kette) (Eyüce 2016), which was part of the German Expressionists³, centred around Bruno Taut and the poet Paul Scheerbarth. They created in the spirit of the geometric trend, the result of a fascination with the structure of crystals (Zamiatnin 2024). They believed that crystalline forms, which were a utopian vision of architecture, could become the basis for a new social morality (Eyüce 2016). Taut also presented a visionary image of dispersed development in agricultural and mountainous areas (Fig. 1), the idea of which was to erase the alienating divide between

³ The Expressionist architectural movement (development 1910–1930) introduced a new type of expression in architecture. Through the use of innovative technologies of reinforced concrete, steel and glass, the dynamics of structural work and the plasticity of biomorphic and geomorphic sculptural forms were captured in architectural forms. Expressionist architecture can be divided into geometric (regular) and organic (irregular) style (Zamiatnin 2024). The geometric current, identified with visions of soaring buildings formed in the shape of crystalline mountains, was until recently considered a short-lived episode that had little impact on the development of contemporary architecture. Analyses of neo-expressionist architecture from the 1950s and 1960s and later deconstructivism or biomimetic architecture, however, indicate that this assumption appears to be incorrect (Tobolczyk 2017).



Fig. 2. Sanctuary of Our Lady Queen of Peace in Neviges designed by Gottfried Böhm (drawing by J. Cichosz-Fornalczyk)

II. 2. Sanktuarium Matki Bożej Królowej Pokoju w Neviges projektu Gottfrieda Böhma (rys. J. Cichosz-Fornalczyk)

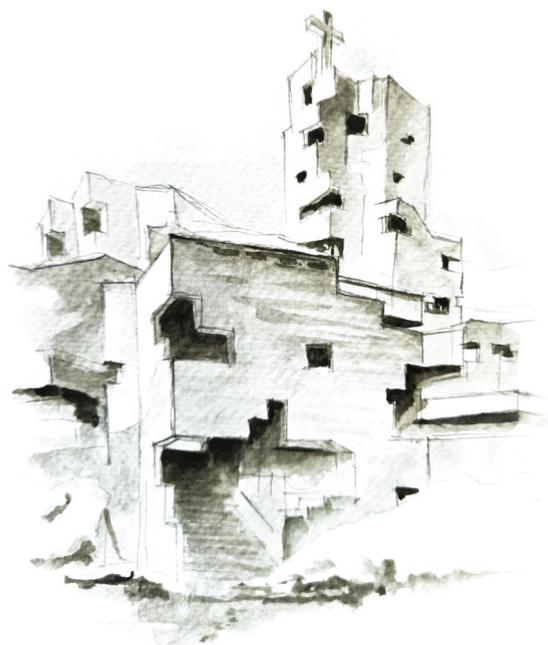


Fig. 3. St. Nicholas Church designed by Walter Förderer (drawing by J. Cichosz-Fornalczyk)

II. 3. Kościół pw. św. Mikołaja projektu Waltera Förderera (rys. J. Cichosz-Fornalczyk)

town and country and to eliminate the boundaries between man, nature and the cosmos (Miller 2017).

Expressionism of the 1920s focused mainly on the motif of mountains in a locative sense, treating the mountain as a site for the erection of architecture that drew on the characteristics of rock crystal in terms of form. Later, however, there was a turn towards likening the architectural object to a mountain peak in a structural sense, exposing the severity, the contrast, the power of the mountain. This approach found common ground with Brutalism, which developed from the 1940s onwards. Among the best-known examples of architecture inspired by mountain forms are the Sanctuary of Our Lady Queen of Peace (Fig. 2) in Neviges⁴ (Germany) and the Church of St. Nicholas⁵ (Fig. 3) designed by Walter Maria Förderer in Hérémence⁶ (Switzerland). These churches are monumental, which has made them recognisable buildings and therefore described in detail in the literature.

⁴ The building goes beyond the previous motifs and scope of sacred symbolism and exemplifies the combination of different fields of creativity – architecture and sculpture. The brutalist building lump abandons the constraints of style and can be seen as a form alluding to poetic mountain motifs (Serafin 2019). Böhm created an expressive concrete building lump reminiscent of piled-up naked mountain peaks, which has entered the pages of architectural history as a canonical construction object (Fig. 2).

⁵ Completed in 1971, it is a temple of white, raw concrete, with an external form reminiscent of rock structures affected by deep erosion. A towering building lump, it cascades down to rest on the rocky ground with which it blends in. The strictly defined openings in the bare walls have no glazing, giving the impression of cubistically framed mountain caves (Fig. 3).

⁶ Other important realisations of Walter Förderer with a similar architectural expression include the Heiligkreuz Church in Bern (Kirche Heiligkreuz), the Catholic Church of St. John in Lucerne (Johanneskirche), the Church of the Holy Cross in Chur (Heiligkreuzkirche) – all in Switzerland.

