Biophilic Modernism

The Pioneers of Austrian Biophilic Design

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Biophilic Modernism

The Pioneers of Austrian Biophilic Design

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Kurzfassung

Biophiles Design, das die Verbindung zwischen Mensch und Natur stärkt, hat in Zusammenhang mit dem steigenden Bewusstsein über die Folgen der Klimaerwärmung an Bedeutung gewonnen. Dazu hat der Wunsch nach einem gesünderen Umfeld, als Folge der Corona-Pandemie dieses Phänomen weiter verstärkt. Das Ziel dieser Diplomarbeit war es die historische Relevanz des biophilen Designs im österreichischen Kontext zu untersuchen und dabei herauszufinden, welche Architekten Pionierarbeit geleistet haben und als erstes mit dem biophilen Ansatz experimentiert haben.

Dennoch wird biophiles Design oft als greenwashing abgestempelt. Die zeitgenössische Auffassung von Nachhaltigkeit in der Architektur ist sehr technologisch. Bewertungssysteme für umweltfreundliches Bauen legen hauptsächlich einen Fokus auf die thermische Effizienz von Gebäuden und Energiegewinnung aus erneuerbaren Quellen. Dies führt oft zu Gebäuden mit einer erhöhten Trennung von Mensch und Natur.

Da „biophiles Design“ einem zeitgenössischen Trend entspricht, besteht ein Mangel an Post-Occupancy Evaluierung. Daher konzentrierte sich die Forschung auf Architektur aus der Zeit nach dem Zweiten Weltkrieg bis 1975. Einfamilienhäuser wurden als Typologie für eine vertiefte Analyse ausgewählt, da diese Typologie meistens die klarste Darstellung der Philosophie von ArchitektInnen repräsentieren.

Um Anhaltspunkte zu finden, wurden österreichische Architekturzeitschriften vom Ende des Zweiten Weltkriegs bis 1975 studiert. Sobald relevante Anhaltspunkte gefunden waren, wurden Archivrecherchen und die schriftliche Literatur von Pionierarchitekten studiert, um eine Auswahl von Einfamilienhäusern für die vertiefte Analyse zu bestimmen. Wo es möglich war, wurden Ortsbesichtigungen und Interviews mit den Bewohnern und ehemaligen BauherrInnen durchgeführt. Die vertiefte Analyse der ausgewählten Einfamilienhäuser erfolgte anhand eines Kriterienkatalogs, der nach Recherche aktueller Arbeiten und Literatur zum biophilen Design erstellt wurde.

Die Ergebnisse dieser Arbeit bieten einen wertvollen Einblick in eine Vielzahl von Low-Tech-Lösungen, die vor allem im Bereich der nachhaltigen Architektur weiterhin von großer Bedeutung sind. Die verfeinerte Analyse zeigt erfolgreiche Beispiele für die Maximierung des Tageslichtanteils bei gleichzeitiger Verstärkung der Verbindung zwischen Innen und Außen, verschiedene Anwendungsmöglichkeiten natürlicher Baumaterialien und die Integration von Gebäuden in natürliche Landschaften bei gleichzeitiger Lockerung der Grenze zwischen Innen und Außen. Typisch für diese Epoche ist das Ölheizungssystem, das in den meisten der besprochenen Beispiele eingesetzt wurde, was ihre Rechtfertigung als nachhaltige Architektur mindert. Hier kann der heutige Ansatz des nachhaltigen Designs Lösungen bieten, die dieses Problem überflüssig machen.

Abstract

Biophilic design, increasing the human-nature connectedness, has recently gained popularity in conjunction with society's growing awareness of the impacts of global warming, as well as the renewed interest in healthy environments following the coronavirus global pandemic. The aim of this thesis was to study the historical relevance of biophilic design in the Austrian context and discover which pioneering architects first experimented with the biophilic approach.

However, biophilic design is often dismissed as green washing. The current perception of sustainable design is very technological, green building rating tools are target-driven focusing primarily on the thermal efficiency of new buildings and renewable sources for energy production. This can lead to buildings with an increased human separation from nature.

As biophilic design is such a recent trend, post-occupancy evaluation of such architecture is insufficient. Therefore, research was focused on architecture from the period following the end of WWII up until 1975. Detached single-family homes were chosen as a typology for a refined analysis, as this typology most often embodies the clearest representation of an architect's philosophy.

To discover leads, Austrian architectural journals from the end of WWII-1975 were studied. Once relevant leads were established, archival research and the written literature by pioneering architects was studied to confirm a selection of single-family homes for the refined analysis. Where possible site visits and interviews with residents and former clients were conducted. The refined analysis of the selected single-family homes was guided by a criteria catalogue, which was compiled following research into current papers and literature on biophilic design.

The findings in this thesis offer valuable insight into a wide array of low-tech solutions that remain highly relevant, especially in sustainable design. The refined analysis showcases successful examples of maximising daylight exposure, whilst increasing the interior connection with the exterior, several possible applications of natural building materials and how to integrate buildings in natural landscapes, whilst softening the boundary separating interior from exterior. Typical of this era, the oil heating system present in most of the discussed examples weakens their justification as sustainable architecture. This is where the current approach to sustainable design can offer solutions that eliminate this issue.

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Dedicated to Mum

Receiving a letter
Makes me feel instantly better.
It is so much more personal,
and versatile.
It can make me emotional.
When I read kind words,
it gives me comfort,
like hearing birds or
picking herbs

Dagmar Anna Hunt
11.04.1963-07.12.2022

Introduction

Biophilic design, increasing the human-nature connectedness, is a recent trend in architecture that has gained popularity in conjunction with society's growing awareness of the impacts of global warming, as well as the renewed interest in healthy environments following the coronavirus global pandemic.[1] In 1984 the biologist Edward O. Wilson published the book "biophilia,"[2] which represents the introduction to the concept that spurred on the development of biophilic design as we know it today. In 2008, a book titled: "Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life"[3] was published representing the most comprehensive description of biophilic design to date. Interpretations, guidelines, research, and examples from several architects, alongside several other academic professionals were included within this publication supporting the biophilia hypothesis.

Many supporters of biophilic design believe that this specific approach to architecture should have a more prominent position in sustainable design. Increased vegetation in cities is proven to reduce the urban heat island effect,[4] as well as creating micro-climates that increase a buildings thermal efficiency.[5] However, biophilic design is often dismissed as green washing. Architects are regularly criticised for using biophilic design, to promote an unsustainable building as environmentally friendly. The current perception of sustainable design is very technological, green building rating tools are target-driven focusing primarily on the thermal efficiency of new buildings and lacking biophilic design principles in their rating criteria. This can lead to buildings with an increased human separation from nature.

As biophilic design is a contemporary trend, post-occupancy evaluation of such interventions is insufficient, as too little time has passed to make an adequate evaluation.

Therefore, this thesis aims to study the historical relevance of biophilic design in the Austrian context, understand which pioneering figures first experimented with the biophilic approach and select specific objects of interest for a refined analysis. The selection was confined to the period following the end of WWII up until 1975. The typology for the selected objects of interest was the detached single-family home, as this typology most often embodies the clearest representation of an architect's philosophy.

The first step was to gain a comprehensive understanding of biophilic design. The first chapter introduces the concept of biophilia. The following chapters summarise the current perception of the fundamental principles that define biophilic design, along with an insight into research on the health benefits, as well as the current dialogue on this recent trend. Following this research, a criteria catalogue was compiled summarising all the relevant criteria to form a basis for the analyses of objects of interest.

To gain an awareness of the historical Austrian architectural scene following WWII and discover possible leads for archival research, "Der Bau" and "Der Aufbau" architectural journals from this period were studied. Following this initial research, four architects were singled out for a further analysis:

Ernst A. Plischke (1903-1992)

Eugen Wörle (1909-1996)

Roland Rainer (1910-2004)

Ernst Hiesmayr (1920-2006).

Archival research was then conducted in the collections of the Academy of Fine Arts Vienna, the Architekturzentrum Wien and the Technical University Vienna. After this period of archival research, a selection of houses for the refined analysis was confirmed and where possible these objects were visited, and interviews were conducted with residents or clients. The houses chosen for the refined analysis were "Haus Frey" completed in 1973 by Ernst A. Plischke, "Haus in Salmannsdorf" an unbuilt proposal by Eugen Wörle from 1959, "Sommerhaus St. Margarethen" completed in 1957 and "Haus unter Bäumen" completed in 1966 both by Roland Rainer and finally "Zweithaus Parisini" completed in 1965 and "Wohnhaus Siemer" completed in 1969 both by Ernst Hiesmayr.

Literature from the individual architects formed a basis for their written profiles, which included a biographical account of their architectural development, an interpretation of their architectural philosophy with a focus on biophilic tendencies and a selection of projects that exhibit biophilic principles. Once all the archival material, including plans, original photographs, personal accounts etc. was gathered and categorised, the refined analysis of the objects of interest was completed along the guidelines of the criteria catalogue.

References

1. https://blog.landscapeprofessionals.org/exploring-the-biophilic-design-trend/
(last visited 01.02.2024)

2. Edward O. WILSON, biophilia, Cambridge (Harvard University Press) 1984

3. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life, Hoboken (John Wiley & Sons, Inc.) 2008

4. https://www.epa.gov/green-infrastructure/reduce-urban-heat-island-effect
(last visited 01.02.2024)

5. Stefano BOERI, a vertical forest/ un bosco verticale, Mantova (Corraini Edizioni) 2015, p. 122

Biophilia

CH. 1

Biophilia is a recent addition to the English vocabulary, less than a century old. It is comprised of two words that are much older, "bios" and "philia." Both words originate from ancient Greek and are etymologically defined as follows:

Bios: Life, mode of life, manner of living

Philia: Affectionate regard, friendship[1]

The term Biophilia was coined by the German-born American psychologist Erich Fromm. He used it for the first time in his book "The Heart of Man: Its Genius for Good and Evil." This book was published in 1964 at a time of political turmoil. The cold war was in full swing, with America militarily engaged in Vietnam and an imminent threat of nuclear apocalypse. The 1960s was also a time of rapidly changing social norms, often resulting in violence. These factors concerned Fromm and so this book's aim was to "study the phenomenon of indifference to life in an ever increasingly mechanized industrialism, in which man is transformed into a thing, and as a result, is filled with anxiety and with indifference to, if not with hate against, life."[2] He believed understanding this phenomenon was the first step towards initiating change.

As the title suggests Fromm explains how humans are capable of both good and evil. He elaborates on the different behavioural patterns and factors that lead to a person being good or evil, but always stresses how humans can shift from one end of the spectrum to the other. He describes shifting towards the evil end as regressing, shifting towards the opposite as progressing. He categorises these behavioural patterns into six different orientations, with three orientations of a progressive nature, each with their counterparts of a regressive nature. One of the progressive orientations is the biophilous orientation and its counterpart is the necrophilous orientation.

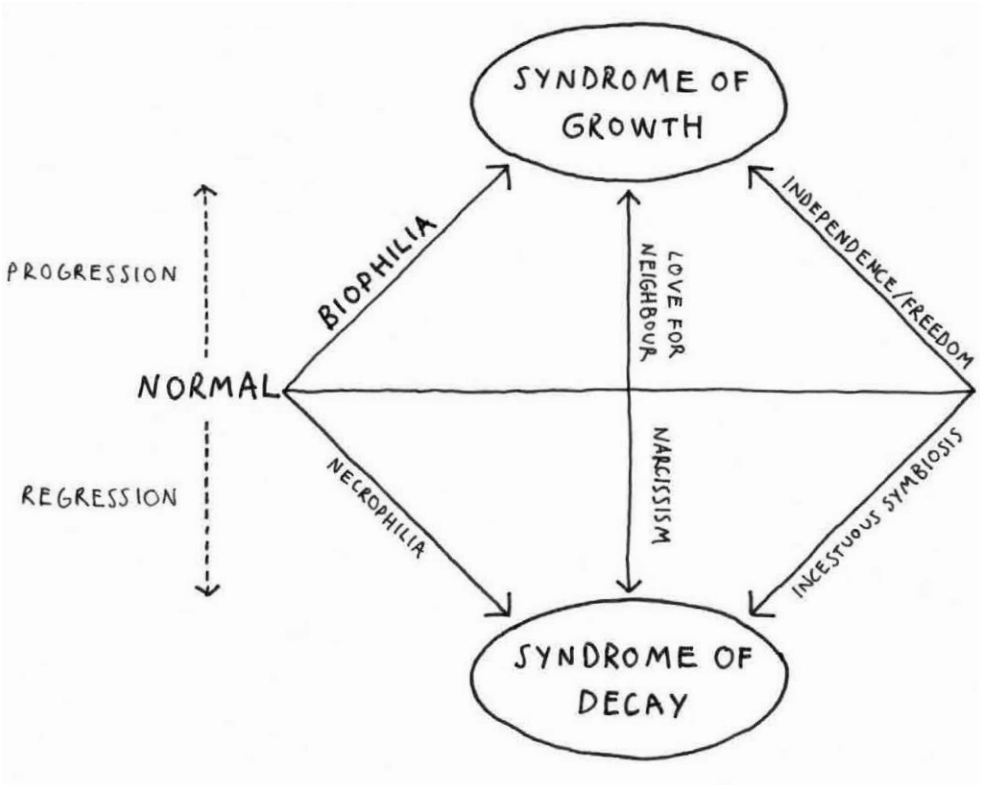
"The full unfolding of biophilia is to be found in the productive orientation. The person who fully loves life is attracted by the process of life and growth in all spheres. He prefers to construct rather than retain. He is capable of wondering, and he prefers to see something new to the security of finding confirmation of the old. He loves the adventure of living more than he does certainty. His approach to life is functional rather than mechanical. He sees the whole rather than only the parts, structures rather than summations. He wants to mold and to influence by love, reason, by his example; not by force, by cutting things apart, by the bureaucratic manner of administering people as if they were things. He enjoys life and all its manifestations rather than mere excitement."[3]

This is Fromm's understanding of Biophilia, a motto and a set of specific morals to live by. Embracing life in all its forms, found in nature or the relationships we have with each other, as well as with animals. The choice of words indicates how a positive attitude towards nature is a progressive characteristic, as opposed to a life, where technology and the machine become idolised.

Necrophilia is the extreme opposite; it is summarised as the love of death. A necrophilous person wishes to kill, to transform the organic inorganic and they possess a love for destruction.[4] Fromm further explains that there are varying degrees of regression, with the necrophilous orientation more pronounced in some than others. He warns of the danger of letting a single orientation regress too far and the knock-on effect it can have.

"I have tried to show that each of the three orientations described here can occur on various levels of regression. The deeper the regression in each orientation, the more the three tend to converge. In the state of extreme regression they have converged to form what I have called 'the syndrome of decay.' On the

Fig. 1 - Erich Fromm diagram



other hand, with the person who has reached an optimum of maturity, the three orientations also tend to converge. The opposite of necrophilia is biophilia, the opposite of narcissism is love; the opposite of incestuous symbiosis is independence and freedom. The syndrome of these three attitudes I call 'the syndrome of growth.'"[5]

The diagram shown in (Fig. 1) explains Fromm's theory visually. Another argument Fromm presents is that following a path of regression or progression is a choice. External factors will influence this choice, but every human makes the decision as to which path they begin to follow. He further argues there is a point of no return if you have continued down a certain path for too long. He explains in the case of a regressive path, if your "heart has hardened to such a degree that there is no longer a balance of inclinations"[6] you have lost the freedom to choose to progress.

"Indeed, we must become aware in order to choose the good – but no awareness will help us if we have lost the capacity to be moved by the distress of another human being, by the friendly gaze of another person, by the song of a bird, by the greenness of grass. If man becomes indifferent to life there is no longer any hope that he can choose the good. Then, indeed, his heart will have so hardened that his 'life' will be ended. If this should happen to the entire human race or to its most powerful members, then the life of humankind may be extinguished at the very moment of its greatest promise."[7]

This is the final paragraph of the "The Heart of Man" and Fromm's appeal to humankind. His introduction of the biophilous orientation demonstrates how a healthy relationship towards nature and life could result in many benefits for the wellbeing of humankind. He explains that embracing a lifestyle where

nature is experienced to the fullest will diminish humankind's inclination for violence and hate.

Two decades after the release of "The Heart of Man," where biophilia was introduced into the English vocabulary, a new book was published adopting this new word for its title. The author was no longer a psychologist, he was a biologist called Edward O. Wilson. In this book, Wilson reinterprets the word biophilia, delving deeper into the possibilities of what it could represent and developing a definition of his own.

"biophilia, ...the innate tendency to focus on life and lifelike processes."[8]

This is the brief definition Wilson employs to explain his understanding of biophilia and it has become the most widely adopted definition today. He uses "innate tendency" to describe his hypothesis that it is a genetic predisposition to want to affiliate with nature.

"The biophilic tendency is nevertheless so clearly evinced in daily life and widely distributed as to deserve serious attention. It unfolds in the predictable fantasies and responses of repetitive patterns of culture across most or all societies, a consistency often noted in anthropology. These processes appear to be part of the programs of the brain. They are marked by the quickness and decisiveness with which we learn particular things about certain kinds of plants and animals. They are too consistent to be dismissed as the result of purely historical events working on a mental blank slate."[9]

Here, Wilson talks of particular patterns that seem to recur in societies across the world. His hypothesis states it is impossible these societies could have influenced each other due to large geographic separations. Therefore, a collective memory stemming from a far more distant relative is responsible for their shared understanding of particular things. One of the repetitive patterns Wilson elaborates on further is the "awe and veneration of the serpent."[10] The fascination of the serpent is manifest in myths, gods, and other symbolism. He argues that many societies revere a serpent god, and that this reverence developed individually in each society, but the root of it lies in the DNA that every human shares.

"... What is there in snakes anyway that makes them so repellent and fascinating? The answer in retrospect is deceptively simple: their ability to remain hidden, the power in their sinuous limbless bodies, and the threat from venom injected hypodermically through sharp hollow teeth. It pays in elementary survival to be interested in snakes and to respond emotionally to their generalized image, to go beyond ordinary caution and fear. The rule built into the brain in the form of a learning bias is: become alert quickly to any object with the serpentine gestalt. Overlearn this particular response in order to keep safe."[11]

As Wilson explains, snakes have many dangerous characteristics and encountering the wrong snake can have fatal consequences. Throughout human evolution snakes have been the cause of many deaths and injuries, so an instinctual caution is imbedded within all of us. He then adds that culture has developed this caution further, by telling stories and creating myths, so that a response becomes ingrained in the human psyche. Some may be scared to death of snakes, some may be mesmerized, but very few are indifferent towards them.

"The brain evolved into its present form over a period of about two million years, from the time of Homo habilis to the late stone age of Homo sapiens, during which people existed in hunter-gatherer bands in intimate contact with the natural environment. Snakes mattered. The smell of water, the hum of a bee, the directional

bend of a plant stalk mattered. (...) Although the evidence is far from all in, the brain appears to have kept its old capacities, its channelled quickness. We stay alert and alive in the vanished forests of the world."[12]

This is Wilson's primary argument supporting his hypothesis regarding biophilia. The period he mentions, where the brain evolved into its current form constitutes the majority of modern human's evolution. Therefore, he argues that although modern humans currently have an entirely different lifestyle, how some of us live in metropolises much larger than the communities of primal hunter-gatherer bands, our brain is still wired to adapt to the latter lifestyle. The development modern humans have undergone since we transitioned away from hunter-gatherer societies to agrarian ones has been so immense and happened so rapidly, that our brain never stood the chance to evolve with it.

A subject Wilson explores in further detail is the modern human's natural choice of habitat. During the period, where the human brain evolved into its current form, "human beings lived on the savannas of Africa, and subsequently those of Europe and Asia, vast, parklike grasslands dotted by groves and scattered trees."[13] He argues a savanna was well suited to human evolution, "as it offered an abundance of animal and plant food (...) as well as the clear view needed to detect animals and rival bands at long distances."[14] On top of that three criteria were desirable for the best-suited location within this landscape. Firstly, topographic relief was beneficial, as it allowed for the surveillance of greater areas of the landscape from a higher vantage point. Furthermore, overhangs and caves provided shelter. The next criteria are scattered clumps of trees to provide shaded retreats during long marches or shelter bodies of drinking water. Finally, lakes and rivers offer a source of nourishment, and the shorelines act as perfect natural perimeters of defence.[15] The criteria and landscape described thus constitute the perfect environment, where our brain is wired to feel most at ease.

"Put these three elements together: it seems that whenever people are given a free choice, they move to open tree-studded land on prominences overlooking water. This worldwide tendency is no longer dictated by the hard necessities of hunter-gatherer life. It has become largely aesthetic, a spur to art and landscaping. Those who exercise the greatest free choice, the rich and powerful, congregate

Fig. 2 - Stowe gardens, Buckinghamshire

Fig. 3 - „Canaletto view“ from Belvedere

on high land above lakes and rivers and along ocean bluffs. On such sites they build palaces, villas, temples, and corporate retreats.”[16]

Wilson names Belvedere in Vienna, as an example of such a palace. Belvedere is perched on the highest point of the 4th district. Its baroque gardens ensure an obstructed view of Vienna’s 1st district, worthy of the name it was given and reserved for a man as powerful as prince Eugene. Further examples support Wilson’s hypothesis, such as English landscape gardens, which became very popular amongst the aristocracy of Europe. Stowe gardens in Buckinghamshire is a famous example. The carefully planned gardens in their current form exemplify many characteristics of the savanna landscape. Bodies of water, scattered clumps of trees are all present in the carefully considered vistas. Another visible example is the situation in the canton of Zurich. Almost every vantage point with a view of the lake has been developed and house prices differ massively, if you want the privilege of a “Seesicht.”

As one can tell the concept of biophilia is very recent, yet Fromm and Wilson provide convincing arguments in support of the fruits it could bear. In Fromm’s case, he advocates for the preservation and encouragement of life. He believed embracing this mindset could help society steer clear of a path of destruction and suffering. Whilst Wilson advocates for the concept of biophilia as an essential ingredient to maintaining good public health. His hypothesis states that affiliating with nature is what our brains are adapted too, a world filled with technology and virtual realities is so far detached from what our brains can comprehend.

References

1. Henry George LIDDELL & Robert SCOTT, A Greek-English Lexicon. revised and augmented throughout by. Sir Henry Stuart Jones. with the assistance of. Roderick McKenzie. Oxford (Clarendon Press) 1940

2. Erich FROMM, The Heart of Man: Its Genius for Good and Evil, New York (Harper & Row) 1964, p. 10

3. Erich FROMM, The Heart of Man: Its Genius for Good and Evil, New York (Harper & Row) 1964, p. 43

4. Erich FROMM, The Heart of Man: Its Genius for Good and Evil, New York (Harper & Row) 1964, pp. 40-41

5. Erich FROMM, The Heart of Man: Its Genius for Good and Evil, New York (Harper & Row) 1964, pp. 109-110

6. Erich FROMM, The Heart of Man: Its Genius for Good and Evil, New York (Harper & Row) 1964, p. 145

7. Erich FROMM, The Heart of Man: Its Genius for Good and Evil, New York (Harper & Row) 1964, p. 145

8. Edward O. WILSON, biophilia, Cambridge (Harvard University Press) 1984, p. 1

9. Edward O. WILSON, biophilia, Cambridge (Harvard University Press) 1984, p. 85

10. Edward O. WILSON, biophilia, Cambridge (Harvard University Press) 1984, p. 85

11. Edward O. WILSON, biophilia, Cambridge (Harvard University Press) 1984, pp. 92-93

12. Edward O. WILSON, biophilia, Cambridge (Harvard University Press) 1984, p. 101

13. Edward O. WILSON, biophilia, Cambridge (Harvard University Press) 1984, p. 109

14. Edward O. WILSON, biophilia, Cambridge (Harvard University Press) 1984, p. 109

15. Edward O. WILSON, biophilia, Cambridge (Harvard University Press) 1984, p. 110

16. Edward O. WILSON, biophilia, Cambridge (Harvard University Press) 1984, p. 110

Biophilic Design

CH. 2

2.1

Biophilic Theory

Following on from the discovery of the concept of biophilia, further academics began to research into the topic, and many began to see the possible applications in architecture and design. One of the first and most influential figures to expand Wilson's research into the realm of architecture and design was a professor of social ecology at Yale, called Stephen R. Kellert. Kellert began to see the possible link between biophilia and environmentally- or ecologically friendly design. However, he recognised the differences in current definitions of sustainability and proposed a different approach called "restorative environmental design."

"...'restorative environmental design,' an approach that aims at both a low-environmental-impact strategy that minimizes and mitigates adverse impacts on the natural environment, and a positive environmental impact or biophilic design approach that fosters beneficial contact between people and nature in modern buildings and landscapes."[1]

In this definition he argues, there is no need to entirely disregard our current perception of sustainability. However, he implies the current approach is lacking a "positive" contribution towards the environment and a biophilic approach could fill this gap. Any building endeavour will invariably take away a part of nature, the biophilic approach aims to give something back.

Kellert categorizes his understanding of biophilic design into two dimensions. The first dimension is the organic or naturalistic dimension, "defined as shapes and forms in the built environment that directly, indirectly, or symbolically reflect the inherent human affinity for nature."[2] He elaborates further on the different experiences of nature and defines them as follows:

- Direct experience - contact with self-sustaining features of the natural environment (e.g. daylight, plants, animals, natural habitats, and ecosystems)

- Indirect experience - contact with nature requiring ongoing human input to survive (e.g. potted plant, aquarium etc.)

- Symbolic experience - representation of the natural world through image, metaphor etc.[3]

The direct and indirect experiences of nature represent the closest connection, as they constitute experiencing nature physically with our senses. The symbolic experience of nature is a more complex subject. It is a contact with nature experienced within the brain, relating to experiences and instincts originating from the natural world.

The second dimension is the vernacular or place-based dimension, "defined as buildings and landscapes that connect to the culture and ecology of a locality or geographic area."[4] This dimension encompasses all aspects relating to "genius loci," encouraging a respectful response to a building's context, as well as the preservation of a site's existing habitat. Kellert relates the definition of this dimension back to "the human territorial proclivity developed over evolutionary time that has proven instrumental in securing resources, attaining safety and security, and avoiding risk and danger."[5] Further, he believed designing buildings that instil a strong sense of place and identity, inspires people to engage with the built and natural environment in a responsible manner.[6]

Kellert introduced these dimensions and the concept of restorative environmental design to form a basis for understanding the possibilities of the biophilic approach. It has spurred on many other architects and

academics to begin research and contribute definitions and guidelines of their own. The following paragraphs will provide a comprehensive understanding of the design elements and methodology, that constitute the biophilic approach.

Environmental Features

Incorporating natural elements within the built environment is the most obvious and appropriate characteristic of biophilic design. Direct and indirect experiences of nature are only possible using the "real thing."

Natural Building Materials

The use of natural building materials within a building's structure and for its surfaces is key to producing a biophilic design. Natural building materials are products of the plant- or mineral world. They are raw materials that require no further changes to their chemical composition or substance,[7] as opposed to artificial materials, such as plastic, which requires the chemical process of polymerization to reach its ultimate form. Furthermore, the use of natural building materials, found on site or from the surrounding landscape is a part of the biophilic approach. It enhances a sense of place and identity, as well as reducing carbon emissions by eliminating the need to transport goods across large distances.

Augmenting Biodiversity

As mentioned previously, one of the main priorities of the biophilic approach is to give back to nature. A form of compensation is to provide nature the space it needs to flourish. In the built environment natural plants are incorporated into the building envelope in the form of green roofs, green walls, or roof gardens. Plant life is also encouraged in the interior of buildings with potted plants or planter systems.

The approach to site treatment is another important aspect of biophilic design. The aim is to retain the existing natural setting as much as possible. Existing trees should be preserved and incorporated into a design and the built environment should adapt to the existing topography, as opposed to ignorantly levelling it. Furthermore, enhancing native flora & fauna species contributes positively to a site's sense of place and identity, as well as providing benefits to the local ecology.

The biophilic approach to landscape design is to do as little as possible and let nature do the rest. Therefore, natural landscape promotion with minimal management is suggested. Ecological complexity is found throughout most natural settings, consequently a rich combination of planting is suggested to create flourishing ecosystems.

Water

Water is the elixir of life. Humans, animals, and plants cannot survive without this valuable resource. We literally consist of water, as about 60% of our body is made up of it. As Wilson explained we react positively to water, as it was always considered a source of nourishment and protection. Hence the presence of water in the built environment is a necessary feature to satisfy our evolutionary desire. Water can be integrated into a design in many different forms. It can be used for recreational purposes in the form of swimming pools or spa facilities. The sound of water cascading down a waterfall or gently flowing in a fountain is known to have a soothing effect.

On-site water management is another important aspect to consider. Stormwater routing combined with landscaping features makes it visible. Incorporating wetlands into

the landscape design also provides access to water, as well as augmenting biodiversity. Another applicable feature are rain gardens or retention ponds. These allow water to be absorbed by vegetation and infiltrate to underlying groundwater. This last feature is more beneficial than directing all the rainwater into canals, which inevitably leads to flooding once the canal system is overwhelmed by heavy rainfall.

Sun

Just like water, the sun is a vital source of nourishment sustaining life on earth. Plants use the biological process of photosynthesis to convert energy from the sun into chemical energy. During this process carbon dioxide is plucked from the atmosphere and the oxygen we need to breathe is delivered to us. The sun is particularly important to humans, as we evolved into a "largely diurnal animal, heavily reliant on sight for securing resources and avoiding hazard and danger."[8]

Access to daylight in buildings is proven to alleviate pain and depression.[9] It is also vital for our natural production of vitamin D. A vitamin D deficiency is very common, especially in climates with limited sunlight in winter months. However, another cause is the excessive amount of time humans spend indoors.[10] Therefore, provision of ample daylight indoors is essential to maintaining a healthy standard of living. Building orientation is the most effective way to ensure the maximum comfortable exposure to daylight. Further, a carefully considered building orientation is the best way to maximise thermal gain. Thermal gain reduces the need to mechanically control the interior temperature, providing a natural means, as well as making buildings more energy efficient.

Finally, a natural setting will provide varied sources of daylight. In a forest setting, daylight will filter through leaves and fall to the ground as dappled light. Approaching a clearing from a shaded pathway, daylight bursts through the canopies to welcome you in. Or whilst swimming on rocks by the ocean, you'll notice strands of reflected light dancing along a craggy cliff overhang. The biophilic approach encourages architects to take inspiration from nature and employ such varied situations of daylight within the built environment. The use of filtered and diffused light, an enticing interplay of light and shadow, reflected light and light pools are features that generate an emotional experience more akin to situations that occur in our natural habitat.

Exterior

"Although we spend 95% of our time indoors, we are really outdoor animals. The forces that have selected the genes of contemporary man are found outdoors in the plains, forests, and mountains, not in air-conditioned bedrooms and at ergonomically designed workstations. Fifteen generations ago, a period of little consequence in evolutionary terms, most of our ancestors would spend the majority of their waking hours outdoors, and buildings would provide only shelter and security during the hours of darkness. Even when inside, the relatively poor performance of the building meant that the indoor conditions closely tracked the outdoor environment."[11]

The biophilic approach aims to strengthen the human relationship with nature. We can do this by using natural building materials or including nature within the interior of a building. Nonetheless, if we really want to get closer, we must also focus our attention on the exterior environment, where true nature exists.

Filter Indoor/ Outdoor

There is no denying the built environment is man-made and therefore non-biological. You can't plant a seed and hope for a house to grow out of the ground. The use of the baobab tree as a dwelling is a precedent that contradicts the previous statement.[12] Still, you'll need to find the right specimen and hollow it out to make it habitable. Humans need to modify the natural environment to create suitable habitats and there are far too many of us now to find enough suitable caves for us all to live in. The exterior as opposed to the interior of the built environment requires the least amount of modification. This transition from exterior to interior and the relationship these opposing sides have with each other is particularly important in a successful biophilic design.

"Just a decade ago the word façade would have been used to describe the building elevation. Skin is appropriate here for its biological reference. Skin acts as a filter, not an envelope, which selectively admits and rejects the environment based upon the needs of the body across time. It sweats to provide evaporative cooling and forms goose bumps to close its pores to the cold."[13]

This is a quote from the architect Stephen Kieran outlining his approach to dealing with the boundary seperating interior from exterior. He criticises creating an envelope that seals the interior entirely, instead he advocates for an adaptive skin. Kieran further illustrates his understanding of an adaptive skin using the coffee filter as a metaphor.

"The filter is a smart membrane. It is designed to keep out what we do not want (coffee grinds) and to let in what we desire (liquid coffee extracted from the grinds)."[14]

To adapt to climatic changes throughout the day, openings and shading devices should be operable. Operable openings provide the added benefit of natural ventilation. Passive solar design integrated into the skin of a building can also fulfil dual functions, such as providing shade in hot summer months and sunlight in cold winter months.

"The key difference between the climate chamber and the real working or living environment is that in the second case the subject has a range of actions available to him or her that will mitigate the non-neutral thermal sensation. We refer to these actions as adaptive behaviour, and the facility to carry them out as adaptive opportunity."[15]

"Adaptive opportunity" was introduced by the physicist Nick Baker, who spent most of his academic career conducting research in building physics. He agrees with Kieran's criticism of a sealed envelope. His research involved a study on occupants' thermal comfort in two types of office settings, one with good adaptive opportunity and the other with poor adaptive opportunity. The study was conducted by one of Baker's students and it concluded that occupants have a higher tolerance for non-neutral thermal conditions if they have the choice to open a window or deploy shades.[16] His research suggests that we have a psychological preference to personally adapt to climatic changes. Further, he suggests this psychological aspect of adaptive opportunity could be synthesized in a climate-controlled setting.

"For example a temperature swing could be delivered by the a/c system at the same time that a strong visual event was created by the lighting system. This could then be neutralized by an action through a graphic interface on the occupant's workstation. Would this synthetic ambiance be as satisfying as walking to the window and throwing it open?"[17]

In other words, he suggests we prefer low-tech solutions to highly sophisticated

technological ones. In climate-controlled settings, we become much more sensitive to slight changes in temperature and the lack of adaptive opportunity can fill us with anxiety. This further underlines our preferred connection to the outdoor natural environment, as opposed to an interior environment dominated by technology.

Nonetheless the built environment will still separate inhabitants from the outdoors, and this separation is necessary to provide the shelter and thermal comfort we desire. The former paragraphs argued not to segregate the interior from the exterior, but rather create a semipermeable barrier between them. Intermediate spaces such as atria, conservatories or wintergardens can further soften the edge between the interior and exterior. Such spaces don't need to be cooled or heated, and the use of glass brings the occupant a step closer to the exterior. Then interior spaces begin to merge with the landscape. The occupant can move from an interior space to a transitional space and finally to the exterior. With every transition the degree of shelter is loosened. Likewise, the approach towards a building must be carefully considered to soften the edge between interior and exterior. Merging a building with the surrounding landscape, especially in a country setting, making it only visible once you are very close, leaving the natural landscape as the predominant feature softens the boundary between the biological and non-biological.

Views and vistas are the most obvious factor to consider when strengthening a connection with the exterior. In evolutionary terms a good view of the prospect had a survival advantage. Capturing views of features in the landscape can strengthen a sense of place and identity. On top of that, views to the exterior heightens the occupant's awareness of climatic changes and the passing of time. If it isn't possible to provide the "real thing" inside, make sure the inhabitants can see it from the inside. In this sense, views and vistas containing natural features and vegetation are most beneficial.

Exterior Architecture

"Temperature, or rather the heat balance of the body that it controls, is one of the key environmental parameters affecting survival. We would expect it to be one of the most vital responses hard-wired in our genes. With civilization and development it has lost nothing in its importance, for in struggling to isolate ourselves from the natural variations in temperature, energy for heating and cooling buildings has become the largest single energy end use."[18]

This quote describes the reason why we spend so much time indoors. We have become so adept at controlling the temperature within buildings that we hardly need to go outside at all, especially since the conditions can be so unpredictable. If it gets too hot outside, we turn on the air conditioning inside. When the cold comes in winter, we fire up the heater inside. Then we can comfortably walk about in a T-shirt inside at – 3° Celsius outside. Finally, you wouldn't wish it upon anyone to spend a night outdoors in the rain either. The exterior environment is unpredictable, and it can be unforgiving. The interior environment shelters us from all this, providing stability and comfort.

However, we can't ignore our primal connection to the exterior environment, so the biophilic approach encourages providing the necessary infrastructure to facilitate longer interactions with the outdoors. Outdoor sheltered spaces, designed to shelter occupants from wind and rain, allow people to spend more time outdoors, when in different circumstances the climatic conditions would be too uncomfortable. The same goes for outdoor shaded spaces to provide shelter from the sun. Trees and vegetation work particularly well in fulfilling a need for shade.

Symbolic Design

Theoretically, the most successful biophilic design is a cave on a rocky outcrop overlooking a vast African savannah. Realistically, the world's population isn't going to relocate to the African savanna in search of their primal habitats to find peace of mind. Although our brain evolved in a cave, the modern world has changed dramatically. Environmental features are the most successful way to facilitate closer interactions between humans and nature in the built environment, whilst providing the infrastructure to allow humans to spend more time outdoors brings us a step closer to our natural habitat. Symbolic experiences of nature seek to revive instinctual memories. The aim is to provide a substitution for the "real thing" in places it may not be able to exist.

Sensorial Richness

"A flat lawn, by contrast, while better than a rectangular concrete slab, represents the same visual purity (emptiness) as the plain slab. Our senses perceive it as a single scale and are unable to connect to it fractally. Moreover, lawn is an ecological monoculture irrelevant to local ecology, because it exists on a single ecological scale. Nature exhibits ecological complexity: interacting plants that in turn provide visual complexity, which is a source of neurological nourishment."[19]

This is a quote from Nikos Salingaros, a mathematician that has made many contributions to architectural theory and is especially interested in Wilson's biophilia hypothesis. Here, he introduces the concept of neurological nourishment. As he explains, a genuine natural environment is biodiverse, as opposed to a monoculture like lawn or a corn field. This visual complexity stimulates our brains, as they evolved accustomed to a biodiverse natural environment. Direct and indirect experiences of biodiverse settings stimulate our brains the most. However, Salingaros is also a supporter of symbolic experiences of nature, arguing they can stimulate our brains in a similar way to the "real thing."

"...the biophilic effect is not some mysterious vitalistic property of biologically living organisms, but rather an effect due to their geometry. Therefore, it follows that we can approximate the biophilic effect from the right inanimate structures. Much of traditional art and architecture embodies biophilic qualities, intuitively sought after by their makers."[20]

Salingaros claims the visual complexity from a natural setting can be replicated in the built environment, using alternatives to environmental features. He suggests "we shape our living spaces according to very specific geometries, and use colors, ornamentation and patterns to obtain similar environmental nourishment."[21] Further, he argues it "is not a surface imitation of nature, but rather the generation of natural geometry."[22]

With "specific geometries" Salingaros is most likely referencing concepts such as the golden ratio. A ratio found in numerous examples exhibited in nature, such as the seed distribution in sun flowers or the spiral structure of snails. In architecture it is believed the golden ratio defined the proportions of the Parthenon and during the renaissance the ratio was rediscovered and commonly referred to as the "divine proportion." Further, straight lines and right angles are an anomaly in nature, so natural forms and shapes, such as oval, tubular forms are encouraged.

The colour palette in nature is truly infinite. For this reason, the use of colour is supported within biophilic design. Bright and vibrant flowering colours attract us, as well as blues from the sky or sea, or more common natural

earthy tones, such as browns and greens.

"As in the world of letters there is a kind of book which has a brief passion of life succeeded by total neglect, so in the decorative world there are brilliant colours, the stimulating effects of which soon pall. In the natural world these intense colours are found in the passing pageant of the flowers, while the constant tints are those sober, quiet tones which one may love little, but which one can love long; and inasmuch as these vivid colours are those which fade, one may perhaps take the hint which nature thus conveys, and in the permanent dyes for the adornment of the house keep to quiet colour as a setting for the transient brightness of flowers, or the concentrated brilliance of a decorative picture in stained glass."[23]

This is a quote from the architect Mackay Hugh Baillie-Scott. He warned of the necessary caution when dealing with colours. Although he advocated finding reference in nature, he gives a valid argument for using bright and vibrant flowering colours as accents, rather than excessively.

The use of ornamentation and patterns is further claimed to visually stimulate our brain. However, as always nature should be the source of inspiration. For example, fractal structuring, defined as similarities occurring at varying scales, evident in trees or clouds is suggested as a good reference point.

"Scientists are beginning to document how environmental factors, including information coming from the environment, affect our physiological well-being. It appears that geometrical features found in traditional architectures, such as ornamentation and fractal structures elicit a positive reaction from our neurophysiology. And this reaction is built into our organism. Our reaction is emotional and visceral rather than intellectual. Architects can offer all the intellectual arguments they want, favoring minimalist or high-tech design, but those are not going to affect the way we react physically to forms and environments."[24]

Salingaros supports a return to more traditional architectural forms, and he is a heavy critic of modernism. He believes modernism's main doctrine, renouncing ornamentation, has a detrimental effect on human well-being, as then we lack the visual complexity that our brains cherish.

Most of the above-mentioned paragraphs have dealt with a single sense, the sense of sight. In reality, nature will stimulate every other sense just as much. Nature consists of an abundance of smells, sounds, tastes, and haptic sensations and these are constantly changing.

"I believe it's about the multi-sensory. You can grasp the analog, you can smell it, it's there, it's real, it's unpredictable, it always feels warmer. These are organically grown, chemical reactions that are simply closer to reality. For me the digital is more superficial. Of course it's faster and this also has its advantages. Perhaps this fits well as an example: When you're driving in your car or out and about, you hear music as an MP3, or on a CD. But when you come home, prepare a nice meal, drink a glass of red wine, then you put on a record. This has more depth, it's a pause in an increasingly fast world."[25]

This was the answer Florian Kaps, an Austrian biologist and entrepreneur, provided when he was asked about what he believed was the major difference between the analogue and the digital. His description of the benefits of the analogue aligns with the concept of sensory stimulation in biophilic design. The digital could be seen as the antithesis of biophilia. As he describes, the digital only stimulates a single sense, whilst the analogue

can stimulate all the senses, providing us the neurological nourishment that this fills us with joy. Concentrating on the haptic quality of surfaces, such as the cooling sensation when you step barefoot onto stone flooring or celebrating the use of wood for its musky scent, are examples of sensorial stimulation encouraged in biophilic design.