It is worth noting, however, that attempts to interpret mountain motifs can also be seen in much smaller ecclesiastical buildings, which include mountain chapels picturesquely inscribed in the Alpine landscape. The intensity of the relationship between architectural form and landscape is more subtle in their case (mainly due to their scale), but clearly discernible. The choice of materials, the colour scheme, the architectural form or the symbolic meanings have so far not been the subject of detailed analysis undertaken in the context of references to mountain motifs.

Aim and working methods

The aim of the study⁷ is to attempt to analyse and interpret the external form (building lump) of selected small religious buildings from the Alpine region⁸ in terms of their reference to the mountain or rock crystal motif and the architectural means of expression used to achieve this. As a prelude to the research, the buildings were identified by means of Desk Research method with regard to their genesis and creative process. Fifty mountain chapels created after 1960 were analysed, from which the construction objects⁹ were selected whose architecture referred directly or indirectly to the mountain motif (i.e. the mountains and their symbolism were an element of inspiration in the

⁷ This work has been completed while the first author was the Doctoral Candidate in the Interdisciplinary Doctoral School at the Lodz University of Technology, Poland.

⁸ The Alpine area covering part of the territory of Austria, Germany, Switzerland, France, Italy, Liechtenstein and Slovenia.

⁹ Seven buildings – Catholic, Protestant and ecumenical chapels.

creative process). The detailed research of the selected buildings was monographic, qualitative and carried out in the form of a detailed description, which formed the basis for the development of systematisation of solutions and meanings according to the adopted criteria. The systematised groups of buildings were subjected to the author's interpretation of form and content, based on in situ research (impression sensations) and conclusions derived from part of the preliminary research (desk research). In addition, the technique of architectural sketch (Niezabitowska 2014) was used to highlight the most significant architectural or symbolic features of the analysed buildings.

The detailed analysis of the buildings included:

– the external form of the building (height, character of walls, roof and glazing, the way in which the architectural form is constructed – including tectonics of the building lump, the contribution of dynamic planes and edges at varying angles, the compactness or fragmentation of the

body of the building) together with an interpretation of the visual effects,

– colours and materials used, including the character of the relationship with the surrounding natural landscape,
– the symbolism and meaningful content of the building, including the expressiveness of the inspiration from mountain symbolism.

Results

The preliminary analyses made it possible to identify seven buildings (Table 1) with clear references to mountain or crystalline forms at the level of architectural form:

– Kapelle Sontga Maria (Maria Himmelfahrt), Switzerland, Grisons, Lukmanier Pass, Josef Rieser, 1967,
– Chapelle Saint Pierre, France, Auvergne-Rhodan-Alpes, Mont Cenis Pass, Atelier d'Architecture en Montagne, 1968,

Table 1. Detailed summary of the characteristics of the studied buildings (elaborated by J. Cichosz-Fornalczyk, A. Cieślak-Arkuszewska)
Tabela 1. Szczegółowe zestawienie cech badanych obiektów (oprac. J. Cichosz-Fornalczyk, A. Cieślak-Arkuszewska)

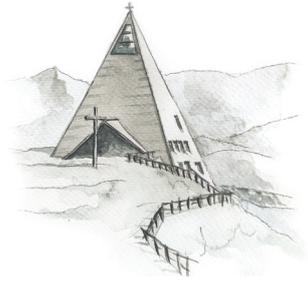
No.	Name	Graphics by Justyna Cichosz-Fornalczyk	Features	
1	Kapelle Sontga Maria		building lump	dynamic, dismembered, solid abandonment of right angles, introduction of displacement of planes, fragmentation, small glazings
			materials	façade – white plaster roof – seamed sheet
			dominant colour	shades of white
			references	mimicry of mountain peaks
			role in the landscape	the building stands out in the landscape in summer (temporal dominance*)
2	Chapelle Saint Pierre		building lump	dynamic, geometrised, solid, small glazed areas no displacement, structural logic, soaring
			materials	raw concrete
			dominant colour	greys/browns
			references	reference to crystal geometry
			role in the landscape	in the winter months, the building is strongly distinguished by its form and colour (temporal dominance) and in the summer months, it provides a spatial accent (soaring form)
3	Chapelle œcuménique de Flaine		building form	dynamic, dismembered, solid, abandonment of right angles, introduction of displacement of planes, fragmentation while maintaining legibility of form, soaring element, small glazed areas
			materials	wooden shingles
			dominant colour	greys/browns
			references	mimicry of mountain peaks
			role in the landscape	the building is distinctive in form and colour in the winter months (temporal dominance), is a spatial accent in the summer months

Table 1 continued. Detailed summary of the characteristics of the studied buildings (elaborated by J. Cichosz-Fornalczyk, A. Cieślak-Arkuszewska)
 Tabela 1 cd. Szczegółowe zestawienie cech badanych obiektów (oprac. J. Cichosz-Fornalczyk, A. Cieślak-Arkuszewska)

No.	Name	Graphics by Justyna Cichosz-Fornalczyk	Features	
4	Kapelle Sogn Giachen		building lump	dismembered, solid, squat, partial abandonment of right angles, fragmentation, small glazed areas
			materials	façade – white plaster roof – seamed sheet
			dominant colour	shades of white
			references	mimicry of mountain peaks
			role in the landscape	the building blends in with the landscape, partly distinguished by its colour in the summer months (spatial accent), cohesive form** in the winter months (blends in with the surroundings)
5	Kapelle des weißen Lichts		building lump	partly dismembered, solid, squat, displacement of planes, curvilinear roof, fragmentation while maintaining clarity of form, small glazed areas
			materials	marble
			dominant colour	shades of white
			references	mimicry of shapes (snowdrifts)
			role in the landscape	distinguished by its colour and form in the summer months, rounded shapes (soft lines) contrasting with the rocky surroundings; in winter, a cohesive form, blending into the landscape, seeking dialogue with the soft lines of the snowdrifts
6	Granatkapelle		building lump	compact, geometrised, solid, no displacement, structural logic, no clear glazing
			materials	corten sheet metal, raw concrete
			dominant colour	shades of red – a reference to the colour of the mineral
			references	reference to the geometry of the crystal and to a mineral with a crystalline structure found in the region – i.e., garnet***
			role in the landscape	building dominating the landscape, working through contrast, using the colour of the materials to lift the volume from the background and achieve a levitation effect, year-round dominance
7	Die Gegenwartkapelle am Venet		building lump	dismembered, glazed, abandonment of right angles, use of displacement of planes, strong fragmentation, soaring form, dominant role of glazing
			materials	raw concrete, coloured glass
			dominant colour	grey walls, blues and yellows of glass
			references	mimicry of mountain peaks, inspiration by the structure of clear crystal
			role in the landscape	strong, distinctive form, blended in the landscape but accentuated by colour and light

* “Temporal dominance” – in the sense that for certain months of the year the building stands out from the surrounding landscape and provides a strong, focussing form within it. The duration of this impact on the space depends on the weather conditions. As the snow falls and melts, changing the character of the surrounding landscape, the strength of the structure’s dominance in the landscape changes. As the colour of the building blends into the landscape, its role as a dominant feature diminishes and it can then be described as a spatial accent, understood as a building that stands out in the surroundings but does not dominate.

** Cohesive form understood as blending in with the surroundings, imitating and/or relating to the landscape through form and colour, creating a harmonious, coherent whole with it – not dominating it.

*** A group of minerals belonging to the silicate group. It consists of isostructural and (mostly) isomorphous island silicates. It usually forms mixed crystals of similar structure (Hochleitner 1994).

- Chapelle œcuménique de Flaine, France, Auvergne-Rhodan-Alpes, Flaine, Marcel Breuer, 1973,
- Kapelle Sogn Giachen (St. Jakob des Älteren), Switzerland, Acla, Medel, Richard Brosi, 1979,
- Kapelle des weißen Lichts, Austria, Tyrol, Pitzal glacier, Rudi Wach, 1998,
- Granatkapelle, Austria, Tyrol, zb. Penkenjoch, Mario Botta, 2013,
- Die Gegenwartkapelle am Venet, Austria, Tyrol, Venet mountain, Herbert Traxl, 2016.

The analysis made it possible to distinguish two main groups of structures inspired by the mountain motif:

- buildings in which references to crystalline or geometric forms can be seen,
- buildings treated as sculptures directly inspired by the forms of rock massifs.

Discussion

Crystal forms and geometry of the form

The term “crystal” is derived from the Greek *krystallos* (i.e. “ice”) and was first used to refer to rock crystals. Crystals are solids whose components (atoms, ions, molecules) form a regular, mathematically described lattice-based structure (Greuel 2021). They are an expression of the absolute subordination of spatial form to mathematical logic. They symbolise an ideal order based on comprehensible rules, and yet they create structures that are unique and unrepeatable every time. The form of the crystal was the inspiration for Mario Botta’s 2016 Granatkapelle project. The chapel was designed as a “jewel” adorning the hill, and the building lump was inspired by the garnet crystals mined in the area by the investor’s family. The tradition of mining this mineral is an important part of the region’s culture, and garnets are regarded as a folk gemstone of the Zillertal. Consequently, the building corresponds to the cultural heritage of the valley and has a symbolic value, combining spiritual values with the identity of the region.