Instinctual Memory

"...we are still innately drawn to settings whose characteristics hold some survival advantage, even though that survival advantage may no longer have any practical value for us."[26]

In this day and age, most of us don't hunt or search for our food, we buy it from a supermarket wrapped in plastic. In the developed world, we don't need to live next to a body of water, we have a tap to turn on. We don't need a view to spot a lion from a distance, we can be rest assured the lock on our door will keep all the lions at bay. Nonetheless, according to the biophilia hypothesis, these instincts and desirable features mattered for most of our history and therefore we still find spaces attractive that resemble these ancient caves and landscapes that protected us and allowed us to prosper. The following paragraphs will categorise these instinctual memories and provide a basis for understanding how they can be adapted to the built environment.

- Prospect and Refuge

"Refuge is small and dark; prospect is expansive and bright; they cannot coexist in the same space. They can occur contiguously, however, and they must, because from the refuge we must be able to survey the prospect, and from the prospect we must be able to retreat to the refuge."[27]

This quote is an introduction to the prospect-refuge theory. In evolutionary terms, the refuge was the cave. Here, we were protected from the weather, and we knew there were masses of solid rock, no predator could ever penetrate, behind us. The prospect is the African savanna we can view from the entrance of our cave. It's bright, predators or prey can be spotted at far distances and all the nourishment we need is collected from there. We need the prospect to sustain ourselves, we need the refuge for shelter.

This theory explains why some views over large expanses will increase real estate value. If this view disappears behind a new apartment block the value will often decrease. However, this theory doesn't only apply to views of the exterior, it can also apply to situations within a building's interior. The layout of a restaurant is an example most people can relate to. Certain seats will often be less desirable than others. Most guests will prefer a cosy booth tucked away in the corner of a restaurant, as opposed to the freestanding table in the middle of the room. The reason is simple; people prefer the maximum prospect, as well as maximum refuge. The maximum prospect is a view of all the entrances and the rest of the guests. The refuge is provided by the wall behind the booth. In this sense we need not check our backs for predators, because we can sense a solid impenetrable wall behind us.

Room layouts, as well as room sequences can also promote prospect-refuge situations. In a large room, room partitions can create pockets of refuge, whilst the rest of the room can function as a prospect. A recess in an otherwise larger room could serve as an interior refuge. In such a case, the ceiling heights could differ, and the larger space should provide more window openings to access more daylight. Then the interior refuge is smaller, darker, and cosier and from this sheltered position you can survey the prospect of the larger brighter room.

- Enticement

"A scene high in mystery is one in which one could learn more if one were to proceed farther into the scene ... What it evokes is not a blank state of mind but a mind focused on a variety of possibilities, of hypotheses of what might be coming next. It may be the very opportunity to anticipate several possible alternatives that makes mystery so fascinating and profound."[28]

The theory of enticement or mystery plays on our evolutionary desire to be curious. The urge to discover stems from the promise or possibility of finding a better refuge or prospect somewhere around the corner or across the ridge. Enticement is something you experience more in motion and in architecture it can be applied to the sequencing of spaces. Spaces that are slightly hidden and only fully revealed once you approach them is a form of enticement. They lure you in and then reward you as the scene unfolds. Moving from dark to light is encouraged, as "we will see before we are seen, and so will ensure relatively safe exploration."[29] If we move from light to dark, dangers can hide from us, leading to unpleasant surprises. Obviously, whilst moving through architectural spaces that are consistently occupied, you will invariably have to go back to the place you came from, so the biophilic approach encourages creating multiple instances of enticement within a floorplan or along a pathway.

- Peril

"In settings of peril, real dangers are fully evident, but they are dangers we can control, even if only by the exercise of care and skill – thus the appeal of such purely natural settings as Niagara Falls, the Grand Canyon, and the Matterhorn. Such settings present apparent and dramatic peril, but in all cases, we control the degree of risk, and in that controlled confrontation, we find a thrilling elation."[30]

In evolutionary terms the "fight and flight" response was essential. The "increased heart rate and contractility to speed circulation, increased rate and depth of breathing to speed gas exchange, sweating to cool the body and make it slippery, increased glucose synthesis to provide energy, shunting of blood from gut and skin to muscles, increased muscle tension to increase strength and endurance, and increased blood clotting in preparation for possible tissue damage"[31] made the difference, if you were unfortunate enough to encounter a lion hiding in the bushes. The concept of peril seeks to reawaken this evolutionary response that could make the difference between life and death. However, the "fight and flight" response is unsustainable and countless studies demonstrate the dangers of chronic stress on physical and mental health. Therefore, the aspect of "control" in a situation of peril is very important.

Adapted to the built environment, a situation of peril is present on a balcony. From a balcony you can survey the world beneath you from a high vantage point, where if you were to fall you would most likely suffer a fatal injury. The railing on a balcony provides that necessary level of control to avoid the previously mentioned scenario, so the thrill emerges from the opportunity to experience a space that is in essence still dangerous.

References

1. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 1 Dimensions, Elements and Atributes of Biophilic Design, Stephen R. KELLERT, Hoboken (John Wiley & Sons, Inc.) 2008, p. 5

2. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 1 Dimensions, Elements and Atributes of Biophilic Design, Stephen R. KELLERT, Hoboken (John Wiley & Sons, Inc.) 2008, p. 5

3. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 1 Dimensions, Elements and Atributes of Biophilic Design, Stephen R. KELLERT, Hoboken (John Wiley & Sons, Inc.) 2008, pp. 5-6

4. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 1 Dimensions, Elements and Atributes of Biophilic Design, Stephen R. KELLERT, Hoboken (John Wiley & Sons, Inc.) 2008, p. 6

5. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 1 Dimensions, Elements and Atributes of Biophilic Design, Stephen R. KELLERT, Hoboken (John Wiley & Sons, Inc.) 2008, p. 6

6. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 1 Dimensions, Elements and Atributes of Biophilic Design, Stephen R. KELLERT, Hoboken (John Wiley & Sons, Inc.) 2008, p. 6

7. Friedrich EULER, Planen und Bauen für das Wochenende, Vienna (Steyrermühl-Verlag) 1928, p. 66

8. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 1 Dimensions, Elements and Atributes of Biophilic Design, Stephen R. KELLERT, Hoboken (John Wiley & Sons, Inc.) 2008, p. 7

9. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 6 Biophilic Theory and Research for Healthcare Design, Roger S. ULRICH, Hoboken (John Wiley & Sons, Inc.) 2008, pp. 98-100

10. https://www.hsph.harvard.edu/nutritionsource/vitamin-d/
(last visited 01.02.2024)

11. G. BROADBENT & C. A. BREBBIA, Eco-Architecture: Harmonisation between Architecture and Nature/ Cultural responses to primitive needs, Nick BAKER, Southampton (WIT Press) 2006, p. 3

12. Bernard RUDOFSKY, Architecture Without Architects: A Short Introduction to Non-Pedigreed Architecture, Alburquerque (University of New Mexico Press) 1987, p. 21

13. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 14 Evolving an Environmental Aesthetic, Stephen KIERAN, Hoboken (John Wiley & Sons, Inc.) 2008, p. 247

14. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 14 Evolving an Environmental Aesthetic, Stephen KIERAN, Hoboken (John Wiley & Sons, Inc.) 2008, p. 245

15. G. BROADBENT & C. A. BREBBIA, Eco-Architecture: Harmonisation between Architecture and Nature/ Cultural responses to primitive needs, Nick BAKER, Southampton (WIT Press) 2006, p. 5

16. Manuel GUEDES, Thermal Comfort and Passive Cooling in Southern European Offices. PhD Thesis, Univ. Cambridge 2000

17. G. BROADBENT & C. A. BREBBIA, Eco-Architecture: Harmonisation between Architecture and Nature/ Cultural responses to primitive needs, Nick BAKER, Southampton (WIT Press) 2006, p. 12

18. G. BROADBENT & C. A. BREBBIA, Eco-Architecture: Harmonisation between Architecture and Nature/ Cultural responses to primitive needs, Nick BAKER, Southampton (WIT Press) 2006, p. 4

19. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 5 Neuroscience, the Natural Environment, and Building Design, Nikos A. SALINGAROS & Kenneth G. MASDEN, Hoboken (John Wiley & Sons, Inc.) 2008, p. 63

20. https://www.archdaily.com/623966/unified-architectural-theory-chapter-10 *(last visited 01.02.2024)*

21. https://www.archdaily.com/623966/unified-architectural-theory-chapter-10 *(last visited 01.02.2024)*

22. https://www.archdaily.com/623966/unified-architectural-theory-chapter-10 *(last visited 01.02.2024)*

23. Mackay H. BAILLIE-SCOTT, Houses and Gardens, London (George Newnes Ltd.) 1906, p. 49

24. https://www.archdaily.com/623966/unified-architectural-theory-chapter-10 *(last visited 01.02.2024)*

25. https://www.friendsoffriends.com/profiles/florian-kaps/ *(last visited 01.02.2024)*

26. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 16 Biophilic Architectural Space, Grant HILDEBRAND, Hoboken (John Wiley & Sons, Inc.) 2008, p. 263

27. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 16 Biophilic Architectural Space, Grant HILDEBRAND, Hoboken (John Wiley & Sons, Inc.) 2008, pp. 265-266

28. Stephen KAPLAN, 1979. Perception and landscape: conceptions and misconceptions. In: Elsner, Gary H., and Richard C. Smardon, technical coordinators. 1979. Proceedings of our national landscape: a conference on applied techniques for analysis and management of the visual resource Incline Village, Nev., April 23-25, 1979 . Gen. Tech. Rep. PSW-GTR-35. Berkeley, CA. Pacific Southwest Forest and Range Exp. Stn., Forest Service, U.S. Department of Agriculture: pp. 241-248

29. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 16 Biophilic Architectural Space, Grant HILDEBRAND, Hoboken (John Wiley & Sons, Inc.) 2008, p. 267

30. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 16 Biophilic Architectural Space, Grant HILDEBRAND, Hoboken (John Wiley & Sons, Inc.) 2008, p. 269

31. George FINK, Stress: Concepts, Cognition, Emotion, and Behaviour/ Ch. 11 Evolutionary Origins and Functions of Stress Response System, R.M. NESSE, S. BHATNAGAR & B. ELLIS, Cambridge (Academic Press) 2016, p. 98

2.2

Biophilic Criteria

I have tried to summarise the current perception of biophilic design in the previous chapter. I haven't included the many discussions on urban design as it is not relevant to the core subject of my thesis, although this aspect is a very important part of the debate surrounding biophilic design. Most of the references are gathered from the book "Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life." This book was published in 2008 and it is the most comprehensive piece of work on the topic thus far. It summarises all the research and guidelines that were gathered in support of Wilson's original biophilia hypothesis. I am in accordance with almost all opinions, yet the discussions on symbolic design are sometimes more challenging to comprehend. Specifically, the arguments from Nikos Salingaros as he advocates for a return to "traditional architectures" and uses the biophilia hypothesis to support this statement. By my understanding, he isn't referring to "traditional architectures" in the vernacular sense, instead he is referring to Renaissance, Baroque, Gothic or Ancient Roman and Greek architecture. I agree with his statements on retaining the complexity of nature, yet I do not believe this can be achieved by simply replicating the geometry of nature in the form of ornamentation. Ornamentation isn't alive, which contradicts Fromm's original "love of life" definition. Further, I believe the illusion of nature could never compete with the complexity of the "real thing."

"Ornament means squandered manpower and thus squandered health. It has always been so. But today it also means squandered material and both together mean squandered capital."[1]

If we observe this quote from Adolf Loos' infamous text "Ornament and Crime," one could argue that the visual complexity, for which we have an evolutionary desire, shouldn't be conjured up by ornamentation. Putting manpower into creating space for living things, plants and vegetation seems more constructive, than squandering that manpower on creating an illusion. I don't want to disregard ornamentation, but I do not believe it should be included as a requirement for biophilic architecture. Further, this should not be a reason to exclude modernist architecture from biophilic design.

"If Modernism has explored abstract form and space on a more or less blank canvas, the next architecture might turn these statements into a conversation with the essential elements of a place. The driving ethic may be seen as a new "minimalism" imperative: stripping away mechanical breathing apparatus, weaning off energy created far away or long ago, using nothing that can't be infinitely recycled. When architects pare down to the least possible degree of intervention, and draw instead on natural, free endowments of sunlight, water, and other elements, what beauty will emerge from the landscape's healthy glow?"[2]

This is a quote from the final chapter of "Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life." It suggests fusing together modernist principles with biophilic ones. I find this an optimistic outlook and it resonates with Kellert's concept of "restorative environmental design." There is no need to disregard the architecture of the past or where it is currently headed. The aim is not to spur on a new style in the traditional sense. It's a friendly reminder not to conquer nature, we're encouraged to work with her, take on a humanist approach and scale down our egos and capitalist ideals. The following pages introduces a criteria catalogue, that summarises all relevant principles in biophilic design. This criteria catalogue will be used for the analysis of the objects of interest from the pioneers of Austrian biophilic design.

References

1. Adolf LOOS, Ornament and Crime: Thoughts on Design and Materials, Translated by Shaun Whiteside, London (Penguin Random House) 2019, p. 195

2. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 23 Reflection on Implementing Biophilic Design, Bob BERKEBILE, Bob FOX, Hoboken (John Wiley & Sons, Inc.) 2008, p. 353

Environmental Features

Natural Building Materials

- wood
- bamboo
- cork
- reed
- straw
- moss
- stone
- gravel & sand
- earth & soil
- use of natural materials found on site or sourced locally

Augmenting Biodiversity

- preservation of exising trees and natural topography
- enhance native species ratio (flora & fauna)
- ecological complexity (rich combination of planting)
- natural landscape promotion with minimal management
- green roofs & roof gardens
- green walls

Water

- incorporating wetlands in outdoor landscape design
- permeable surfaces for storm water management
- landscape features combined with on-site storm water routing
- rain gardens or retention ponds
- water as recreation

Sun

- maximising daylight exposure
- building orientation
- passive solar design
- thermal gain
- light and shadow
- filtered and diffused light
- reflected light
- light pools

Exterior

Filter Indoor/ Outdoor

- natural ventilation
- views and vistas (containing natural features and vegetation)
- merging with the landscape
- adaptive opportunity

Exterior Architecture

- provision of outdoor sheltered space (shelter from wind & rain)
- provision of outdoor shaded space (promotion of plants canopy for shading)

Symbolic Design

Sensorial Richness

- natural colours (flowering colours, blue skies, earth tones etc.)
- natural shapes and forms (egg, oval and tubular forms/ shapes resisting straight lines and right-angles)
- sensory stimulation (sight, smell, taste, hearing, touch)

Instinctual Memory

- prospect and refuge
- enticement
- peril

Fig. 4 - Biophilic Criteria Catalogue

2.3

Benefits of Biophilic Design

Restorative Effects of Nature

"The evolutionary framework holds that modern humans, as a genetic remnant of evolution, have a capacity for readily acquiring restorative and other healthful responses to certain nature scenes and content (vegetation, water), but have no such predisposition for most built or artifact-dominated environments and materials (concrete, glass, metal, for example)."[1]

The preceding chapters have introduced the biophilia hypothesis and how to implement biophilic design in the built environment. We have learned that although modern humans may lead entirely different lifestyles to their ancient ancestors, they are still wired the same. Following the hypothesis, biophilic design encourages architects, landscape architects and urban designers to create spaces that bring humans closer to their primal habitats in the natural environment. The hypothesis makes logical sense, and the general idea is humankind will profit positively from a biophilic approach. However, proof of the concept is required to persuade architects and clients to adopt biophilic principles into their projects. Thus far, the research indicates that biophilic design could provide many health benefits, because of the restorative effects of nature.

"Studies in both laboratories and real environments have consistently found that viewing nature produces significant physiological restoration within three to five minutes at most, as evidenced, for example, in brain electrical activity, blood pressure, heart activity, and muscle tension.
(...)
Although most nature views are stress reducing, most built or urban settings lacking nature (streets, parking lots, windowless rooms) are unsuccessful in producing restoration, and in some instances worsen stress."[2]

This is a quote from an architectural professor called Roger S. Ulrich, who specialises in research on healthcare design. His research involves studying the effects of nature on patients' recovery. One of the most promising effects of nature is the influence it can have on patients' perception of pain. Ulrich references two theories explaining how pain is experienced and the way in which nature possibly provides relief. The "gate control" theory assumes that "neural structures or mechanisms in the spinal cord act as a gate in the transmission of sensory input or pain impulses through the spinal cord to the brain. When the gate is open, impulses flow to the brain and pain is experienced. When the gate is closed, pain impulses are inhibited from reaching the brain and pain is diminished or not felt."[3] According to this theory, a gate can be closed by positive emotional messages descending from the brain.

"... viewing nature reliably produces restoration from stress, as manifested by declines in negative emotions such as anxiety, enhanced positive feelings, and physiological changes indicative of diminished stress mobilization. These positive changes, according to gate control theory, should close the gate and inhibit pain impulses from reaching the brain, thereby alleviating pain."[4]

The alternative view on pain-relief is the "distraction theory." According to this theory humans have a limited amount of conscious attention. Experiencing pain requires a lot of conscious attention. If we increase our attention on a specific injury, our experience of pain will increase. Therefore, a distraction that diverts our conscious attention away from the source of pain will decrease the level of pain experienced. The more engrossing the distraction, the less pain we experience.[5]

"... nature views may be effective in reducing pain because they are emotionally pleasant distractions as well as capable of eliciting

sustained attention and perceptual intake."[6]

Countless studies have proven this theory and one of the earliest was published in 1984 by Ulrich himself. In this study, Ulrich compared patient records from two almost identical rooms in the same hospital. However, patients in one room had a view of trees and in the other a view onto a brick wall. Patients included in the study all underwent the same type of surgical procedure. To evaluate the restorative effects of nature, nurse records, postoperative hospital stays, intake of analgesic medication and postsurgical complications were compared.[7] The findings were summarised as follows:

"... in comparison with the wall-view group, the patients with the tree view had shorter postoperative hospital stays, had fewer negative evaluative comments from nurses, took fewer moderate and strong analgesic doses, and had slightly lower scores for minor postsurgical complications."[8]

Increased exposure to sunlight is also proven to alleviate pain. A similar study in 2005, comparing a room with ample daylight to a room with limited daylight showed similar findings, and once more patients required less intake of analgesic medication following a surgical procedure.[9] Ulrich speculates the research presents a financial case for including biophilic principles in healthcare design, as there are substantial cost savings, because "intake of costly pain drugs is reduced, and stays are shortened for some categories of patients."[10]

Most of the research tends to verify the restorative benefits of nature. Still, Ulrich warns that nature can also generate negative responses. These negative responses are triggered by certain nature stimuli that posed a threat or danger to our early ancestors.

"These stressful and potentially dangerous stimuli included shadowy enclosed spaces, snakes and spiders, reptilian-like tessellated scale patterns, pointed or piercing forms, and angry and fearful human faces."[11]

To avoid triggering such negative responses, Ulrich introduces positive nature stimuli that should be included in the built environment:

- Spatial openness that fosters visual surveillance
- Sunshine or good light in contrast to poor light or threatening weather
- Qualities linked with high habitability and food availability
- Calm or slowly moving water
- Verdant vegetation, flowers
- Savanna-like or parklike properties (scattered trees, grassy understory)
- Unthreatening wildlife such as birds[12]

Much of the previously mentioned research focusses on the restorative effect of nature aiding patients' recovery in a healthcare setting. Another benefit of nature is proposed by the "Attention Restoration Theory." This theory assumes experiences in nature help people recover cognitive resources and it was first introduced by the environmental psychologists Stephen and Rachel Kaplan.

Firstly, we must understand how cognitive resources are depleted in the first place. The "Attention Restoration Theory" distinguishes between directed attention and voluntary attention, otherwise known as fascination. Directed attention requires a certain degree of effort. It is employed when we have a weak intention for doing a task we perceive as difficult. This required effort is prone to

fatigue, which hems our ability to further employ directed attention. Fascination is the opposite; it requires no effort, and it is resistant to fatigue.[13] When we have fascination for a subject such as a captivating book, it doesn't require a large amount of effort to read a substantial number of pages. It is an enjoyable process of distinguishing individual letters from one another, developing the constructs of letters into words, and assembling a story we find fascinating to read.

"More formally, any prolonged effort leads to directed attention fatigue. It might seem peculiar that a mechanism so intimately involved with human effectiveness would be so susceptible to fatigue. Yet, in evolutionary perspective, this apparent limitation might have been quite reasonable. To be able to pay attention by choice to one particular thing for a prolonged period of time would make one vulnerable to surprises. Being vigilant, being alert to one's surroundings may have been far more important than the capacity for long and intense concentration.
(...)
All too often the modern human must exert effort to do the important while resisting distraction from the interesting. Thus the problem of fatigue of directed attention may well be of comparatively recent vintage."[14]

This quote demonstrates how our modern lifestyles have changed so dramatically, increasing the likelihood of directed attention fatigue or mental exhaustion. Writing a thesis is the perfect example of such a prolonged period of effort. The writing part is difficult, it requires much concentration to put into your own words, what you have learned from the fascinating research, that can effortlessly lead you down a wormhole. Fascination is the positive counterpart to directed attention. It won't exhaust you, allowing the brain to recover and recuperate the resources or effort required for further directed attention.