The body of the building is made up of an expressive, geometric dodecahedron with rhomboidal walls (which is a closed, finite form, almost entirely devoid of glazing) built on a square base, strongly distinguished in colour from the dark planes of the walls. The light base blends in with the colours of the hill, making appear less visible and “disappear” in perception. This gives the impression of floating above the surface of the hill, with the levitation effect enhanced by reflections in the water surface (the reservoir is adjacent to the building and acts as a mirror). The building itself, or rather its image, has been multiplied and strongly affects the surrounding landscape. The chapel spatially dominates both in winter and summer, clearly standing out from the colour scheme of its surroundings. However, the structure does not compete with the landscape. It is a strong, eye-catching form and enters into a relationship with the landscape by way of contrast, thus emphasising the value and importance of each of the elements in the system (i.e., the natural landscape and the strong anthropogenic form). It is the project designer’s belief that the piece of “pure geometry” symbolised by this structure facilitates better reading

of nature, landscape, sky and atmosphere. It is noteworthy that the chapel is dedicated to Blessed Engelbert Kolland, who died as a monk and martyr in Syria in 1860. Thus, the precious stone (garnet) mined in the valley has been linked to the spiritual symbol of the region, i.e. Blessed Engelbert (Granatkapelle “The architect Mario Botta”).

The Chapelle Saint Pierre, designed by Atelier d’Architecture en Montagne, is also an example of a building with a minimalist, geometric form. In this case, the reference to the mountain motif lies in the creation of a building symbolising a mountain. The building took the form of a pyramid on a square plan, thus referring to the symbolic motif of the interface between different levels of existence (Astakhova 2020). The symmetrical structure seems to reflect order and beauty, and at the same time a metaphysical contact between heaven and earth. The structure was built at an altitude of about 2,100 m above sea level to commemorate other buildings (chapels and “hospices”) that were destroyed by the construction of the dam. The authors were tasked with designing a chapel for around 100 worshippers, a flat for the celebrant, a house for pilgrims and a museum (Amouroux “Rénover Prieuré...”). From an observer’s point of view, the building appears much smaller than it actually is, as part of the volume has been hidden behind a steeply sloping hillside and only a section of the chapel emerges above the site from the access road. The process of adaptation the design to the topography of the site allows for a stronger integration of the geometrised volume, which is the result of human labour, into the natural landscape. The materials and colours used help to embed the building in the colours of its surroundings. The chapel stands out in the space especially in winter. It is a strong, attention-grabbing form and, although it refers in shape to the mountain motif, its geometric structure sets it apart from the surrounding dynamic landscape. Nevertheless, the pyramid does not compete with the mountain peaks, but symbolises their severity and simplicity. The planes of the walls are illuminated or disappear into the darkness in a similar way to the hillsides that form the background, creating a harmonious composition. The building form is compact, coherent and soaring, and the low number of glazings allows the building to be identified with stone, symbolising durability and indestructibility.

Shape of the mountain

– construction object inspired by the landform

Marcel Breuer, a prominent representative of the Bauhaus, was invited at the beginning of the 1960s to collaborate on a project for a winter sports centre in Flaine, which was to stimulate tourism and give a face to progress. The construction of an ecumenical chapel, designed by Breuer, was envisaged as a complement to the hotel and leisure facilities. The Flaine chapel, adjacent to the brutalist hotel buildings, consists of three interlocking volumes. The sloping planes of the walls form cubes that taper upwards to resemble the dynamically aligned peaks of a mountain range. Despite its small size, the construction object made up of sloping planes appears similar to the mountains looming in the distance. Architecturally, the chapel stands

out from the austere architecture of Flaine, as it has an artistic character and exemplifies Breuer's poetic work. Unlike the other buildings of the ensemble, it was also not built of concrete, but of a material typical of the Alpine area, i.e., wood, and covered with dark shingles, which is to be understood as a reference to local traditions and regional architecture, despite its innovative form. Breuer has created a construction object that can be interpreted as an architectural sculpture erected in correlation to the landscape and as a tribute to the mountains. Its geometric form represents a modern minimalism that reflects ideas of simplicity and functionality. On the one hand, it is a place of worship, on the other a temple of inner spirituality and a unique space connecting people with nature and its beauty. The building's straight lines and raw materials emphasise the purity of form and express the desire to create a place that facilitates concentration and contemplation, or at least finding inner harmony. Thus, the construction object, through its location and architectural form, acts as a link between the sacred and the profane.

A similar union of the different art disciplines was called for by Bruno Taut (among others), who spoke of the need for an art that is a connection between architecture, painting and sculpture, while at the same time reinforcing the position of architecture as a superior art capable of performing a spiritual and social liberating role from chaos (Miller 2017). A building that seems to fulfil the above postulates is the chapel *Gegenwartkapelle am Venet*, designed by priest Herbert Traxl and architect Florian Mathies. This small chapel was located on a mountain ridge right next to a nearby trail as a place of prayer and contemplation for tourists and pilgrims visiting the Venet mountain. It is open to all, regardless of religion, and provides a peaceful atmosphere to facilitate concentration and inner harmony. Embedded in the rugged mountain landscape, it is a true "Chapel of the Presence" referring to the idea of the presence of spiritual values in human life. The building consists of multifaceted concrete structures arranged in layers. The building lump is soaring, stretched upwards and blends in with the natural ground. The form is complemented by multicoloured glazing, relatively large in relation to the body of the building, in intense colours alluding to the colours of the sky at sunset. The concrete form of the chapel embodies the character of the geological forms and the glazing attempts to capture the beauty of the mountain sky. A clear reference can be seen here to the idea of crystal: filtering and splitting light, which was requested by the German Expressionists of the Glass Chain movement. What has occurred here, however, is the realisation of a utopian vision – the monumental architecture of the crystal has been "disenchanted", enclosing it in a "small glass", which nevertheless contrasts sharply with the strong form of the rocks and concrete slabs from which the building was made. Images of crystalline forms towering over Alpine peaks are confronted with the true power of the mountains, offering boundless, wild spaces in which an architectural object can only be a small diamond refining the landscape rather than a dominant form. However, the building focuses light, reflects it and appears as a strong accent in this austere environment.

The attitude of the architect-sculptor is also evident in the two Swiss structures located in the Lukmanier Pass. The *Sontga Maria (Maria Himmelfahrt)* chapel, designed by Josef Rieser in 1967, was built as the crowning achievement of the construction of the dam and, as with the *Chapelle Saint Pierre*, is a form of "restoration" of a temple that was destroyed by flooding of the area. In this case, however, historic interior fragments from the original building have been secured and placed in a modernised lump, thus creating a certain symbolic continuity of the building and preserving the memory of the forms lost as a result of the construction of the reservoir. The external form of the chapel oscillates between modernism and expressionism. A treatment reminiscent of the *Naviges cathedral* or the *Flaine chapel* was used here – the roofline was dismembered in an attempt to recreate the mountainous landscape. Folds and varying levels were introduced to imitate piled-up peaks. In the case of *Sontga Maria*, the designer opted for a clear contrast between the colours of the building body and the surrounding landscape. The walls finished in white plaster cut the building off from its surroundings, making it a dominant feature, especially in spring and summer. This may be due to the influence of modernism, but also to the plastering tradition of Alpine churches. A similar architecture can be seen in the *Sogn Giachen Chapel*, designed by Richard Brosi in 1979. The chapel was given a new form after it was rebuilt when the previous building was destroyed by an avalanche. The purpose of the new block was to provide resistance in the event of a similar situation (Kirchen-Online "Acla / Medel..."). The building is characterised by a relatively calm and not very dynamic form, although tectonics alluding to mountain peaks are noticeable here. The building lump is disjointed but squat, strongly embedded in its surroundings and creates an impression of solidity, which is probably a response to the avalanche threat. The *Sogn Giachen Chapel* is reminiscent of the nearby *Sontga Maria Chapel*. Its walls are plastered the same white and the roof is finished in sheet metal, but this building is smaller and simpler, lacking a bell tower, and the roofline is built up only by individual folds. The strength of this form, which lacks clear glazing, comes from its massiveness and its colour, which stands out against the summer rock cliffs and blends in with the colours of the winter landscape.

A much later building, which is also characterised by its white façade and sculptural structure, is the *Chapel des weißen Lichtes* by sculptor Rudi Wach. The structure, which dates from 1998, is located on the *Pitzal glacier* at an altitude of 2,880 metres above sea level. It was made of 180 individual pieces of Carrara marble suspended from a stainless steel structure. In summer, the white form stands out slightly from the surrounding landscape, although it corresponds to the colour of the region and, due to its location, picturesquely blends in with the structure of the sky. In winter, when the mountain peaks are covered in snow, the building blends in with its surroundings, becoming an integral part of them. Compared to the other chapels analysed, this one stands out for its use of curvilinear forms, which contrast with the dynamic and aggressive lines of the peaks. The rounded shapes of the roof

seem to be a counterpoint to the surroundings and a reference to the soft forms of the overcast sky. There is a symbolic connection between the mountain (the compact form of the building) and the sky (the rounded roof shape). The perception of the building also evolves over time and its spatial meaning changes with the changing seasons and the surrounding aura. In this context, the rounded forms can also be a reference to the soft lines of snow drifts. An altar is hidden inside the building, with special windows making it shimmer with different shades of light, which is reminiscent of the structure of a transparent crystal, filtering and splitting light. In this context, the light becomes an element of the sculpture and creates an elevated interior atmosphere.

Summary and conclusions

Mountain-inspired chapels combine art, nature and transcendence, and architecture becomes a tool for deepening spiritual experiences (not only of a religious nature, but also at the level of personal reflection or experiencing a feeling of harmony).