Therefore, the more fascinating an environment the more restorative it will be. Kaplan introduces further components that constitute a restorative environment. First of all, a restorative environment should be new and different to the environment that causes fatigue. He describes this as "being away." A restorative environment must have extent, to engage the mind. And finally, the restorative environment must be compatible with the restorative activity in mind, so that that you don't have to think twice on how to act.[15]

Kaplan argues that natural settings fulfil many of the requirements that facilitate attention restoration. In terms of fascination, nature exhibits many situations that captivate our minds, such as the passage of clouds or a sunset by the sea. As mentioned previously, many modern humans are forced to spend much of their time completing tasks that require directed attention to earn a living. More often than not these tasks are completed in an indoor environment, so "being away" in a natural setting provides the perfect balance. To experience true extent in nature you need to travel far away from civilization, but extent can also be achieved in an urban environment. Kaplan suggests looking towards Japanese or Chinese gardens as a source of inspiration in creating extent on a miniature level. Designing pathways and trails in a meandering manner, creates a sense of extent as a variety of scenes can occur in a single smaller space and consecutive scenes are concealed from one another. Finally, according to the biophilia hypothesis natural settings are particularly compatible environments for humans. We don't need to think twice on how to act because our instincts help to guide us.[16]

Many studies have produced convincing results for the particular effectiveness of nature's cognitive restoration powers. Another professor in psychology called Terry Hartig conducted a study comparing different groups

of vacationer's cognitive performance before and after a restorative trip. Three groups were compared: wilderness vacationers, urban vacationers, and a control group of non-vacationers. Before and after the vacations the groups were asked to perform a proof-read, a task requiring a lot of directed attention. The wilderness group showed a significant improvement in test results, whilst the other two groups scored lower results after the vacation period.[17] A different study compared students in dormitory rooms, some with views of nature and some without. Once again participants took part in tests requiring directed attention and students with views of nature scored significantly higher.[18] This could provide another financial case for including biophilic principles in the workplace environment, as it can help employees restore cognitive resources, thus improving productivity.

Pro-Environmentalism

In the previous paragraphs we have learnt about the restorative benefits of nature, providing an argument for increasing our connection with nature to improve health. Unfortunately, humans' connection with nature has been on a steady decline ever since the transition from a hunter-gatherer society to an agrarian one. This means we are beginning to miss out on the health benefits, but it also means our attitude towards nature becomes more and more estranged, as we distance ourselves further and further away from it. The loss of human-nature interactions has led many scientists to claim this provokes negative emotions towards nature. On the other hand, increasing interactions with nature could lead to pro-environmental beliefs and inspire people to take better care of the environment.

"Although it is hard to pinpoint exactly what has led to this decline in spontaneous outdoor activities, several possible triggers have been identified, such as rapid growth in the number and proportion of people living in urban areas; technological advancements and the emergence of sedentary pastimes such as watching television, playing computer games, and using the internet; and the overscheduling and micromanagement of children's lives. For many people today, outdoor nature experiences are being replaced by virtual alternatives."[19]

This quote explains the critical point modern society has reached today. Replacing nature with virtual alternatives not only diminishes all the health benefits of experiences in nature, the sedentary aspect of these alternatives also decreases the amount of physical activity we do. As a consequence of interacting less with nature a fear of such an interaction can emerge, otherwise referred to as "biophobia." Multiple studies have shown the loss of these interactions has an adverse impact on people's attitude towards nature. The result being people assign less value to nature, and they are unwilling to protect it. This will further manifest in their actions, with less environmentally conscious consumption, less willingness to vote for pro-environmental policies or politicians etc.[20]

To counteract this phenomenon, people need more accessibility to greenspace in urban areas. The size and number of greenspaces must grow, and it has also been suggested to incorporate "lightly managed natural environments" into the built environment. This allows for wildlife to "spillover" into adjacent urban areas, facilitating further closer interactions with nature.[21] These are the solutions on a macro-level, on a micro-level biophilic design can facilitate closer interactions by increasing the connection between interior and exterior, as well as bringing nature into the interior.

References

1. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 6 Biophilic Theory and Research for Healthcare Design, Roger S. ULRICH (John Wiley & Sons, Inc.) 2008, p. 100

2. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 6 Biophilic Theory and Research for Healthcare Design, Roger S. ULRICH (John Wiley & Sons, Inc.) 2008, p. 91

3. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 6 Biophilic Theory and Research for Healthcare Design, Roger S. ULRICH (John Wiley & Sons, Inc.) 2008, p. 93

4. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 6 Biophilic Theory and Research for Healthcare Design, Roger S. ULRICH (John Wiley & Sons, Inc.) 2008, p. 93

5. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 6 Biophilic Theory and Research for Healthcare Design, Roger S. ULRICH (John Wiley & Sons, Inc.) 2008, pp. 93-94

6. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 6 Biophilic Theory and Research for Healthcare Design, Roger S. ULRICH (John Wiley & Sons, Inc.) 2008, p. 94

7. Roger S. ULRICH, View through a Window May Influence Recovery from Surgery, Science, New Series, Vol. 224, Issue 4647, 27.04.1984, pp. 420-421

8. Roger S. ULRICH, View through a Window May Influence Recovery from Surgery, Science, New Series, Vol. 224, Issue 4647, 27.04.1984, p. 421

9. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 6 Biophilic Theory and Research for Healthcare Design, Roger S. ULRICH (John Wiley & Sons, Inc.) 2008, p. 100

10. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 6 Biophilic Theory and Research for Healthcare Design, Roger S. ULRICH (John Wiley & Sons, Inc.) 2008, p. 101

11. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 6 Biophilic Theory and Research for Healthcare Design, Roger S. ULRICH (John Wiley & Sons, Inc.) 2008, p. 90

12. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 6 Biophilic Theory and Research for Healthcare Design, Roger S. ULRICH (John Wiley & Sons, Inc.) 2008, p. 90

13. Stephen KAPLAN, The Restorative Benefits of Nature: Toward an Integrative Framework, Journal of Environmental Psychology, Vol. 15, Cambridge (Academic Press Limited) 1995, pp. 169-170

14. Stephen KAPLAN, The Restorative Benefits of Nature: Toward an Integrative Framework, Journal of Environmental Psychology, Vol. 15, Cambridge (Academic Press Limited) 1995, p. 170

15. Stephen KAPLAN, The Restorative Benefits of Nature: Toward an Integrative Framework, Journal of Environmental Psychology, Vol. 15, Cambridge (Academic Press Limited) 1995, p. 173

16. Stephen KAPLAN, The Restorative Benefits of Nature: Toward an Integrative Framework, Journal of Environmental Psychology, Vol. 15, Cambridge (Academic Press Limited) 1995, p. 174

17. Stephen KAPLAN, The Restorative Benefits of Nature: Toward an Integrative Framework, Journal of Environmental Psychology, Vol. 15, Cambridge (Academic Press Limited) 1995, p. 175

18. Stephen KAPLAN, The Restorative Benefits of Nature: Toward an Integrative Framework, Journal of Environmental Psychology, Vol. 15, Cambridge (Academic Press Limited) 1995, p. 176

19. Masashi SOGA & Kevin J. GASTON, Extinction of experience: the loss of human-nature interactions, Frontiers in Ecology and the Environment, Vol.14, Issue 2, Washington DC (Ecological Society of America) March 2016, p. 94

20. Masashi SOGA & Kevin J. GASTON, Extinction of experience: the loss of human-nature interactions, Frontiers in Ecology and the Environment, Vol.14, Issue 2, Washington DC (Ecological Society of America) March 2016, pp. 97-98

21. Masashi SOGA & Kevin J. GASTON, Extinction of experience: the loss of human-nature interactions, Frontiers in Ecology and the Environment, Vol.14, Issue 2, Washington DC (Ecological Society of America) March 2016, p. 99

2.4

The Dialogue on Biophilic Design

A Current Trend

In recent times, Climate Change has become a topic of heated debate. Ever since the "First World Climate Conference" in Geneva in 1979, scientists have repeatedly warned of humankind's detrimental impact on the climate. At the UN Climate Change Conference (COP21) in 2015, the first "legally binding international treaty on climate change" was signed by 196 parties, otherwise known as the Paris Agreement. This put Climate Change onto the international agenda and the ultimate goal is to limit global warming to 1.5°C.[1]

In 2018, a Swedish pupil, called Greta Thunberg began a school strike. Her goal was to raise awareness on climate change and pressure the Swedish government into implementing the targets set out in the Paris Agreement. Thunberg decided to strike every Friday until the Swedish government passed the necessary laws to ensure global warming was kept well below the recommended limit. Her actions went viral on social media and inspired countless other students worldwide to join the movement, commonly referred to as "Fridays for Future."

Fig. 5 - „Fridays for Future" logo

This movement had a real impact on public perception of climate change, evidenced for example in the UK's "Public Attitudes Tracker Survey." This survey has tracked the UK's public concern on climate change since 2012. The results showed "a gradual rise in concern since 2015, increasing more rapidly from 2018."[2] These results correlate with the Paris Agreement in 2015 formally introducing the issue on the world stage and the beginning of "Fridays for Future" in 2018 that spread the dire message across the globe.

"Scientists have a moral obligation to clearly warn humanity of any catastrophic threat and to 'tell it like it is.' On the basis of this obligation (...) we declare, with more than 11,000 scientist signatories from around the world, clearly and unequivocally that planet Earth is facing a climate emergency."[3]

In January 2020, a climate emergency was declared by the scientific community. The current trajectory of society was questioned, and the main issues, along with their solutions were introduced:
Energy production needs to be streamlined, the capacity for storage must increase, and low-carbon renewables should replace fossil fuels. Short-lived climate change pollutants, such as methane need to be reduced. Protecting and restoring Earth's ecosystems is vital, as we can benefit from the carbon sequestration nature excels in. Our diets must change, transitioning away from the consumption of animal products to mostly plant-based foods. The current economic system needs to change, as "excessive extraction of materials and overexploitation of ecosystems, driven by economic growth" has a negative impact on the Planet's health. Finally, population growth must stabilise across the world.[4] According to the scientific perception of limiting climate change, nature's proficiency in carbon sequestration is the most convincing argument justifying biophilic design as a sustainable practice.

In a report published by the "International Environment Agency" in 2022, the buildings and construction sector accounted for 37% of global CO2 emissions. The operation of buildings was responsible for 27%, whilst the construction industry accounted for the remaining 10%.[5] As this sector is guilty of producing such vast amounts of CO2 emissions, architecture has come under increased scrutiny because of unsustainable practices, and consequently it is becoming a requirement to design sustainable buildings to stay in business. As public awareness has risen for sustainability and the need to treat our planet with more care, so has the awareness of biophilia and the role it could play in architecture. Following the pandemic there was a renewed focus on health and well-being and the enforced quarantines reminded us of our instinctual desire for the outdoors.

The most publicised project, which likely kicked off the literal green movement in architecture was the "Bosco Verticale" designed by Stefano Boeri completed in Milan in 2014. The "Bosco Verticale" represents two residential towers, comprising a gross floor area of 18,200m². The most prominent aspect of the "Bosco Verticale" is the inclusion of over 800 trees, 15,000 perennials and 5,000 shrubs distributed across the envelope of both towers. This amounts to a total of 30,000m² of woodland and undergrowth, theoretically maximising the biodiverse capability of the overall site (3,000m²) tenfold.[6]

"Even though the energy sustainability criterion is part of its founding principles, the Vertical Forest is nevertheless the result of a vision that puts the concept of biodiversity before that of sustainability. While the primary goal

Fig. 6 - Bosco Verticale, 2014 - Stefano Boeri Architetti

of sustainable architecture is to minimize its impact on the environment while always keeping a strong anthropocentric vision of the project, the approach to a concept of biodiversity within the Vertical Forest is based on the idea that mankind is just one of the many presences on the planet, and that is why new forms of cohabitation have to be found."[7]

In this quote Boeri illustrates how prioritising biodiversity was the driving force behind "Bosco Verticale." However, there are other arguments he puts forward to justify the sustainable benefits of incorporating real green into a building's envelope. First of all, he mentions the ability of living elements to reduce overall pollution. Along with the benefit of carbon sequestration and oxygen production, the plants can also absorb fine particles produced by urban traffic, as well as providing a sound barrier that reduces noise pollution for inhabitants. Further, Boeri describes the benefit of reducing energy consumption. The process of transpiration in plants extracts heat from the surrounding environment, leading to a "reduction of nearly 3 degrees between outside and inside temperature and – in summer – a decrease in the heating of the facades by up to 30 degrees."[8] This process of transpiration also mitigates the urban heat island effect, a further reason to include more greenery in the urban environment.

"Bosco Verticale" went on to win many awards and generated widespread publicity. It was a proof of concept and catapulted Boeri to the rank of Starchitect. Boeri continues to advocate for vertical urban forests and his initial concept has been replicated in China and Holland, with further plans to build vertical forests in Egypt, Albania, and the United Arab Emirates. This is an indication of the growing popularity for biophilic design and the will of investors to back such ambitious projects.

"It is not just organic life that can have an important impact. Alongside planting, our interior design group introduces biophilia-inspired manifestations, natural materials, and views of trees; a client even tasked us with making moving around a central London office feel like taking a stroll through a woodland."[9]

This is a quote from Ruth Marsh, head of sustainability at Sheppard Robson. It comes from an article published in "Property Week" in July 2023, indicating how awareness and popularity for biophilia is growing amongst clients. Biophilic design is now in demand!

Greenwashing

The term "greenwashing" was coined by the American environmentalist Jay Westerveld in 1986, when he criticised the hotel industry for encouraging guests to reuse towels for the sake of the environment. It was in fact a marketing stunt to cut costs. Greenwashing describes the process of marketing a product or service as environmentally friendly, where upon deeper inspection the opposite is the case. As popularity has increased for making buildings greener in the literal sense, academic criticism and use of the term "greenwashing" has increased with it.

"It takes roughly 17 mature trees 10 years to absorb one tonne of CO_2. Big new commercial buildings will cost tens of thousands of tonnes of CO_2 emissions to build, let alone use, so you can see that the amount of greening shown (on some recent proposals) will make barely any impact."

(Simon Sturgis, director of Targeting Zero)[10]

This criticism puts the carbon sequestration possibilities of environmental features into perspective. Sturgis explains the carbon sequestration of plants included in a building

Fig. 7 - Bosco Verticale, 2014 - Stefano Boeri Architetti

could never make up for the embodied carbon of most construction materials used. In his opinion our attention should be focused on delivering low carbon and resource efficient projects.[11] This aspect has been criticised the most about "Bosco Verticale."

"How many decades or centuries will it take for the tree to absorb the carbon dioxide that was emitted making the balcony and the planter that is holding (it)?"

(Lloyd Alter)[12]

The heavy use of concrete to construct "Bosco Verticale" is its major weakness. The process of creating concrete is very carbon intensive, with 6% of global CO_2 emissions caused by construction with concrete, aluminium, and steel.[13] For this reason, many question the green credentials awarded to "Bosco Verticale."

"These projects position the forest, often explicitly, as a one-to-one replacement of wild or potentially rewilded land given over to development. The visually seductive imagery of urban life in a forest city serves primarily to arrest reflection on whether a brand new city, district, or tower is the most ecologically sound choice. In many ways, the forest city has replaced the zero-carbon city of a decade ago as the eco-cloaking device for mass construction."[14]

What many critics of "Bosco Verticale" allude to is that incorporating green elements into a design gives architects and developers justification to undertake projects that are in essence unsustainable from the start. It is considered a prime example of green washing, when a building has been constructed at an enormous carbon cost, yet it is lauded as the future of "green" design, because of the visible incorporation of plants into the façade

or the interior. The green features distract from the underlying issues, such as where the construction materials are sourced from, what construction materials are used and whether a building of this magnitude is even necessary.

"...despite the rhetoric of reconciling the city with nature, today's green urban dream is too often about bringing a technologically controlled version of nature into the city and declaring the problem solved, rather than looking at the deeper causes of our current environmental and urban discontent."[15]

This is a quote from the journalist Wade Graham further describing the process of greenwashing prevalent in projects that seek to integrate nature within the built environment. Interestingly, he refers to environmental features incorporated into a design, as a "technologically controlled version of nature." This definition contradicts the biophilic approach, where the aim is to steer clear of technological processes and take inspiration from natural ones. This definition has also been used as a criticism of the approach in "Bosco Verticale." By incorporating trees at such a height, they had to be specifically engineered to survive these conditions, with an automated irrigation system, special anchoring system, as well as a specially trained maintenance team. Consequently, the question asked is how close are the inhabitants getting to "true" nature?[16]

"Typically, most plants prefer growing from the ground; an effective irrigation system and careful maintenance is needed to keep most green walls alive. Plants can thrive much more easily in a flat bed of soil."[17]

Similarly, green walls are criticised for their reliance on technology to function. Forcing nature into a habitat it isn't adapted to, requires lots of technology to keep it alive. It is suggested green roofs are better suited to house nature, because they provide space for planting in the horizontal plane. Green walls are also heavily reliant on a sophisticated irrigation system. If this system breaks down, it can have devastating effects on the plant life, for which it is responsible. On top of that, these irrigation systems require a lot of water. It is rare, that the required amount can be harvested entirely on site. Some criticise this as a wasteful consumption of such a precious resource.[18] However, supporters of green walls argue that building elevations represent approximately 80% of the surface area in an urban environment. This area represents a vast potential for increasing the amount of green in our cities.[19]

Ultimately, green walls, green roofs and integrating nature into the built environment will always require a certain level of expertise. Greenwashing has become increasingly prevalent in architecture, especially with the use of renders. Hyper realistic imagery allows architects to plant trees on top of balconies that would either buckle under the weight or lack enough substrate to even sustain grass. Architects have understood there is a demand for more green, but they aren't trained to know what plants actually need to survive. This is why many suggest a closer cooperation with landscape architects, as well as an earlier integration within the design phase of projects.

"Landscape architects today can be radical only if they are given a bigger role in city planning and new developments. Their understanding of open spaces as well as of natural processes is crucial to allow the creation of more inclusive, liveable, and truly sustainable cities."[20]

This is an appeal by the landscape architect Celine Baumann. She describes how landscape architects need to be given more responsibility, as opposed to filling in the spaces left over by architects.

Green Building Rating Tools (GBRTs)

The green building revolution is well under way and as mentioned previously, public awareness for the responsibility of the building sector has increased rapidly with it. Now architects are scrambling to find ways to justify their buildings as sustainable. The best way to gain such recognition is to have it certified by one of the many GBRTs available today. GBRTs were first developed in the 1990s and LEED and BREEAM are the most recognisable amongst them today.

"Current environmentally sustainable design approaches fail to provide an integrated design tool that reaches beyond the narrow focus of avoiding harmful environmental impacts, which translates into a focus only on the thermal efficiency of the building envelope. Although the thermal efficiency of new buildings is a fundamental and essential parameter of sustainable design, it fails to address the equally critical concerns of increasing human separation from nature..."[21]

Supporters of biophilic design criticise the technological focus and quantitative emphasis of current GBRTs. The dominant focus on thermal efficiency creates buildings with a sealed envelope, producing an impenetrable airtight separation between the interior and exterior. For this reason, "Passive Houses" are considered highly efficient and therefore they will gain high GBRT scores. However, the reliance on mechanical ventilation and the fear that opening a window could destabilise this system is also successful at isolating us further away from nature. The general consensus is GBRTs promote buildings that achieve high standards in reducing their impact on the environment but lack focus on promoting healthy environments for their occupants.

"Among all selected GBRTs, none of them pinpointed the essential requirement of outdoor seats with shading structures in the outdoor setting. (...) Their absence in current GBRTs is due to the engineering approach adopted in defining and measuring building performance which is usually focused on building services and envelope systems and therefore is confined to indoor environments and activities."[22]

Further analysis and comparison of different GBRTs shows the interior environment is the sole focus of attention. This is counter-intuitive when it comes to increasing our connection with nature, as biophilic design encourages providing infrastructure that facilitates spending more time outdoors. The technological or building-centric approach of current GBRTs is criticised. Alternatively, a human-centric approach is proposed to "shatter the boundary of indoors and outdoors and connect buildings and nature to promote health and wellbeing."[23]

Conclusion

To summarise, there are valid arguments for continuing the current approach to sustainability and the way it is rewarded. There are also valid arguments for brandishing biophilic design as greenwashing, especially if the flashy green elements are used to cover up darker secrets. Nonetheless, there is no denying there are environmentally sustainable benefits to incorporating green elements and biophilic design into the built environment. The process of transpiration in plants can mitigate the urban heat island effect, as well as creating micro-climates that increase a buildings thermal efficiency. The air we need to breathe is still produced by plants and trees, so including more of them in the built environment will certainly increase the quality. Biophilic design encourages the use of natural building materials, which in most cases require much less embodied carbon in the construction process, than artificial materials like concrete or plastics.

Following a deeper analysis of the research into biophilic design, it becomes clear the main benefits are seen in terms of health, well-being, and increased biodiversity. Advertising all the environmentally sustainable credentials of a biophilic design, of which there are still many, is less convincing than demonstrating the psychological and physiological advantages. If we continue the current approach to sustainability, we are missing out on most of these benefits. Perhaps the dismissal of biophilic design as greenwashing by the academic community is too abrupt.

"Urban greening and biophilic design are not the panacea for climate change, but they are tools in the kit of parts to shape a compelling and holistic sustainability strategy. They have the advantage of being eye-catching, unlike many other invisible characteristics of sustainable design, but without the necessary expertise in the design stage and a robust maintenance plan, their full potential will not be delivered."[24]

This quote summarises the sensible approach to incorporating biophilia into architecture and design. It admits to the fact that focussing solely on making a design biophilic isn't inevitably going to produce an environmentally sustainable project. On top of that, if it isn't executed and maintained by people with the correct know-how, it can become a burden in the built environment. It brings us back to Kellert's definition of "restorative environmental design," encouraging architects and designers to adopt biophilic principles into their practice as an added layer to the existing methodology. Biophilic design can improve the occupant's health and wellbeing, which is a basic principle of the architectural profession, and this shouldn't be ignored.

References

1. https://unfccc.int/process-and-meetings/the-paris-agreement
(last visited 01.02.2024)

2. https://commonslibrary.parliament.uk/the-rise-of-climate-change-activism/
(last visited 01.02.2024)

3. William J. RIPPLE, Christopher WOLF, Thomas M. NEWSOME, Phoebe BARNARD, William R. MOOMAW, & 11,258 Scientist Signatories from 153 Countries, World Scientists' Warning of a Climate Emergency, BioScience, Vol. 70, No. 1, Oxford (Oxford University Press) January 2020, p. 8

4. William J. RIPPLE, Christopher WOLF, Thomas M. NEWSOME, Phoebe BARNARD, William R. MOOMAW, & 11,258 Scientist Signatories from 153 Countries, World Scientists' Warning of a Climate Emergency, BioScience, Vol. 70, No. 1, Oxford (Oxford University Press) January 2020, p. 11

5. United Nations Environment Programme, 2022 Global Status Report for Buildings and Construction: Towards a Zero-emission, Efficient and Resilient Buildings and Construction Sector, Nairobi 2022, p. 41

6. https://www.stefanoboeriarchitetti.net/en/project/vertical-forest/
(last visited 01.02.2024)

7. Stefano BOERI, a vertical forest/ un bosco verticale, Mantova (Corraini Edizioni) 2015, p. 97

8. Stefano BOERI, a vertical forest/ un bosco verticale, Mantova (Corraini Edizioni) 2015, pp. 120-124

9. https://www.sheppardrobson.com/journal/our-connection-to-nature-is-a-powerful-force-and-not-to-be-underestimated
(last visited 01.02.2024)

10. https://www.architectsjournal.co.uk/news/is-the-boom-in-green-roofs-and-living-walls-good-for-sustainability
(last visited 01.02.2024)

11. https://www.targetingzero.co.uk/expertise
(last visited 01.02.2024)

12. https://www.cbc.ca/news/world/green-housing-bosco-milan-trudo-netherlands-1.6228709
(last visited 01.02.2024)

13. United Nations Environment Programme, 2022 Global Status Report for Buildings and Construction: Towards a Zero-emission, Efficient and Resilient Buildings and Construction Sector, Nairobi 2022, p. 41

14. Daniel A. BARBER & Erin PUTALIK, Forest, Tower, City: Rethinking the Green Machine Aesthetic, 45: Into the Woods, Cambridge (Harvard University Graduate School of Design) 2018

15. https://www.latimes.com/opinion/op-ed/la-oe-graham-folly-of-green-buildings-20160306-story.html
(last visited 01.02.2024)

16. Daniel A. BARBER & Erin PUTALIK, Forest, Tower, City: Rethinking the Green Machine Aesthetic, 45: Into the Woods, Cambridge (Harvard University Graduate School of Design) 2018

17. https://www.architectsjournal.co.uk/news/is-the-boom-in-green-roofs-and-living-walls-good-for-sustainability
(last visited 01.02.2024)

18. Stephen FELL, Pro Landscaper, Litlehampton (ELJAYS44) January 2020, p. 9

19. Chris CHURCHMAN, Pro Landscaper, Litlehampton (ELJAYS44) January 2020, p. 9

20. https://www.dezeen.com/2019/10/31/celine-baumann-landscape-architecture/
(last visited 01.02.2024)

21. Niranjika WIJESOORIYA & Arianna BRAMBILLA, Bridging biophilic design and environmentally sustainable design: A critical review, Journal of Cleaner Production 283, Amsterdam (Elsevier Ltd.) February 2021, p. 3

22. Fei XUE, Stephen SiuYu LAU, Zhonghua GOU, Yifan SONG & Boya JIANG, Incorporating biophilia into green building rating tools for promoting health and wellbeing, Environmental Assessment Review 76, Amsterdam (Elsevier Ltd.) May 2019, p. 104

23. Fei XUE, Stephen SiuYu LAU, Zhonghua GOU, Yifan SONG & Boya JIANG, Incorporating biophilia into green building rating tools for promoting health and wellbeing, Environmental Assessment Review 76, Amsterdam (Elsevier Ltd.) May 2019, p. 105

24. https://www.sheppardrobson.com/journal/our-connection-to-nature-is-a-powerful-force-and-not-to-be-underestimated
(last visited 01.02.2024)

Origins of Biophilic Design

CH. 3

3.1

Moderate Modernism

"A house is a machine for living in..."

(Le Corbusier)

This quote is probably one of the first things that comes to mind when the word modernism is uttered. It originates from the most influential and infamous modernist architect of all time, Le Corbusier. Young aspiring architects are introduced to this quote and Le Corbusier in any introduction to architectural history and if you ask most students which fragments remain from those early lectures, most will answer, something about the home and how it is supposed to be a machine. For those of us, who are less interested in architectural history, this introduction paints the picture that modernism is soulless, rational and the extreme opposite of biophilic.

In short, modernism emerged as a reaction towards the style wars of the 19th century. In universities across the world, the Viennese "Ringstrasse" development during the latter half of the 19th century is chosen as an example that clearly illustrates the eclectic mix of styles at the time. Starting at the renaissance styled opera house, we continue past the classical Greek parliament, only to arrive at the gothic civic hall, all constructed within the same century. Modernist architects were fed up with this random selection of imitation, and their goal was to break free from the shackles of past styles and create architecture that embraced modern life. Freedom from style was short-lived, as the seminal "Modern Architecture: International Exhibition" held at New York's Museum of Modern Art in 1932, packed modernism back into the style box, when it coined the term: "The International Style."

Le Corbusier's five points in architecture succinctly summarise the new possibilities of "The International Style:"

- Pilotis -

  Replacement of ground floor supporting walls by a grid of reinforced concrete columns that bear the structural load is the basis of the new aesthetic.

- The free design of the ground plan -

  Raised on free-standing columns with the absence of supporting walls, means the ground floor is unrestrained in its internal use.

- The free design of the façade -

  Separating the exterior of the building from its structural function sets the façade free from conventional structural constraints.

- Horizontal windows -

  The absence of load-bearing walls allows for windows of any size. Large horizontal windows increase the sense of space and lights rooms equally.

- Roof garden -

  A flat roof can serve a domestic purpose while providing essential protection to the concrete roof.[1]

Fig. 8 - Villa Savoye, 1931 - Le Corbusier

A couple of these five points are sure to remain in the heads of most architectural students, or at least during the exam period leading up to the first-year architectural history exam. Le Corbusier's "Villa Savoye" completed in 1931, a year before the MOMA exhibition, is the built manifestation of these five points. A radical influential building, so simple in appearance but ever so complex conceptually, consisting of concrete structural elements. At first glance, many would struggle to call this building biophilic. Nonetheless, Le Corbusier has freed up much of the ground floor area with the help of columns to provide a large covered outdoor space. The horizontal windows provide unobstructed panoramic views into the exterior environment. In the final point, Le Corbusier literally propagates turning the flat roof into a green roof. If we take a closer look at Le Corbusier's radical "Plan Voisin" proposal for Paris in 1925, most viewers are shocked by the monumentality of the large cross-shaped towers. Once that initial shock subsides, the countless pockets of green encompassing the monumental skyscrapers emerge into view. It is clear that one of the intended benefits of stacking functions on top of each other in multiple storeys was to free up space on the ground floor and allow residents more access to greenery. Unfortunately, the radical nature of Le Corbusier's buildings and writings leads to the fact that many of the outrageous elements are the ones that stick during architectural education. Modernism now has a reputation for being inhumane and idolising technology and much of the architecture that followed seems to demonstrate this ideology.

Fig. 9 - Plan Voisin, 1925 - Le Corbusier

One of the first architects to publicly question the machine aesthetic defining early modernism was the Austrian architect, Josef Frank. Frank was very much involved with the inner circle of pioneering modernist thinkers. He was there, along with Le Corbusier, when the first International Congress of Modern Architecture (CIAM) was held in Lausanne in 1927. In the same year, Frank was the only Austrian architect invited to partake in the first "Werkbundsiedlung" exhibition in Stuttgart. His contribution in Stuttgart was the first sign that Frank was an outsider amongst this inner circle of radical thinkers. It was not so much the exterior, but the interior that distinguished Frank from the rest.

"...der neue Deutsche fühlt die moralische Verpflichtung, schlecht zu sitzen, und will nicht wissen, daß es auch anderes gibt. Der Gott, der Eisen wachsen ließ, der wollte keine Holzmöbel."[2]

Fig. 10 - Wassily Chair, 1925 - Marcel Breuer

Frank had a particular aversion towards the tubular steel chair. When the "Werkbundsiedlung" in Stuttgart was completed, the hype around tubular steel furniture was fully launched. It was readily adopted by most of the participating architects, as it "perfectly embodied the machine aesthetic so popular at the time."[3] It was minimal, light, and airy, resonating with the fundamental principles of modernism. On the other hand, Frank argued that tubular steel furniture failed to fulfil its main purpose, that of providing comfortable support to the person who sits on it. To the criticism of most other participants Frank included Persian rugs, wooden furniture, and patterned curtains in his interior design. It was a stark contrast to the rest of the minimalist interiors and perceived as too traditional and not modern.

"Die Ornamentlosigkeit ist heute, als solche geschätzt, ebenso ornamental, wie die Antireligiosität eine Art von Religion ist, die, auf Glaubenseifrige beschränkt, geschickt geleitet in das Gegenteil umschlagen kann. Aber die Gleichgiltigkeit Nebensächlichem gegenüber, die Erkenntnis von der Vielfältigkeit unserer Welt, die Anerkennung unserer sehr berechtigten Gefühlswerte gehören zu den Grundlagen des modernen Lebens und seines Symbols, der modernen Architektur. Es gibt heute noch (ohne über den Wert dieser Dinge zu urteilen) genügend viel Menschen, die auch zu alten Formen gewisse Beziehungen haben. Denn Form und Inhalt haben miteinander wenig zu tun. Amerika hat uns bewiesen, daß man jedes, auch das bequemste Haus in allen Stilarten bauen kann, ohne auch nur das geringste an Behaglichkeit aufgeben zu müssen; diese Häuser sind durch eine bestimmte und klare Lebensform, die seine Bewohner haben, unseren Formspielereien bei weitem überlegen. Modern ist das Haus, das alles in unsere Zeit Lebendige aufnehmen kann und dabei doch ein organisch gewachsenes Gebilde bleibt. Die moderne deutsche Architektur mag sachlich sein, praktisch, prinzipiell richtig, oft sogar

reizvoll, aber sie bleibt leblos."[4]

This is a quote from Frank's seminal book "Architektur als Symbol" first published in 1931. It was Frank's reaction to his perceived unfavourable trajectory of modern architecture at the time. In this book, Frank goes to great lengths to describe the different architectural styles of the past and how each style emerged as a reaction to its predecessor. Frank explains that each new style was founded based on the discontent with the current leading style at any time. This discontent would always spur on the next generation to entirely disregard what their peers may have propagated. Further, Frank believed that every architectural style was defined by their current attitude towards classical architecture.[5] In essence, Frank believed that no matter how much defiant pioneering architects were convinced that everything before them was a mistake and their new style was going to solve the world's problems once and for all, history is always going to repeat itself and a following style would emerge as a reaction that disregards all the hard work they had just put in. That is why Frank propagated a more subtle approach to modernism, because the more radical in disregarding what came before, the more radical the inevitable reaction will be, hindering modernism's fundamental intentions, which as the previous quote demonstrates, Frank supported. It was an accurate prophecy in 1931, as post-modernism in the latter half of the century would emerge as a reaction to modernism's soulless character, embracing ornament and classical symbols once more. The final sentence of

Fig. 11 - Villa Beer, 1925 - Josef Frank - steet-facing façade

the previous quote clearly demonstrates that Frank believed embracing the machine aesthetic as one of the defining characteristics of modernism was producing lifeless architecture unsuitable for humans and incapable of catering to our diverse emotional states.

In 1930 Frank in partnership with Oskar Wlach completed the "Villa Beer" in Vienna's 13th district. The "Villa Beer" is a substantial detached single-family home that represents Frank's most recognisable and influential contribution to Austrian modernist architecture. One of the defining characteristics of "Villa Beer" is the treatment of the façade facing the street as opposed to the façade facing the garden. The street-facing façade has a reduced amount of glazing, whilst the garden-facing façade dissolves into large areas of glazing and multiple terraces providing access into the exterior environment. A double-height bay window extends the interior furthest into the garden. A bench is integrated along each side of the bay window and the rest of the wall surface is entirely glazed, immersing residents in the natural setting of the garden. In essence, this opposing treatment of the two façades represents a prospect-refuge situation, as the façade facing the street is opaquer compared to the transparency of the façade facing the garden. Therefore, residents are visually separated from the street providing a sense of security, whilst the view to the prospect of the garden is maximised.

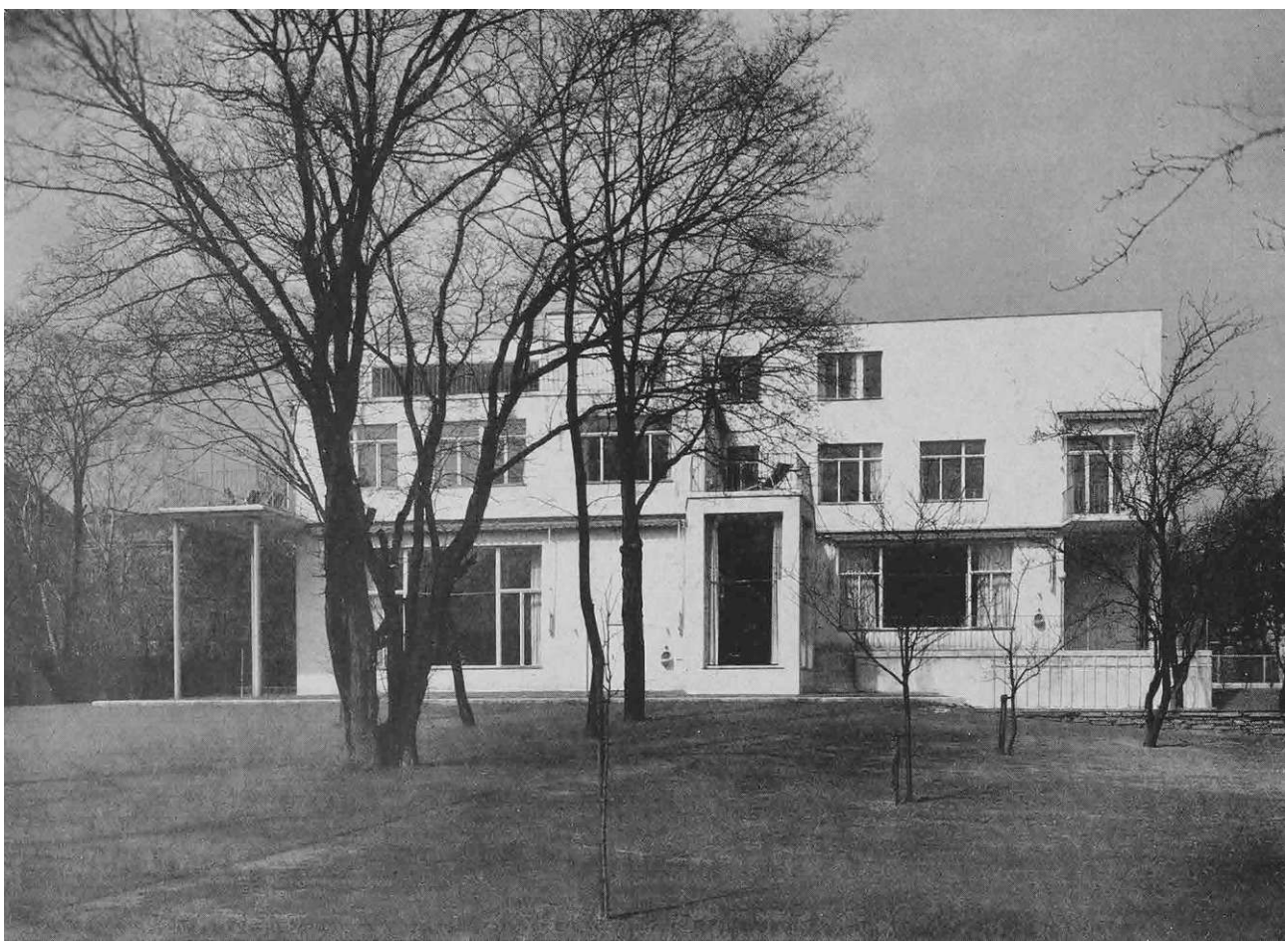


Fig. 12 - Villa Beer, 1925 - Josef Frank - garden-facing façade

Fig. 13 - Villa Beer, 1925 - Josef Frank - interior view of bay window

Frank went on to have a leading role in founding the Austrian Werkbund and organising Vienna's own "Werkbundsiedlung" exhibition in 1932. Unfortunately, Frank's personal influence in Austria was relatively short lived, as he emigrated to Sweden in 1934 and never returned to his country of birth. Coincidentally, in the aftermath of WWII Scandinavia began to take a leading role in developing a more humanist approach to modernist architecture and the undeniable leading figure was the Finnish architect, Alvar Aalto. In 1955, Aalto was invited to Vienna by the "Zentralvereinigung der Architekten Österreichs" to hold a lecture:

"Man sagt, wir sollen Herren der Maschinen sein, in Wirklichkeit aber sind wir deren Sklaven. In diesem Gegensatz liegt natürlich auch eines der großen Probleme der Architektur.
Es ist deutlich spürbar, daß die Architektur nach einer formalistisch-modernen Periode eine neue Aufgabe bekommen hat. Vielleicht wird der Architekt mit größerem Erfolg als der Schriftsteller in der Lage sein, den Menschen über die Maschine zu stellen und nicht umgekehrt. Eine deutliche Aufgabe stellt sich jedenfalls dem Architekten: Wir sind dazu da, die mechanische Form des Materials zu humanisieren.

Wenn wir etwas näher und im einzelnen auf diese Auseinandersetzung eingehen, so wird uns allen klar, daß es den Menschen augenscheinlich unmöglich ist, etwas zu schaffen, ohne gleichzeitig etwas zu zerstören. Es ist nicht nur die Mechanisierung unserer Zeit, sondern auch unsere Tätigkeit, die uns mehr und mehr von der wirklichen Natur entfernt."[6]

In this quote, Aalto touches on similar topics as Frank did, warning of the machine and technology's dominance in the built environment and how this is beginning to dehumanise our world. This quote clearly demonstrates that Aalto supports a biophilic approach to architecture, one that takes care not to distance us further away from nature. Many of his buildings and urban plans are a testament to his unique approach. In the same year Aalto held his lecture in Vienna, he completed one of his most influential buildings, the "Säynätsalo Town Hall."

Fig. 14 - Säynätsalo Town Hall, 1955 - Alvar Aalto - bird's eye view

Fig. 15 - Säynätsalo Town Hall, 1955 - Alvar Aalto - view from east

The building is constructed of two dominant materials, brick, and wood. On the outside, the dark stained wooden elements mirror the surrounding tall slender tree trunks, and the forest approaches the very edge of the building complex. Inspired by classical Italian civic centres, the complex is centred around an interior courtyard with a tower on one corner housing the council chamber. Grass covers most of the interior courtyard, which stands at the same height as the 1st floor. Excavated earth from construction was piled into the middle of the building complex to create this unique courtyard, including a water feature. On one corner a staircase leads down to the ground floor and on the opposite corner Aalto designed grass steps, retained by wooden planks that create a subtle transition from the green interior courtyard above down to the gravel ground floor below.

Fig. 16 - Säynätsalo Town Hall, 1955 - Alvar Aalto - grass steps

"Die Etikette 'organische Architektur,' die vor allem auf das Werk des großen alten Mannes im Hintergrund, Frank Lloyd Wright, geprägt wurde, ist wie alle derartigen Benennungen gefährlich, aber nützlich. Sie weist jedenfalls auf eine unleugbar vorhandene Richtung hin: man hatte nicht zuletzt aus den bitteren Erfahrungen des zweiten Weltkriegs die Grenzen und Gefahren der Mechanisierung erkannt und überall wurden warnende Stimmen laut, welche nach der Gewinnung eines richtigeren Verhältnisses zwischen ‚Mensch und Technik' riefen.

(...)