Two basic motifs can be distinguished in the shaping of building lumps: minimalist geometrised forms and complex forms based on the dynamic tectonics of bodies, edges and angles.

The shaping of buildings using minimalist forms based on a logical, geometric order can be interpreted as the pursuit of an ideal, divine order by, among other things, referring to the idea of the crystal (i.e. ordered ideal structures that are a symbol of perfection). In this context, geometry should be seen as a tool for shaping an architectural structure conducive to contemplation, allowing for tranquillity and concentration. The geometric form is also a counterpoint to the surrounding natural landscape, thus bringing out the values of the building and the surroundings, juxtaposing them in contrast.

For the most part, the chapels with complex forms are characterised by a solid but fragmented body, based on a dynamic arrangement of planes and edges and frequent changes of angle. It is noteworthy that the idea of fragmentation, the departure from right angles, the introduction of dynamics, the unpredictability of displacement of planes and controlled chaos are features that coincide with some of the tenets of deconstructivism¹⁰. However, almost all of the structures studied were created before the official development of this trend (coinciding with the late 1980s) and, as the researchers acknowledge, projects realised in the spirit of deconstructivism were characterised by an exceptional saturation with theory and the need for interpretation in conjunction with accompanying publications (Wąs 2015). Thus, it cannot be assumed that the authors of the chapels studied created them in the spirit

of deconstructivism. Consequently, it must be concluded that the architectural expressions used were intended to directly relate to the physical image of the mountains. The form of the structures is therefore a sculptural attempt to reproduce mountain forms (mainly peaks) – their power, dynamism, majesty, austerity and beauty. In this sense, the effect of the project bears the hallmarks of architectural sculpture, which creatively reproduces a landform. Such solutions were also intended to inscribe the buildings into the surrounding landscape and, in a symbolic sense, to transform the building into a mountain, giving it the meanings ascribed to mountains (e.g. permanence, sublimity, union of the sacred and the profane). Even when the architectural form is dynamic, soaring and lofty (or contains such elements) and is a strong, attention-grabbing form, the tectonics of the building body inspired by the local landscape nevertheless makes the building an integral part of its surroundings and creates a harmonious whole.

Against this background, only two buildings stand out. The first is the Chapelle Saint Pierre, whose pyramidal form combines the idea of geometry and an attempt to imitate the physical image of a mountain. This chapel is clearly subordinated to the principles of geometric order, but in a literal sense it is a simplified (synthetic) representation of a mountain peak, which is in fact a culturally established motif (e.g. mastabas, Egyptian pyramids, pyramidal temples of the Aztecs (Jackowski, Soljan 2001)). The second standout building is the Kapelle des weißen Lichts. In this building, the architects chose to introduce a soft roofline. This form breaks the motif of dynamic, dangerous mountains and turns towards the rounded shapes characteristic of clouds and snowdrifts. Thus, the structure is the only one to contrast with the form of the sharp-edged mountain.

Most of the buildings analysed are characterised by their relatively massive bodies. Glazing is limited and the chapels (even those with disjointed and dynamic structure) create the impression of being compact and solid. In practical terms, this is dictated, among other things, by structural requirements (e.g. resistance to avalanche risks), while in symbolic terms, the massive form gives the structures the characteristics of rock and stone – i.e. durability, solidity, indestructibility. In this context, the chapel Die Gegenwartkapelle am Venet is noteworthy, where the glazing is an important element of the architectural form, reflecting and diffusing light. Importantly, however, the building lump retains a massive and structurally closed character, even though light is the material of the façade here.

The colours and materials used in the analysed buildings indicate that the designers are looking for ways to integrate the building with the natural landscape. The variability of the surroundings due to atmospheric conditions (e.g. the appearance of a long-lasting snow cover) means that the architect has to make a conscious decision regarding the direction of the correspondence. The white colour scheme of the chapels allows them to blend gently in with the snow-covered hillsides. However, as the snow melts, these buildings stand out strongly from the grey-brown colouration of the rocks, making them elements that demonstrate their otherness in the natural landscape.

¹⁰ Bernard Tschumi, one of the most important theorists associated with deconstruction, introduces many new concepts and ideas that reveal deconstruction – destructuring, disjunction, dissociation, disruption, interruption, rejection, dismantling, displacement, distortion. These terms seem almost synonymous, but they conceal a wealth of shades of understanding decompositional thinking (Ivashko et al. 2022).

The use of dark-coloured concrete or wood (obtained both through painting means and as a result of the natural ageing of untreated wood) ensures that the chapels blend into the summer landscape, when strong light brings out individual planes, leaving some of the building lumps in shadow. However, the same buildings stand out significantly in the winter landscape and become a strong dominant feature against the bright, reflective snow.

The colour of a structure can also become a carrier of additional meanings as in the case of Mario Botta's chapel. The rusty colour achieved by the corten panels refers directly to the garnet colour, which was the main inspiration in the process of creating the Granatkapelle project.