Die Durchführung dieser Humanisierung geht in ebenso vielfältiger Weise vor sich wie seinerzeit und manchmal gleichzeitig die Beeinflussung von den Naturwissenschaften her. Getrennt und miteinander finden sich etwa folgende Elemente: die Verwendung ‚organischer Formen,' vor allem unregelmäßiger Kurven; das Zurückgreifen auf die natürlichen Baustoffe, deren Farbe und Oberflächenbeschaffenheit den menschlichen Sinnen vertraut und angenehm ist und die gerne in bewußten Gegensatz zur Glätte der ‚künstlichen' Materialien gesetzt werden; reichlicher Gebrauch der Bepflanzung im Rahmen der architektonischen Gesamtkomposition, im Innen- wie im Außenraum; weitgehende Differenzierung in Plan und Aufbau: in Gegensatz zu dem früher vorherrschenden Prinzip der Vereinheitlichung und Verallgemeinerung (...) tritt nun ein Eingehen auf die besonderen Gegebenheiten jedes einzelnen Falles. Das bedeutet vor allem ein Eingehen auf die Besonderheiten der Örtlichkeit, auf vorhandene Geländebrüche, Wasserläufe, Bäume, Felsen u. dg. - auf die romantischen Elemente der natürlichen Landschaft, wie sie Landschaftsmaler und -gestalter längst als Material zu verwenden wußten, auf die Reize des Zufälligen, auf die nicht zuletzt auch der Film aufmerksam gemacht hatte."[7]

In 1952 the prominent Austrian architectural historian Eduard Sekler published a feature in "Der Aufbau" summarizing the development of European architecture since the end of WWII. One particular movement, outlined in the previous quote, precisely matches biophilic principles and he later mentions how this approach was most pronounced in Switzerland and Scandinavia at the time.[8] Further, he refers to Frank Lloyd Wright as the pioneer that sowed the seed, which led to the germination of this movement.

"Never did I allow the machine to become 'motif'- always machine for man and never man for machine. Ever since, in organic architecture I have used the machine and evolved a system of building from the inside out, always according to the nature of both man and machine - as I could see it - avoiding the passing aspects now characteristic of urban architecture.

The machine I found a better means to broaden the humane interest in modern architecture. Nor, in point of style, have I once looked upon the machine as in itself an end, either in planning or building style. Quantity has never superseded quality."[9]

In 1957 at the ripe old age of 90, Wright published "A Testament." This book includes his opinion on the machine's position in modern architecture. He acknowledges the machine as a useful tool, but opposes the machine aesthetic, affirming human interests should remain the top priority in modern architecture. He refers to his approach as "organic architecture." This could be considered a synonym for biophilic design, yet Wright's definitions of "organic architecture" are more spiritually inclined:

"Organic Unit

Thus environment and building are one: Planting the grounds around the building on

the site as well as adorning the building take on new importance as they become features harmonious with the space-within-to-be-lived-in. Site, structure, furnishing – decoration too, planting as well – all these become as one in organic architecture. What was once called 'decorating' – landscaping, lighting etc. – and modern gadgetry (mechanical fixtures like air-conditioning) all are within the building structure as features of the building itself. Therefore all are elements of this synthesis of features of habitation and harmonious with environment. This is what posterity will call 'modern architecture.'"[10]

Wright's most recognisable commission that epitomizes his architectural philosophy is "Falling Water" completed in 1935. He was commissioned by the wealthy Pittsburgh businessman, Edgar J. Kaufmann, who wanted to build a summer home on an expansive site in Bear Run, Pennsylvania. Embedded within a lush forest, Wright as the name suggests cantilevered the home above the waterfall of a forest stream. The multiple floors consisted of "reinforced concrete trays"[11] anchored to the rocks of the stream bank. They appear to float above the waterfall, compositionally cascading down towards the stream below. Most of the wall surface between the "reinforced concrete trays" was glazed, including the many corners immersing the interior in the surrounding tree canopy and capturing multiple perspectives of the waterfall. A locally sourced sandstone is a dominant material throughout[12] and a staircase suspended from the bottom floor allows residents to descend all the way down to the surface of the stream.

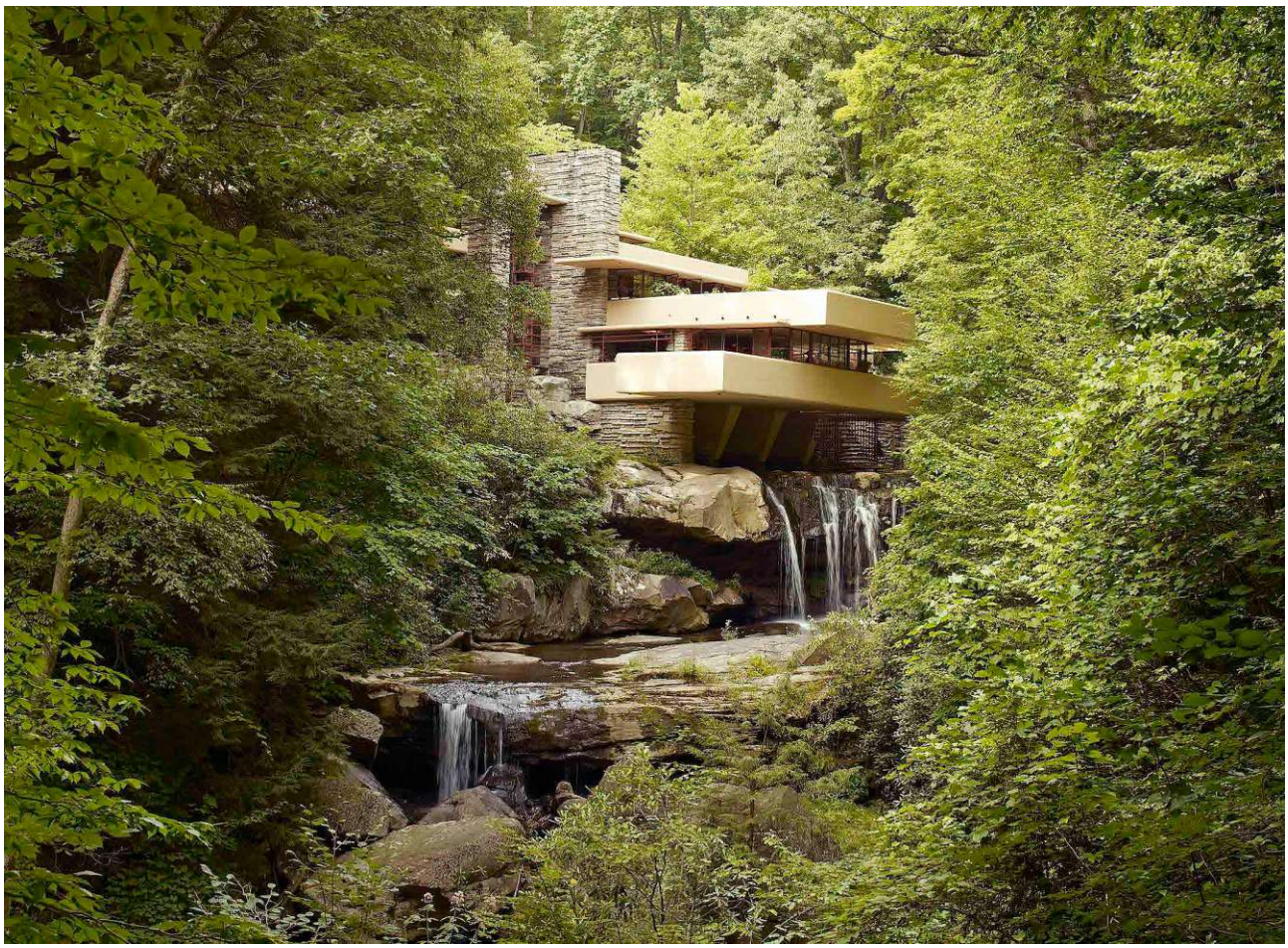


Fig. 17 - Falling Water, 1935 - Frank Lloyd Wright

"In the history of modern architecture and in the history of American civilization Wright has a place apart. He created by an imaginative analysis at once intellectual and instinctive most of the aesthetic resources developed by the modern architects of Europe since the War. Yet he is not merely the forerunner of what has now become a new international style. Fundamentally he remains an individualist, the latest major representative of that particularly American view of the world which shone forth in Emerson, in Melville, and in Whitman. John Robinson addressing the Pilgrim Fathers as they left Leiden established the chord of American affirmation: 'The Lord has more Truth and Light yet to break forth out of his Holy Word.' For Wright that Holy Word is the book of Man and Nature. For him no architectural creed even of his own fashioning has breadth enough for the architectural possibilities yet to burst forth.

(...)

Yet those who have aspired to emulate Wright in all the breadth and license of his undaunted genius have never achieved more than a pathetic parody of his work, while those who have purified and solidified their interpretation of his doctrine, seeking more consonance with the second quarter of the twentieth century and less with the romantic absolutes of Man and Nature, have attained throughout the world a real integration of style."[13]

Wright was included in the "Modern Architecture: International Exhibition," where his work took centre stage. In the exhibition catalogue, Henry-Russell Hitchcock Jr. wrote a profile on Wright acknowledging the tremendous impact he had on the development of modernism. Nonetheless, he explains how the term modernist hardly applies to Wright and that his approach was so unique, that he was in a league of his own. Hitchcock Jr. describes how Wright had many followers that tried and failed to emulate him, but those who understood his doctrine and developed their own interpretations were more successful. One of Wright's many protégés was the Austrian born American architect Richard Neutra.

To meet and learn from Wright and visit his many buildings was one of the main reasons Neutra emigrated to the United States of America in the first place. His dream came true, when he worked for Wright for a few months in his Taliesin studio in Wisconsin during the winter of 1924/ 1925.[14] After his relatively short stint with Wright, Neutra would move on to Los Angeles and establish himself as "the leading modern architect of the West Coast."[15] It could be said that Neutra, who was very much a modernist at heart, combined Wright's approach with the modernist aesthetic. Due to his Austrian heritage, he was influential in channelling this new wave of American modernism back to his country of birth. Neutra was well known in Austria, most of all due to his publications, such as the book "Wie baut Amerika?" published in 1927, introducing the German-speaking world to the new construction methods America was pioneering. This likely caught the attention of Josef Frank, as he invited Neutra to design a house for the Viennese "Werkbundsiedlung," constituting Neutra's only completed commission in his country of birth.

"The natural scene – the precultural environment – has undergone only minor changes throughout the long formative period of our species. The process of early man's adjustment to this environment was largely automatic. Man-made environment, however, is subject to far more rapid changes. There is no time for slow biological adjustment to novelties which at any moment may become technologically feasible. The velocity differential of these two processes is fraught with dangerous friction. Experts in organic requirements and reactions must help us steer clear of precarious maladjustment."[16]

In 1954, Neutra published "Survival Through Design," a book summarising his architectural philosophy. A couple years later the book was translated into German and published under the title "wenn wir weiterleben wollen...." Neutra touches on various topics in this book and the general message is the man-made environment, predominantly shaped by architects has a profound psychological impact on humanity and therefore architects have a huge responsibility to design environments that have a positive effect on mental health. In this book a remarkable number of topics Neutra approaches align with the fundamental principles of biophilic design. The previous quote for example, shows that Neutra knew our brain has no chance of evolving with the pace of change within the man-made environment and that it is wired to "the precultural environment." This accurately matches Edward O. Wilson's "biophilia hypothesis," only Neutra put it into words 30 years earlier. Neutra was also aware of the prospect-refuge theory, before it became known by that name, describing it as follows:

"We all can easily comprehend that it is a fundamental defensive attitude which makes us, almost unawares, place value on protective devices in our surroundings. For instance, much of the time we welcome a solid or opaque enclosure, especially sheltering feature behind us. A wall back of our easy chair where we want to relax, or back of our seat at the desk where our concentration shall not be disturbed by our sustained subconscious watching of the rear, has a specific meaning in this respect."[17]

When it came to urban planning, Neutra advised taking inspiration from natural processes and using metaphors and comparisons derived from "the organic sciences of living, biology and physiology."[18] For example, he refers to neighbourhood boundaries as synapses between nerve cells. He believed that by using such a metaphor, designers are encouraged to create boundaries that no longer separate neighbourhoods from one another, instead these boundaries represent planes of contact, facilitating energy exchange.[19]

Neutra's most recognisable commission is the "Kaufmann House" in Palm Springs, completed in 1946. As the name suggests, Edgar J. Kaufmann, the same Pittsburgh businessman responsible for commissioning Wright to design "Fallingwater" a decade

Fig. 18 - Kaufmann House, 1946 - Richard Neutra - interior view incl. vanishing corner

Fig. 19 - Kaufmann House, 1946 - Richard Neutra - view from east

earlier was Neutra's client. The "Kaufmann House" is a detached single-family home, representing the main typology that Neutra worked on throughout his career. The house shares an intimate connection with the garden, as the majority of walls are floor to ceiling windows and there is an assortment of covered outdoor spaces bordering onto the interior. A particularly famous detail is captured in the view from the living room out into the garden onto the pool. The corner is fully glazed, but the column supporting the roof structure is positioned outside. Residents can slide the two windows across, so the corner disappears entirely and the interior space transforms into an outdoor covered space.

"Der ebenerdige Palast des reichen Mannes von heute; mit allen Mitteln moderner Technik ist die Grenze zwischen Haus und Garten aufgehoben, damit man buchstäblich in der Natur wohnen kann. So wird in fast abstrakter Konsequenz das heutige Wohnideal greifbar gemacht und gleichzeitig dem bekannten Begriff des ‚landschaftsgebundenen' Bauens bewußt eine andere Art von Harmonie zwischen Haus und Umgebung gegenübergestellt."[20]

In 1948 Roland Rainer, a pioneer in his own right, who will be analysed in more detail later in this thesis, complimented Neutra on having achieved the ultimate ideal home in close connection to the exterior environment, although acknowledging that Neutra was blessed with the Californian climate and a client with deep pockets.[21] Nonetheless Neutra used these aspects to his advantage to complete a home where the boundary separating the interior from the exterior could literally all but vanish.

References

1. https://www.studio2a.co/corbusier-manifesto-five-points-of-new-architecture/
(last visited 01.02.2024)

2. Josef FRANK, Architektur als Symbol: Elemente des Neuen Deutschen Bauens, Vienna (Löcker Verlag) 2005, p. 133

3. https://www.thonet.de/en/magazine/history-brand/detail/thonet-and-tubular-steel
(last visited 01.02.2024)

4. Josef FRANK, Architektur als Symbol: Elemente des Neuen Deutschen Bauens, Vienna (Löcker Verlag) 2005, p. 135

5. Josef FRANK, Architektur als Symbol: Elemente des Neuen Deutschen Bauens, Vienna (Löcker Verlag) 2005, p. 44

6. Alvar AALTO, Zwischen Humanismus und Materialismus, Der Aufbau, (July/ August) 1955, p. 174

7. Eduard F. SEKLER, Europäische Architektur seit 1945, Der Aufbau, (June) 1952, p. 224

8. Eduard F. SEKLER, Europäische Architektur seit 1945, Der Aufbau, (June) 1952, p. 226

9. Edgar KAUFMANN & Ben RAEBURN, Frank Lloyd Wright: Writings and Buildings, Cleveland (The World Publishing Company) 1960, p. 306

10. Edgar KAUFMANN & Ben RAEBURN, Frank Lloyd Wright: Writings and Buildings, Cleveland (The World Publishing Company) 1960, p. 317

11. https://franklloydwright.org/site/fallingwater/
(last visited 01.02.2024)

12. https://franklloydwright.org/site/fallingwater/
(last visited 01.02.2024)

13. Alfred H. BARR JR., Henry-Russell HITCHCOCK JR. & Philip JOHNSON, Modern architecture: international exhibition, New York (The Museum of Modern Art) 1932, pp. 29-30

14. Arthur DREXLER & Thomas S. HINES, The architecture of Richard Neutra: from International Style to California modern, New York (The Museum of Modern Art) 1984, p. 7

15. Alfred H. BARR JR., Henry-Russell HITCHCOCK JR. & Philip JOHNSON, Modern architecture: international exhibition, New York (The Museum of Modern Art) 1932, p. 16

16. Richard NEUTRA, Survival Through Design, New York (Oxford University Press) 1954, p. 26

17. Richard NEUTRA, Survival Through Design, New York (Oxford University Press) 1954, p. 220

18. Richard NEUTRA, Survival Through Design, New York (Oxford University Press) 1954, p. 341

19. Richard NEUTRA, Survival Through Design, New York (Oxford University Press) 1954, p. 341

20. Roland RAINER, Ebenerdige Wohnhäuser, Wien (Berglandverlag) 1948, p. 62

21. Roland RAINER, Ebenerdige Wohnhäuser, Wien (Berglandverlag) 1948, p. 18

3.2

East-Asian/ Anonymous Influence

"Der Ostasiate hielt sich nie für den Mittelpunkt der Welt, aber er hatte seinen bescheidenen und wohleingeordneten Platz in ihr. Sein ganzes Menschentum ist nur eine Station auf der ewigen Wanderschaft ins Nichts. Und alles rings um ihn ist mit ihm verwandt, da er als Vogel in der Luft gelebt hat und zum Fisch im Wasser werden kann. Er weiß, daß ein jedes Ding den gleichen Wert hat wie er selbst und liebt alles und kann deshalb den Zusammenhang mit der Natur nie verlieren. Die Natur hat ihm reichere Gaben geschenkt als uns, Materialien, denen er jede Schönheit abgewinnen konnte, Seide und Papier, Lack, Holz und Ton. Er konnte dies ohne die ungeheure Kraftanstrengung, die wir machen mußten, um die leblose Materie menschlich zu beleben. Er wendet sich all diesem mit gleicher Liebe und Sorgfalt zu, denn sein ewiges Leben sichert ihm die Erreichung seines Ziels, und er kann ruhig auf dem aufbauen, was seine Vorfahren, die nun in anderer Gestalt um ihn leben, begonnen haben. Darum steht die ostasiatische Kunst in stetiger, ruhiger Entwicklung, ohne all die krampfhaften Zuckungen, die der Europäer durchmachen muß, dessen Leben kurz ist und zu höchster Intensität und deren Karikatur im Plakatstil anspornt."[1]

This quote was included in Frank's "Architektur als Symbol" publication. Here, he expresses admiration for East-Asian art and culture. He describes the influence of Zen-Buddhism and how this encourages a respectful relationship between humans and nature, as people are not considered the centre of the universe, they are simply a part of it. Frank hypothesizes that a battle of styles could never be fought in an East-Asian society, as the theory of reincarnation encourages members of such a society to work towards a collective goal. Most if not all modernist architects admitted that East-Asian architecture and philosophy, such as the writings by the Chinese philosopher Laozi, was a major influence, as it resonated with the minimalist and functionalist principles in modernism. Wright for example acknowledges an affiliation with East-Asian culture and architecture, remarking that he felt it confirmed his own way of thinking.[2]

"Die Form- und Farbgestaltung der japanischen Architektur ist durchaus einfach und bescheiden. Man sieht allgemein Schönheit im Zweckmäßigen, ohne besondere dekorative Elemente hinzuzufügen. Was an solchen vorhanden ist, deckt sich mit dem Konstruktiven. Es ist daher natürlich, daß in der japanischen Architektur, die vorwiegend aus Holz besteht, gerade Linien vorherrschend sind. Auch die Farben sind wenig stark, da die natürlichen matten Farben des Materials vorwiegen. Das Holz wird zum Beispiel im Innern wie auch im Äußern meistens nicht gestrichen, so daß Maserung, natürlicher Glanz und die Färbung des Holzes zur vollen Wirkung gelangen."[3]

Traditional Japanese architecture was introduced to the German-speaking world by the Japanese architect Testuro Yoshida. He published multiple books on the different aspects of Japanese design through the influential „Wasmuth" publisher. As the previous quote demonstrates, traditional Japanese architecture resonates with both the modernist and biophilic approach. He describes the modest and simplistic approach to the application of colour and massing in Japanese architecture, which resonates with the rejection of ornamentation and the "form follows function" doctrine in modernism. He then goes on to describe the dominant construction material, which is the natural building material wood. As it is predominantly untreated in the exterior and interior, this resonates with the biophilic approach, as the goal is to retain the natural colour and texture of this material. In 1935 Yoshida published the first version of "Das japanische Wohnhaus." It was the first detailed account of traditional Japanese residential architecture accessible to

the German-speaking world. The traditional Japanese home represents a modernist and biophilic ideal, as it is minimalist, airy, filled with daylight and the boundary separating architecture from the garden is literally as thin as paper.

"Das traditionelle japanische Wohnhaus ist ein Haus aus ‚Holz, Papier und Bambus' und ist leicht brennbar. Es ist seinem Wesen nach nichts anderes als das Kriegerhaus der Vergangenheit und paßt daher natürlich nicht völlig zum modernen Leben. Vom technischen Standpunkt aus muß man es sogar primitiv nennen. Trotzdem hat das japanische Wohnhaus seine ganz besonderen Vorzüge, die den neuen Wohnhausstil nicht nur in Japan, sondern auch in anderen Ländern der Welt bereits in entscheidender Weise beeinflussen. Diese bestehen im wesentlichen:

1. Darin, daß das japanische Haus Einzelhaus mit Garten ist, und daß zwischen Haus und Garten eine innige Beziehung besteht, indem Hausinneres und Garten zu einem Ganzen verschmolzen sind,

2. in den vielen und großen Tür- und Fensteröffnungen und nach außen offenen Räumen, wodurch eine starke Verbundenheit mit der Natur und vollkommene Anpassungsfähigkeit an das Landesklima hergestellt wird,

3. in der Elastizität des Grundrisses, d.h. der leichten Veränderlichkeit der Raumeinteilung und der vielseitigen Verwendbarkeit der Räume,

4. in der sachlichen und rationalistischen Baugestaltung und Übereinstimmung von Konstruktion und architektonischer Schönheit,

Fig. 20 - traditional Japanese timber frame construction

5. in der einfachen, klaren und reinen Raumgestaltung mit Tokonoma als Mittelpunkt,

6. in der Verwendung von ungestrichenem Holz, wodurch die natürliche Schönheit der Maserung und Farbe des Holzes zur vollen Wirkung gelangt,

7. in den praktisch eingebauten Möbeln und den Maßnahmen, die eine volle Raumausnutzung gestatten und einen ausgedehnten Flächeneindruck verschaffen,

8. in der Normung der Zimmergröße und Bauteile bis in die kleinsten Einzelheiten, was eine schnelle und billige Herstellung des Hauses ermöglicht, ohne dem Haus seinen individuellen Charakter zu nehmen."[4]

In the introduction to „Das japanische Wohnhaus" Yoshida lists eight fundamental principles that define the traditional Japanese home and all of them could either apply to biophilic design or modernist architecture and some can apply to both. Yoshida accredits the emergence of this specific typology to the climatic conditions in Japan and the spiritual inclination of its civilization.