Referring to the words of Frank L. Wright, who had a significant influence on the development of organic architecture, it can be considered that the basis of architecture is the character of the land where the architecture is realised. The character of the landscape, on the other hand, means colour, texture, "material" and greenery (Chodurska 1988). In this sense, most of the buildings analysed show characteristics that coincide with organic architecture. The aim of this integration is to achieve a harmonious balance between nature and culture, and in an attempt to blend buildings into the natural landscape, architects often use mathematical and geometric structures (Han 2020).

It is noteworthy that the analysed buildings do not, in principle, exhibit features of regional architecture. The exceptions are the references at the material level, e.g.,

the use of white plastered façades, which can be interpreted not only as an attempt to fit the buildings in the winter landscape or as an influence of modernism, but as a reference to the tradition of plastering religious buildings. Wood is also a local material used in construction. Most chapel authors, however, seek a more "austere" means of expression that goes beyond the material characteristic of the "forest line" and try to draw inspiration from the landscape located higher up, whose image is more austere, stony and majestic.

The buildings analysed reflect the relationship between human spirituality and nature. In them, architecture becomes a means of expression, emphasised by the spiritual element of art. Indeed, most of these structures are perceived as spatial sculptures with a significant emotional and aesthetic charge. Shapes, lines, proportions, materials and textures serve to create a space of the sacred. Geometric order or the dynamism of forms are two facets of the same quest to capture the sacred in the architectural lump. In all the buildings analysed, the authors attempt to capture the essence of the mountain along with the symbolic qualities ascribed to it and to create a place of contact between man and the infinite.

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References

- Agkathidis, Asterios. "Implementing biomorphic design. Design methods in undergraduate architectural education." In *Complexity & Simplicity – Proceedings of the 34th International Conference on Education and Research in Computer Aided Architectural Design in Europe*, vol. 1 (August 2016): 24–26.
- Allen, Stan. "Geological form: towards a vital materialism in architecture." In *Landform building: Architecture's new terrain*, edited by Stan Allen, and Marc McQuade, 10–17. Baden: Lars Müller Publishers, 2011.
- Amouroux, David. "Rénover Prieuré, Lanslebourg (Savoie)." *Archi 20–21. Intervenir sur l'architecture du XX^e*. Accessed May 15, 2024. <https://www.archi20-21.fr/edifices/prieure/descriptif-operation/>.
- Astakhova, Elena. "Architectural symbolism in tradition and modernity." In *IOP Conference Series: Materials Science and Engineering* 913, (2020). <https://doi.org/10.1088/1757-899X/913/3/032024>.
- Banasik-Petri, Katarzyna. "Architektura a natura. Wprowadzenie." *Państwo i Społeczeństwo* 19, no. 3 (2019): 5–9. <https://doi.org/10.34697/2451-0858-pis-2019-3-000>.
- Benyus, Janine. *Biomimicry: Innovation inspired by nature*. New York: HarperCollins Publishers, 1997.
- Bernbaum, Edwin. *Sacred mountains of the world*. Washington: Cambridge University Press, 2022. <https://doi.org/10.1017/9781108873307>.
- Chodurska, Danuta. "F.L. Wright i A. Aalto – wielcy humaniści architektury." *Rocznik Naukowo-Dydaktyczny* 117, (1988): 63–69.
- Eliade, Mircea. *Sacrum, mit, historia. Wybór esejów*. Warszawa: Państwowy Instytut Wydawniczy, 2017.
- Eyüce, Emine Özen. "Allure of the crystal: myths and metaphors in architectural morphogenesis." *International Journal of Architectural Research* 10, no. 1 (March 2016): 131–142. <https://doi.org/10.26687/archnet-ijar.v10i1.908>.
- Geva, Anat. "Symbolism and myth of mountains, stone, and light as expressed in sacred architecture." In *Architecture, culture and spirituality*, edited by Thomas Barrie, Julio Bermudez, and Phillip James Tabb, 110–111. New York: Routledge, 2015.
- Gnatiuk, Liliia. "Mysticism and symbolism in sacral space." In *International Conference – defining the architectural space – the myths of architecture*, vol. 2 (2021): 41–54. <https://doi.org/10.23817/2021.defarch.2-4>.
- Granatkapelle. "The architect Mario Botta." Accessed April 5, 2024. <https://granatkapelle.com/en/the-chapel/architect-mario-botta.html>.
- Greuel, Gert-Martin. "Crystals and mathematics – an historical outline." *Symmetry: Culture and Science* 32, no. 1 (2021): 41–57. https://doi.org/10.26830/symmetry_2021_1_041.
- Han, Yunxi. "Organic Architecture." *Journal of Engineering and Architecture* 8, no. 2 (December 2020): 28–31. <https://doi.org/10.15640/jea.v8n2a5>.
- Hochleitner, Rupert. *Mineraly i kryształy. Określanie minerałów według barwy rysy*. Warszawa: Muza 1994.
- Ivashko, Yulia, Olena Remizova, and Andrii Dmytrenko. "The avant-garde of the 1920's and the deconstructivism of today: the logic of inheritance." In *International Conference – Defining the Architectural Space*, vol. 1 (2022): 43–56. <https://doi.org/10.23817/2022.defarch.1-5>.
- Jackowski, Antoni, and Izabela Sołjan. "Środowisko przyrodnicze a sacrum." *Peregrinus Cracoviensis* 12, (2001): 29–50.
- Juchniewicz, Beata. "Architektura – od obrazu natury do jej symulacji." *Czasopismo Techniczne. Architektura* 106, z. 1-A (2009): 314–318.
- Kirchen-Online. "Acla / Medel – Sogn Giachen (St. Jakob d. Ä.)." Accessed May 15, 2024. <https://www.kirchen-online.org/kirchen-kapellen-ingraubuenden-und-umgebung/acla---medel---st-jakob-d-ae.html>.
- Mathieu, Jon. "The sacralization of mountains in Europe during the Modern Age." *Mountain Research and Development* 26, no. 4 (November 2006): 343–349. [https://doi.org/10.1659/0276-4741\(2006\)26\[343:TSOMIE\]2.0.CO;2](https://doi.org/10.1659/0276-4741(2006)26[343:TSOMIE]2.0.CO;2).
- Miller, Tyrus. "Expressionist Utopia: Bruno Taut, Glass Architecture, and the Dissolution of Cities." *Filozofski vestnik* 38, no. 1 (2017): 107–129.

- Niezabitowska, Elżbieta. *Metody i techniki badawcze w architekturze*. Gliwice: Wydawnictwo Politechniki Śląskiej, 2014.
- Pawlyn, Michael. *Biomimicry in architecture*. London: RIBA, 2019.
- Serafin, Aleksander. "Gottfried Böhm's creativity: Architecture as a sculpture made of concrete." In *Intelligence, creativity and fantasy*, edited by Mário Ming Kong, Maria do Rosário Monteiro, and Maria João Pereira Neto, 109–114. London: CRC Press, 2019.
- Tobolczyk, Marta. "Ekspresjonizm w architekturze europejskiej. Ciągłość tradycji." *Zeszyty Naukowe Uczelni Vistula* 53, no. 2 (2017): 57–80.
- Wąs, Cezary. *Architektura a dekonstrukcja. Przypadek Petera Eisenmana i Bernarda Tschumiego*. Wrocław: Instytut Historii Sztuki Uniwersytetu Wrocławskiego, 2015.
- Yedekci, Gülay. "Biomimetic architecture a new interdisciplinary approach." *ALAM CIPTA International Journal of Sustainable Tropical Design & Practice* 7, no. 2 (2014): 59–64.
- Zamiatnin, Filip. "Rozwój nurtu ekspresjonistycznego w XX i XXI wieku." *Builder* 323, no. 6 (2024): 12–15. <https://doi.org/10.5604/01.3001.0054.4685>.

Streszczenie

Formy obiektów sakralnych inspirowane rzeźbą gór. Odwołania do form geologicznych w projektach małych współczesnych kaplic górskich

Twórcy architektury od wieków czerpią inspiracje z natury poprzez kopiowanie form lub poprzez obserwację zjawisk i przełożenie zasad rządzących w środowisku naturalnym na strukturę budynku. Świadome naśladownictwo natury opiera się głównie na formach biologicznych, jednak architekci sięgają również po wzorce wywodzące się z form geomorficznych. Ważnymi źródłami inspiracji architektonicznych pośród nieożywionych elementów przyrody są: góry postrzegane jako wzorzec piękna, kamienie i skały postrzegane jako elementy „niezniszczalne” oraz kryształy górskie symbolizujące doskonałość i światło.

Celem pracy jest próba analizy i interpretacji formy zewnętrznej (bryły) wybranych, małych obiektów sakralnych z obszaru alpejskiego pod kątem nawiązania do motywu gór lub kryształu górskiego oraz zastosowanych w tym celu środków wyrazu architektonicznego.

W pracy omówiono zasady kształtowania bryły, kolorystykę, zastosowane materiały, relacje z krajobrazem naturalnym oraz znaczenia symboliczne obiektów. Wykazano, że analizowane obiekty noszą cechy architektury organicznej i odzwierciedlają związek pomiędzy duchowością człowieka a naturą. Architektura staje się w nich środkiem wyrazu, podkreślonym przez duchowy pierwiastek sztuki.

Słowa kluczowe: kaplice górskie, formy geologiczne, górski kryształ, Alpy, architektura obiektów sakralnych