The Japanese climate is characterised by hot and humid summers and mild winters, so the airy nature of construction is a necessity to encourage cooling airflow. Further, Japan experiences large levels of precipitation, so the lifting of Japanese traditional homes of the ground counteracts the phenomenon of rising damp.[5]

Interestingly, Yoshida admits that the traditional Japanese house is primitive in construction and highly flammable. Japan is a country prone to natural disaster as it "lies along the western edge of the Ring of Fire and is one of the most tectonically active places on Earth."[6] Therefore, buildings normally last up until the next natural disaster, yet Yoshida explains that it is also the Buddhist religion that motivates the primitive nature of construction. It is unnecessary to build a home that can withstand time, as the home is considered a temporary accommodation within an everlasting life.[7]

In the eight fundamental principles Yoshida listed previously, the first two principles named, refer to the intimate connection between the interior and exterior in Japanese architecture. A particular feature that further strengthens this relationship is the "Engawa" (Veranda), which Yoshida categorises as one of the principal components of the traditional Japanese house.[8] Besides fulfilling the function of shelter from rain and sun, it represents the transitional space that softens the boundary between the interior and exterior.

Fig. 21 - traditional „Engawa"

"Der geistige Kern des japanischen Hauses aber beruht auf der ursprünglichen Lebenshaltung des japanischen Menschen, der gern im Natürlichen und Alltäglichen die Bedeutung des Menschenlebens zu finden sucht. Das Leben in der heutigen Zeit hat sich allerdings stark verändert und ist mechanischer und künstlicher geworden. Eine gründliche Wiederbesinnung auf unsere Lebenshaltung erscheint notwendig, und das japanische Wohnhaus mag uns dazu besonders gute Dienste leisten. Wir sollten uns bemühen, den Geist des japanischen Wohnhauses zu erfassen. Es ist sinnlos, nur die äußere Form des alten japanischen Hauses oberflächlich nachzuahmen."[9]

In his conclusion to „Das japanische Wohnhaus," Yoshida includes a word of advice that holds as much value today as it did when it was first written. "Das japanische Wohnhaus" could be considered one of the first times architects in the German-speaking world were introduced to vernacular architecture. Yoshida points out that the strict standardisation in traditional Japanese architecture has nothing to do with the architect deciding that it is the sensible thing to do. It is determined by the traditions of the skilful Japanese joiner, who has acquired this skill and knowledge through centuries of trial and error.[10] The pillar of traditional Japanese architecture is supported by the anonymous builder and not the genius of an independent architect.

"There is much to learn from architecture before it became an expert's art. The untutored builders in space and time – the protagonists of this show – demonstrate an admirable talent for fitting their buildings into the natural surroundings. Instead of trying to 'conquer' nature, as we do, they welcome the vagaries of climate and challenge topography. Whereas we find flat, featureless country most to our liking (any flaws in the terrain are easily erased by the application of a bulldozer), more sophisticated people are attracted by rugged country. In fact, they do not hesitate to seek out the most complicated configurations in the landscape. The most sanguine of them have been known to choose veritable eyries for their building sites – Machu Picchu, Monte Alban, the craggy bastions of the monks' republic on Mount Athos, to mention only some familiar ones."[11]

In 1964 an exhibition was held at the MOMA in New York titled "Architecture without Architects" curated by the Austrian American architect and theorist Bernard Rudofsky. Rudofsky coined the term "vernacular architecture" and the exhibition aimed to create awareness for the anonymous builder and typologies that had emerged across the globe without the influence of an architect, deeply rooted to their specific geographic location. The exhibition was very popular, and it is an indication of the growing awareness of anonymous architecture at the time.

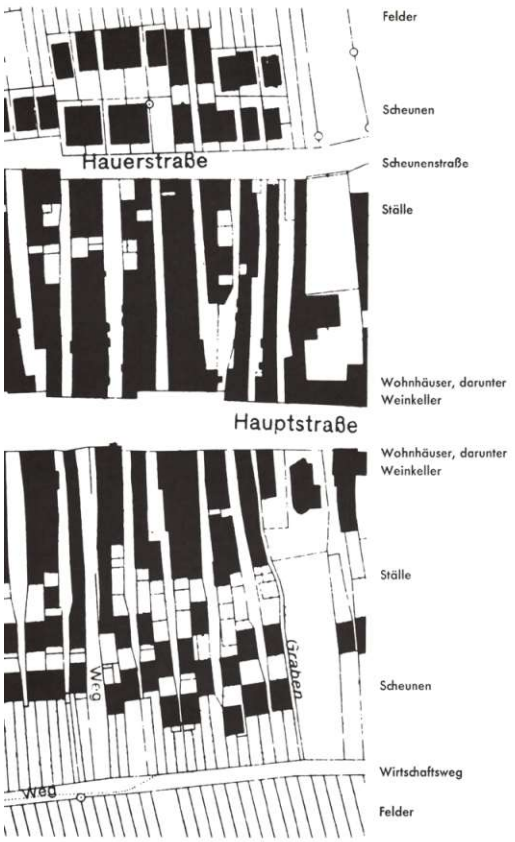


Fig. 22 - figure ground historic Austrian „Streckhof"

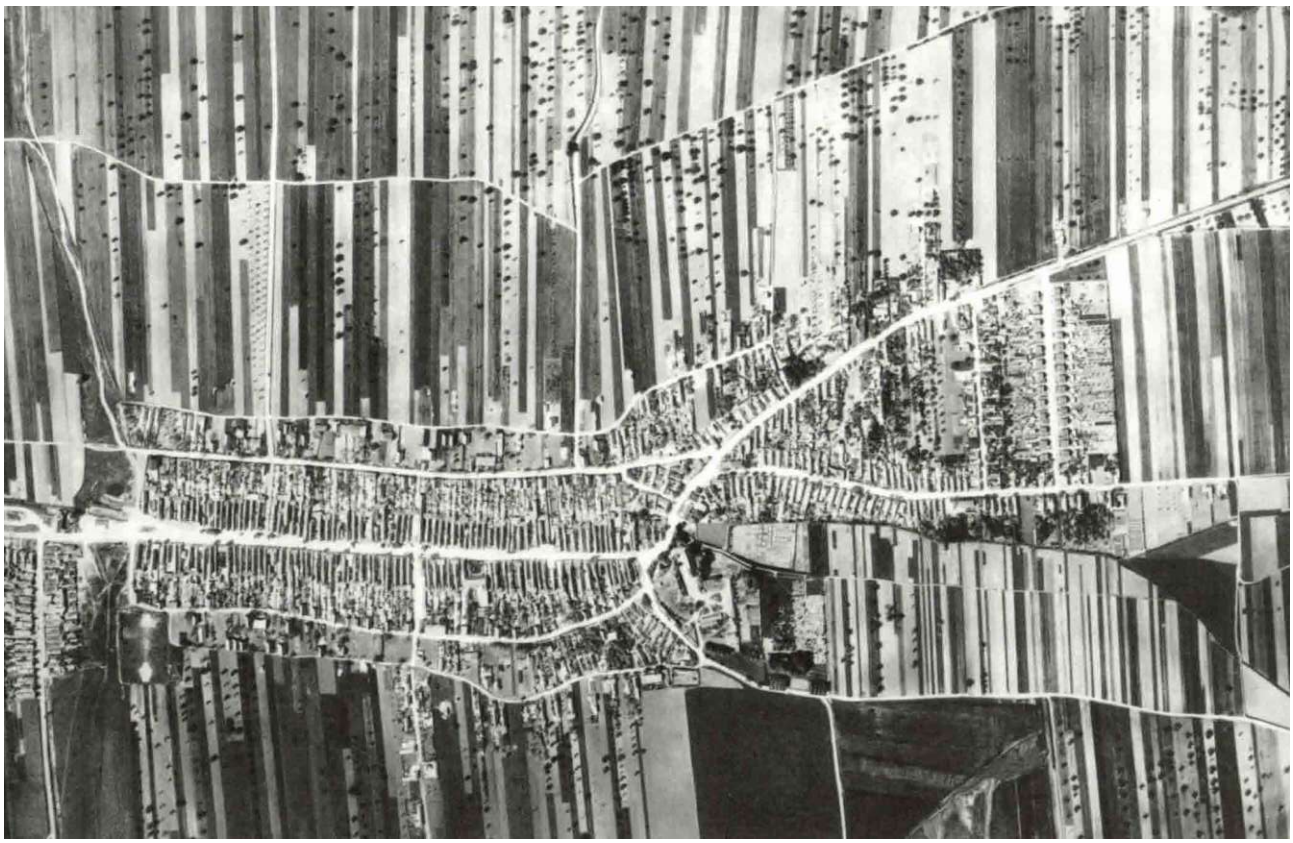


Fig. 23 - aerial photograph of Nordburgenland village

In the Austrian context, Rainer was the first to popularise anonymous architecture when he published the book "Anonymes Bauen: Nordburgenland" in 1961. This publication is a detailed analysis of the specific village typology in Nordburgenland, where the historic Austrian "Streckhof" was documented.

"Although we present biophilic design as an innovation today, ironically, it was the way buildings were designed for much of human history. Integration with the natural elements; the use of local materials, themes and patterns of nature in building artifacts; connection to culture and heritage; and more were all tools and methods used by builders, artisans, and designers to create structures still among the most functional, beautiful, and enduring in the world."[12]

In the preface to "Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life," Kellert acknowledges that before architects took over the role of designing our built environment and globalisation and technology were less dominant in our society, the automatic approach to any building endeavour was biophilic.

References

1. Josef FRANK, Architektur als Symbol: Elemente des Neuen Deutschen Bauens, Vienna (Löcker Verlag) 2005, pp. 146-147

2. Edgar KAUFMANN & Ben RAEBURN, Frank Lloyd Wright: Writings and Buildings, Cleveland (The World Publishing Company) 1960, p. 303

3. Tetsuro YOSHIDA, Japanische Architektur, Tübingen (Wasmuth) 1952, p. 19

4. Tetsuro YOSHIDA, Das japanische Wohnhaus, Tübingen (Wasmuth) 1954, pp. 9-10

5. Tetsuro YOSHIDA, Japanische Architektur, Tübingen (Wasmuth) 1952, pp. 16-19

6. https://education.nationalgeographic.org/resource/plate-tectonics-ring-fire/ *(last visited 01.02.2024)*

7. Tetsuro YOSHIDA, Das japanische Wohnhaus, Tübingen (Wasmuth) 1954, p. 19

8. Tetsuro YOSHIDA, Das japanische Wohnhaus, Tübingen (Wasmuth) 1954, pp. 102-103

9. Tetsuro YOSHIDA, Das japanische Wohnhaus, Tübingen (Wasmuth) 1954, pp. 193-194

10. Tetsuro YOSHIDA, Das japanische Wohnhaus, Tübingen (Wasmuth) 1954, p. 66

11. Bernard RUDOFSKY, Architecture Without Architects: A Short Introduction to Non-Pedigreed Architecture, Alburquerque (University of New Mexico Press) 1987, preface

12. Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life/ Ch. 1 Dimensions, Elements and Atributes of Biophilic Design, Stephen R. KELLERT, Hoboken (John Wiley & Sons, Inc.) 2008, preface

Pioneers

CH. 4

4.1

Ernst A. Plischke

26.06.1903 - 23.05.1992

Bio

Ernst Anton Plischke was born on the 26th of June 1903 in Klosterneuburg. He remained in Klosterneuburg until he completed his schooling. His father was an architect and Plischke was able to gain early experience by helping his father prepare drawings for planning applications.[1] As a teenager, Plischke engaged with the "Wandervogel" youth movement. "Wandervogel" was established as a middle-class youth association in Austria in 1911, although the movement originated earlier in Berlin. As the name suggests, one of the main customs of the "Wandervogel" movement was hiking in nature. It emerged as a reaction towards industrialism, encouraging youths to spend more time outdoors, engage in physical activities, and live a life of simple means in close connection to nature.[2] Like most youth movements of this era in the German-speaking world, "Wandervogel" was eventually appropriated into the "Hitlerjugend" movement.

"Einige Jahre nach dem Krieg wurde der Österreichische Wandervogel neu gegründet. Unter vielen Angehörigen der Vorkriegsgeneration wirkten die alten deutschnationalen Denkmuster weiter und bildeten einen Teil ihres Selbstverständnisses, was sich auch in ihren Publikationen widerspiegelte."[3]

In 2011 on the 100-year anniversary of "Wandervogel," the "Kefermarkter Erklärung" was published by the association confronting their national socialist history. The original morals were revived, outlining the contradiction to national socialist morals. This youth movement likely had a lasting impact on Plischke's environmentalist views and his affiliation towards nature.

After completing his schooling in 1919, Plischke began to spend more time in Vienna. First, he started off as a carpenter intern at the furniture manufacturer "M. Niedermoser & Sohn." A year later, he began his studies at the "Kunstgewerbeschule Wien," now the University of Applied Arts Vienna. Plischke was interested in studying at the "Kunstgewerbeschule" under Heinrich Tessenow. Unfortunately, Tessenow left Vienna shortly before Plischke could enrol, so he had to make do with Tessenow's successor Oskar Strnad. In Plischke's opinion, Tessenow left Vienna, because he was unable to assert himself amongst the big names of the "Wiener Werkstätte," such as Josef Hoffmann and Koloman Moser. Strnad was friendlier with this crowd, much to the disapproval of Plischke. Plischke valued Strnad as an artist, describing him as a competent stage designer, but in terms of architecture he felt Strnad was still restricted by classical thinking.[4] It was a frustrating start to Plischke's studies and gymnastics was a welcome distraction for him. As mentioned previously, "Wandervogel" and most other youth associations at the time Plischke was studying, began to incorporate more and more nationalist ideals into their agenda. In the summer of 1922 Plischke visited a gymnastics congress in Linz, where his cousin held a speech.

"Ich war so aufgewühlt und empört von seiner ‚Blut und Boden'-Rede, daß ich anschließend mit einem Freund fluchend den Pöstlingberg hinaufging."[5]

Plischke was upset by this speech, so he decided to leave the next day, finding a cargo ship on the Danube that brought him as far as Regensburg. In the following two months, he embarked on a formative solo hike through Germany studying the medieval architecture and sites, such as Goethe's house in Weimar. He made it to the border with Denmark before making the journey back to Austria by train. Plischke regarded this trip as a turning point in his early development following the frustration he felt at where his studies were going and how nationalism was beginning

to seep its way into all aspects of life.[6] Upon returning to the "Kunstgewerbeschule," he had his first personal contact with Josef Frank, stepping in for Strnad whilst he was working on a project in Holland. Frank would prove to be the first academic figure Plischke was able to relate to. Plischke also mentions the writings of the British architect Mackay Hugh Baillie-Scott, a leading figure in the arts and crafts movement, as a source of comfort in times that he was frustrated with Strnad.[7]

"...the simplest form of life is the worthiest and most reasonable, (...) true progress lies not in multiplying and complicating the appointments of the house, but in reducing them to the lowest effective limit."[8]

This is a quote from Baillie-Scott's seminal book "Houses and Gardens" published in 1909. Baillie-Scott was an early advocate of modernist principles and Plischke's affiliation with his writings shows he was an avid modernist from the outset.

He graduated from the "Kunstgewerbeschule" in 1923 and subsequently applied to the academy of fine arts to study under the freshly appointed successor to Otto Wagner, Peter Behrens. Plischke's experience at the academy was significantly different to his experience with Strnad. He describes it as his introduction to "real" building, as well as opening his eyes towards contemporary trends.[9] During his studies at the academy, his father's business ran into financial difficulties, so Plischke worked part-time to earn a living. He began in Heinrich Schmid and Hermann Aichinger's atelier, then he secured a part-time job at the Vienna "Stadtbauamt," working for Gottlieb Michal, a former Wagner student.[10] In 1926, Plischke completed his studies at the academy earning the "Meisterschulpreis."

After his graduation he secured a full-time job at the Vienna "Stadtbauamt," working for Karl Ehn, upon recommendation from Michal.

During his short stint with Ehn, Plischke was able to work on the renowned "Karl-Marx Hof." However, he strongly disapproved of the result and switched to Behren's Vienna atelier, upon receiving an invitation. At Behren's atelier Plischke was also dissatisfied, so when he heard that Frank's employee resigned at the beginning of 1927, he approached him for a job immediately. Frank agreed and Plischke resigned.

"Strnad-Behrens-Frank, die letzte Station ist die ihm am meisten entsprechende, denn Frank vermeidet sowohl Monumentalismus, Schwere und den kräftigen Akt der Architektur des Norddeutschen, als auch das Spielerische, Dekorationsfreudige der ‚Inszenierungen' Strnads. Frank ist der Wohltemperierte unter den damaligen Wiener Architekten, derjenige, dem das Beginnen bei den kleinen Dingen, bei der Einrichtung der Wohnung, größtes Anliegen ist. Das ist nicht mehr Josef Hoffmanns ‚Wiener Werkstätte,' gegen die sich Plischke, vielleicht auch als einziger seiner Generation, sträubte, das ist auch nicht mehr Dogma Adolf Loos; Frank bemüht sich undogmatisch zu sein."[11]

Friedrich Kurrent describes Plischke's search to find a suitable mentor succinctly in his curriculum vitae published in "Vom Menschlichen im Neuen Bauen = On the human aspect in modern architecture" in 1969. Plischke admits most of his fundamental opinions on architecture aligned with those of Frank. He believed Frank advocated evolving the fundamental principles of Austrian Biedermeier- and English domestic culture. Although sometimes, Plischke disagreed with Frank's informal approach, regarding it as disorderly.[12]

"Von allen Chefs in den Wiener Büros, in denen ich gearbeitet habe, war Frank der menschlichste. Sein Zimmer im Büro Frank & Wlach war fast leer; ein Tisch ohne Reißbrett und Schiene, ein Bücherregal, darin ein einziges Buch: ‚Der moderne Zweckbau' von Adolf

Behne. Frank erschien in sehr unregelmäßigen Abständen, einmal in ein bis zwei Wochen. Er übergab mir dann Skizzen oder auch bereits quotierte Entwürfe zur Weiterbearbeitung. Nie wurde mir eine Arbeit von ihm zurückgeschmissen."[13]

As this quote demonstrates, Plischke was complimentary of his time with Frank, and he remained with him for the next year and a half as his only employee. As an added bonus, he met his future wife Anna Lang, who was married at the time, whilst working on a wintergarden extension to her house in the 19th district of Vienna. In August 1928, Plischke took the first step to becoming an independent architect, by securing the commission to furnish the flat of the famous ceramic artist Lucie Rie.[14] The beginning of his independent career was characterised by similar domestic refurbishments.

The next stage of Plischke's career would take him to the other side of the Atlantic to the United States of America. The reason for this move was his acquaintance with the American student William Muschenheim, whom he met during his resignation period at Behrens' atelier. During his resignation period, Plischke was appointed as Muschenheim's tutor, who was studying at the academy under Behrens. They developed a close friendship, travelled together multiple times, and collaborated professionally. When Muschenheim completed his degree in early 1929, they decided to go to New York to set up a practice together. Muschenheim was born into a very wealthy German immigrant family, so they hoped to capitalise on his father's connections. Soon after their arrival, these hopes fell short and Plischke was forced to find a different means of getting by. He found employment at Ely Jacques Kahn's practice. Plischke was enthralled by the hustle and bustle of New York and the new framing construction method, that enabled all the towering skyscrapers. Further, he even managed to secure a lunch with Frank Lloyd Wright, whilst he was on a visit to New York.[15] It was to be a short-lived American dream, as the Wall Street Crash of 1929 brought it to an abrupt end. Plischke was fired and decided to make his way back home. Upon his arrival on the European continent in France, he was greeted by Anna. They decided to stop over in Paris and try their luck at meeting Le Corbusier, the next modernist icon on Plischke's bucket list. Plischke credits Anna's charm at getting them past the reception to meet Le Corbusier in person. It was a successful visit that led to several consecutive visits and each time Le Corbusier passed on his business card, allowing them to visit one of his buildings.[16]

Shortly after his arrival back in Vienna, Plischke took on his biggest commission yet, the "Arbeitsamt Liesing." The "Arbeitsamt Liesing" was an administrative office building of modest size situated in the 23rd district of Vienna. Plischke grasped the opportunity to create a design that represented his vision of modern architecture, a building that was rational, sculptural, beautifully proportioned, and transparent. One of the defining features of this building is the stairwell protruding out of the entrance façade. The surface facing the road is composed of opaque slabs, whilst the remaining façades on either side are fully transparent, revealing the staircase. The pitch of the staircase elegantly matches the diagonal drawn from the bottom corner of the windowpanes to the top corner. Further, the protruding stairwell generates a public square in front of the building's entrance, emphasizing the building's public function. It was completed in 1931, receiving more international media attention than domestic.[17] Further commissions for an "Arbeitsamt" in Amstetten and Gmünd, both completed in 1933, followed on from the success in Liesing.

The 1930s also began with several residential projects. The most notable were two terraced

Fig. 24 - Arbeitsamt Liesing, 1931 - protruding stairwell

Fig. 25 - Arbeitsamt Liesing, 1931 - public square

houses in the "Werkbund Siedlung" and the iconic "Haus Gamerith" overlooking Attersee. The "Werkbund Siedlung" is situated in the 13th district of Vienna, and it was organised by Frank, who was the president of the Austrian Werkbund at the time. Plischke was amongst the youngest participating architects, Adolf Loos for example was more than 30 years older, which demonstrates Frank's trust in his protégé. Plischke designed a two-storey terraced housing unit. The façade facing north, and the street featured thin horizontal bands of windows to ensure a level of privacy. The façade facing the garden and south featured larger areas of glazing, as well as a covered area on the ground floor sheltered by a terrace on the floor above. It was completed in 1932.

The early 1930s were particularly successful for Plischke, establishing his reputation as one of the leading modernist architects in Austria. In the latter half of the decade, Plischke's commissions began to dry up. As fascism took a hold in Austria, Clemens Holzmeister began to take a leading role in the architectural scene.

"Ich war in meinen Arbeiten nicht im Sinne Holzmeisters ‚bodenständig,' und deshalb paßte ich ihm nicht in die Richtung, die er prägte. Er erklärte mich zum ‚Kulturbolschewiken,' und damit war mein Fall erledigt."[18]

In 1935 Plischke married Anna, who was Jewish. A year earlier Frank, who was also Jewish emigrated to Sweden. As the political environment in Austria began to heat up, Plischke and Anna were forced to consider emigration. In 1939 they emigrated to New Zealand, losing their entire wealth to the "Reichsfluchtsteuer" in the process.[19]

Fig. 26 - Werkbundsiedlung, 1932 - north facing façade

Fig. 27 - Werkbundsiedlung, 1932 - south facing façade

They arrived penniless in New Zealand, settling in the capital, Wellington. Due to their financial situation, Plischke had to set about finding work as soon as possible. He found his luck at the "Department of Housing Construction." This department was set up by the recently elected Labour Party to plan and implement social housing developments. Gordon Wilson, who led the state housing programme took on Plischke, as he knew his work from a book that Plischke was unaware of himself.[20] The following years, Plischke worked on several social housing projects, the largest and most recognisable is "Dixon Street Flats." Plischke described it as the first continental residential high-rise in Wellington.[21] In 1943, Plischke switched to the town planning division due to personal differences with Wilson. He remained there up until the end of 1947, working on several urban plans, detailed studies for community centres, as well as the "Abel Tasman Monument." Unfortunately, the majority of his community planning work remained unbuilt, or it was heavily altered in the construction phase. In 1947, Wilson was promoted to the role of government architect, placing Plischke under his direct control once more. Subsequently, Plischke resigned from his role at the ministry and decided to try his luck as an independent architect once more.

His first client was Dr. Hardwick-Smith, for whom he designed a detached single-family home. It was the first of many detached single-family homes Plischke designed during his independent career in New Zealand, culminating in his design for house Sutch completed in 1953.

"Beim Entwurf des HAUSES SUTCH konnte ich meine Vorstellungen von einer Synthese aus strukturellem Bauen, Bauplastik und räumlichem Konzept weitgehend verwirklichen."[22]

Besides the many residential projects, Plischke also designed churches, community centres, industrial buildings and the first modern office tower in Wellington, known as the „Massey House." In 1960, after more than two decades of settling into their new life in Wellington, Plischke received a letter from Roland Rainer with an unofficial request to become Holzmeister's successor at the academy of fine arts in Vienna. By 1963, negotiations were over and Plischke made the decision to return to the country he was born.

"Mein Ziel war es aber nicht, lauter kleine Plischkes zu produzieren, sondern die Stärken der einzelnen Studenten zu fördern, um selbständige und entfaltungsfähige Architekten aus ihnen zu machen, die meine Baugesinnung aufrecht erhalten. Der Übergang vom Bauenden zum Lehrenden war für mich einerseits schmerzlich, anderseits erfüllten mich die Erfolge, die ich an der Entwicklung meiner Studenten ablesen konnte, mit Befriedigung."[23]

The following decade Plischke remained at the academy of fine arts, promoted to the role of vice-chancellor from 1965-1966 and retiring in 1973. Unfortunately, his return to Austria stalled his success as an independent architect. Most projects that he worked on remained unbuilt and his final major contribution to Austrian architecture was "Haus Frey" in Graz completed in 1973. Plischke died on the 23rd of May 1992 in Vienna.

Fig. 28 - House Sutch, 1956

Philosophy/ Biophilic Tendencies

„The utilitarian and the aesthetic approaches to planning are not fundamentally opposed. The difference is one of emphasis only. It can never be one of principle, because neither aspect can possibly be excluded in any good design. Where one alone is considered the result will satisfy expediency merely, or else degenerate into a stylistic elevation stuck on to some accidental structure."[24]

This is a quote from the book „Design and Living" Plischke published in New Zealand in 1947. The book was intended as a guideline on how to design a modern home. Figure () shows a diagram Plischke developed later in his career to visually represent what he means by a successful balance between the aesthetic and utilitarian approach. He names sculptural form, conception of space, functional planning, and construction as the main principles that define modern architecture. He argues that each principle must be considered in equal measure. If we sway too far into sculptural form and conception of space, the resulting outcome is abstract sculpture. If we sway too far in the other direction, the resulting outcome is lifeless and pure utilitarianism. Plischke encourages architects to find a synthesis between sculptural form and conception of space, which is derived from the building's function and construction. If you can find the correct balance and tension between these principles, then you can animate a design.[25] It is clear Plischke believes modern architecture is based on a specific approach and not a style defined by a set of rules. Plischke credits the pioneers involved in the "arts and crafts movement" as the first to break away from the shackles of past styles. At the height of style imitations during the 19th century, these pioneers were the first to criticise "the chaotic conditions and taste in the new industrial age."[26]

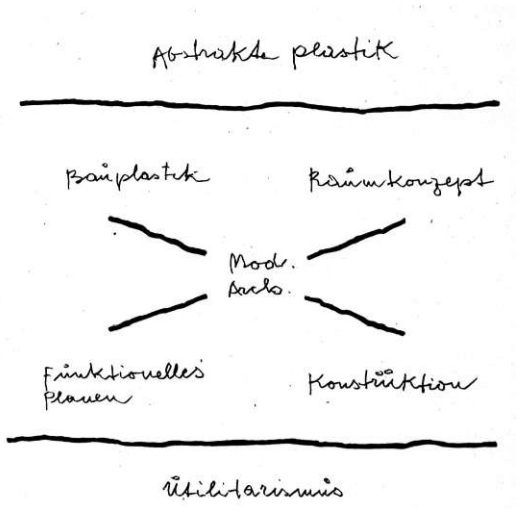


Fig. 29 - modern architecture diagram

"However, this so-called purification movement did not have creative vision forceful enough or far-seeing enough to accept the machine as a new and useful tool. The men and women of the movement were disturbed by it, and instead of trying to take an accurate measure of the machine's capacity for new design, they accepted the easier way and decided that the machine was altogether evil. This hopeless attitude in the face of a new reality delayed the growth of creative artistic activity, a growth which could have flourished within the bounds set by contemporary machine production."[27]

Plischke was critical of the "arts and crafts" approach to dealing with the machine. He believed technology was demonised and judging by his diagram on modern architecture, he believed the "arts and crafts" movement swayed too far into the aesthetic realm of design, as understanding the benefits of the machine facilitates precise functional planning and a more sophisticated construction.

"Um ein offenes Leben in unserer Zeit zu ermöglichen, müssen wir unbedingt grüne Erholungsflächen vorsehen. Es ist meiner Ansicht nach heute nicht so sehr die Frage der Höhe der Baublöcke, die uns interessieren

sollte, sondern vielmehr das Schaffen grüner Flächen für Erholung, Spiel und Sport für Jugend und Erwachsene. Deshalb war auch Grünflächenplanung ein wesentlicher Teil meiner Arbeit in Neuseeland."[28]

Plischke's biophilic tendencies are most clearly evinced in his urban plans created during his time at the town planning division in the "Department of Housing Construction." He worked on several urban plans in the Hutt Valley, a valley close to Wellington on the opposite side of the harbour. Here, he developed an urban plan for NaeNae and Trentham. Plischke's proposal for Trentham is shown in figure () and figure () shows an enlarged area of Trentham's proposed residential streets. A ring road runs along the perimeter of the town and side streets branch off this ring road providing access to the detached single-family homes, representing the preferred choice, and most widely adopted residential typology in the past, as well as present-day New Zealand. The side streets end in cul-de-sacs, or they form a loop, with both ends connecting back onto the main ring road. The proposed centre of the development would have housed shops, administrative functions, and other communal amenities. The defining aspect of the design is the central green space bordering onto the residential streets and the town centre. Plischke packaged

Fig. 30 - Trentham masterplan

all the necessary green infrastructure, such as sports fields for schools, into this central green space, thereby maximising its area.

"Any house on the cul-de-sac can be reached from any other house of the township through the park. The pedestrian will no longer have to follow the usual rigid gridiron or the ribbon street system. Pleasant walks through the park would be part of everyday life."[29]

Plischke's community planning approach aimed to reduce the number of busy streets cutting through a residential neighbourhood, to enable more pedestrian routes through nature. It was revolutionary at the time and heavily influenced by garden city principles. At the time of writing, the latest major developments in Vienna under way or recently completed showcase a similar approach. "Sonnwendviertel," "Nordbahnhofviertel," as well as the "Stadtentwicklungsgebiet Nordwestbahnhof" all feature a large central green space, with development distributed along the perimeter of the site.

"An Anna in tiefster Dankbarkeit
All meine Arbeiten und auch diese Dokumentation sind nur durch die unermüdliche Mitarbeit meiner lieben Frau zustande gekommen."[30]

Finally, it is essential to mention Anna's influence on Plischke's career. Anna was a landscape architect, and she was responsible for most garden designs in Plischke's detached single-family home commissions. In the previous quote, Plischke dedicates his "Vom Menschlichen im Neuen Bauen = On the human aspect in modern architecture" publication to her. In his dedication, Plischke accredits his success to their close cooperation.

Fig. 31 - Trentham masterplan - residential streets

Fig. 32 - Figure ground „Sonnwendviertel"

Biophilic Construction

Haus Gamerith (1933-1934)

Plischke designed "Haus Gamerith" for his old friend and painter Walter Gamerith. Gamerith and his family wanted to build a country house with an integrated studio on a hill site with an expansive vista overlooking Attersee. Gamerith's cousin produced the first proposal. It was a traditional composition and two-storeys tall. Plischke believed this proposal was unsuitable for the site and persuaded Gamerith to let him produce a modern alternative. Eventually, Gamerith and his family decided to take on Plischke's modern proposal, a proposal that had far more in common with the traditional Japanese house compared to the traditional "Sommerfrische Villa."

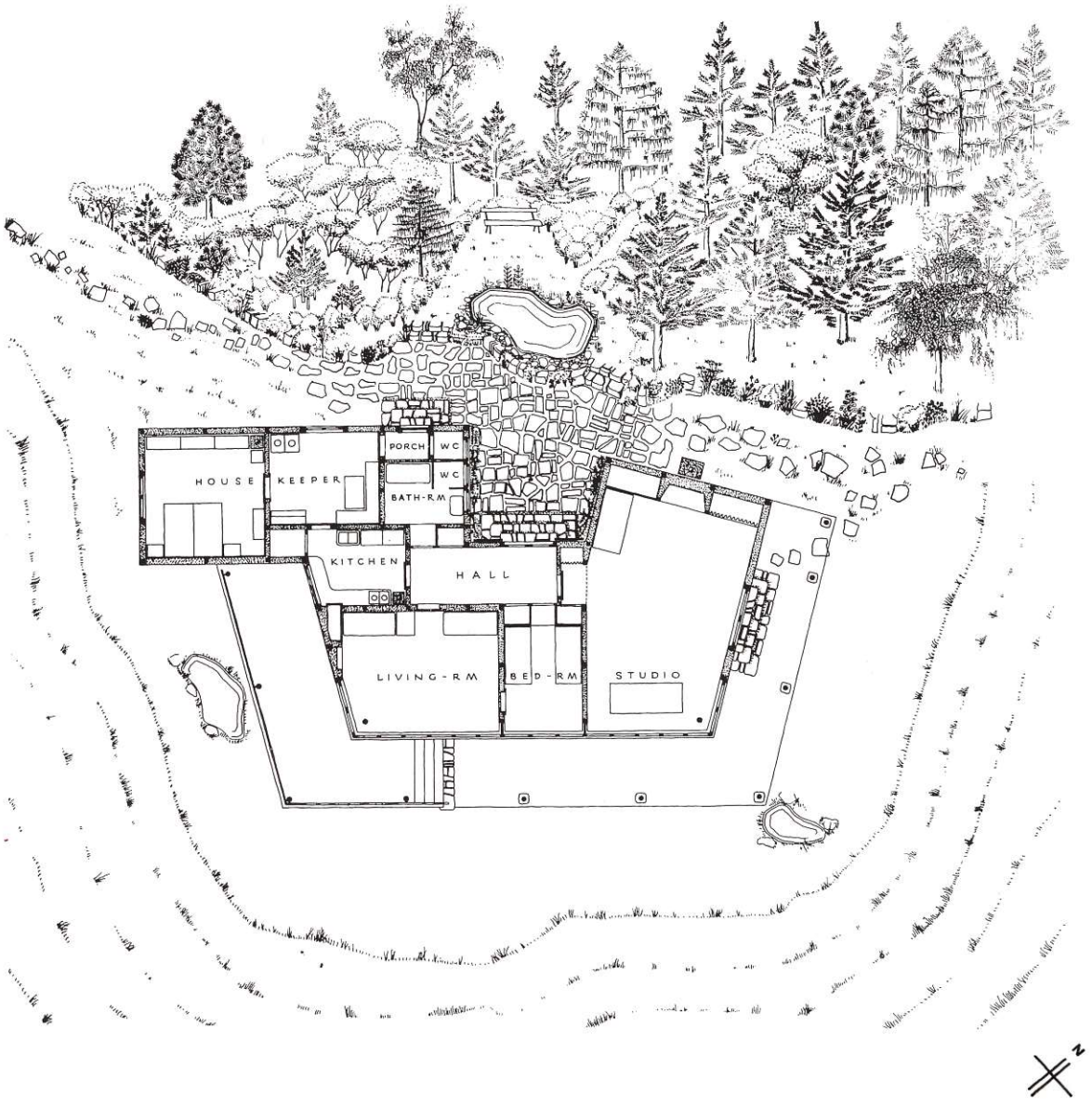


Fig. 33 - Haus Gamerith, 1934 - floorplan

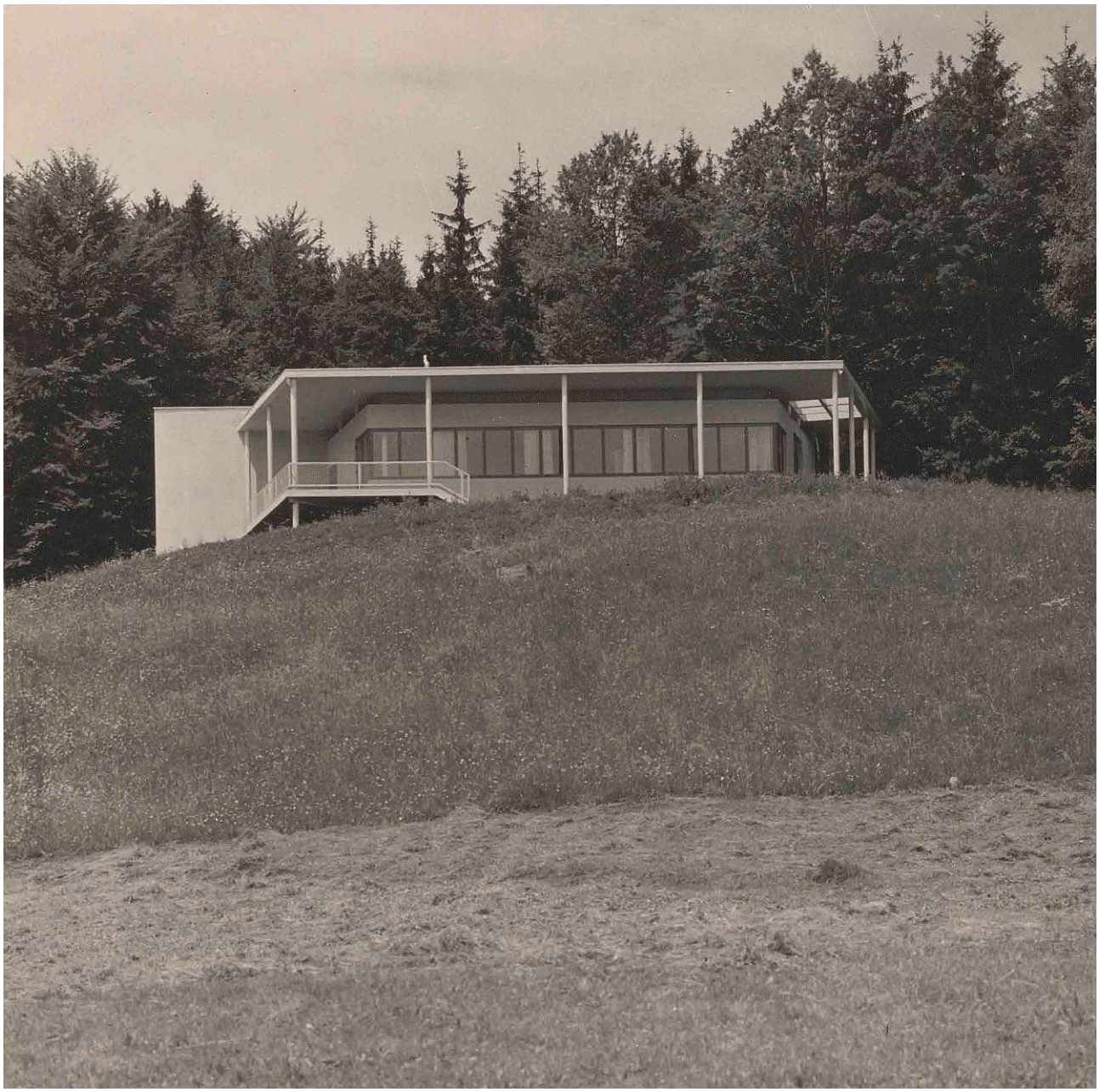


Fig. 34 - Haus Gamerith, 1934 - lake facing façade

Fig. 35 - Haus Gamerith, 1934 - view onto veranda

Fig. 36 - Haus Gamerith, 1934 - view from studio

"Haus Gamerith" is a timber frame construction with round wooden columns painted white. The floorplan responds to the topographic contour lines of the hill and the house is lifted off the ground to allow rainwater from the top of the hill to flow down beneath it. The timber columns stand on concrete footings and the floor structure is a slab of tightly packed tree trunks, providing extra insulation. Between the roof structure and the ceiling there is also a gap generating an insulating air space.[31] The roof structure extends out further than the interior space sheltering a veranda on the southwest facing façade from rain. Plischke carefully calculated the extension to block the summer midday sun from entering the interior, whilst allowing the winter and morning sun to enter the building. Consequently, the roof extension gradually increases from the northeast facing façade to the southwest facing façade. On the northeast facing façade Plischke integrated a pergola construction into the roof structure to allow more daylight to enter and illuminate the studio.

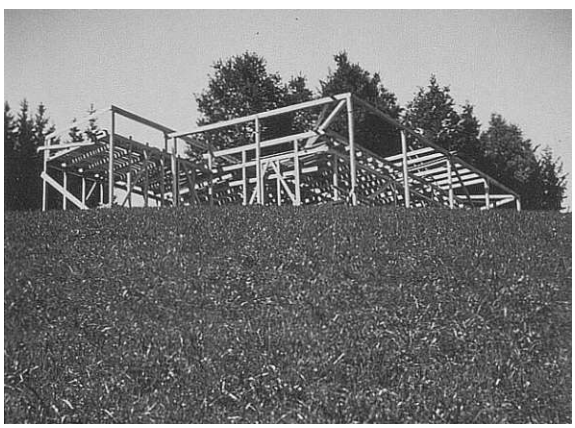


Fig. 37 - Haus Gamerith, 1934 - timber frame

A continuous horizontal band of windows stretches across the northeast, southeast and southwest facing façade capturing panoramic views of the surrounding landscape. Their placement was carefully considered, so that the framed view included an approximately equal ratio of lake, mountains, and sky.[32] The timber frame construction was a conscious decision, "so that the horizontal lines of the mountain ranges are not cut off by wide walls between single windows."[33] The southwest facing veranda also maximises these views, especially as it wraps around the southern corner of the building. Finally, "Haus Gamerith" is obviously an anomaly in the natural landscape that surrounds it. Nonetheless, Plischke designed the house so low to ensure the forest behind the house remained visible from the approach at the bottom of the hill, achieving an effective contrast between the white rationalist home and the dark natural forest behind.

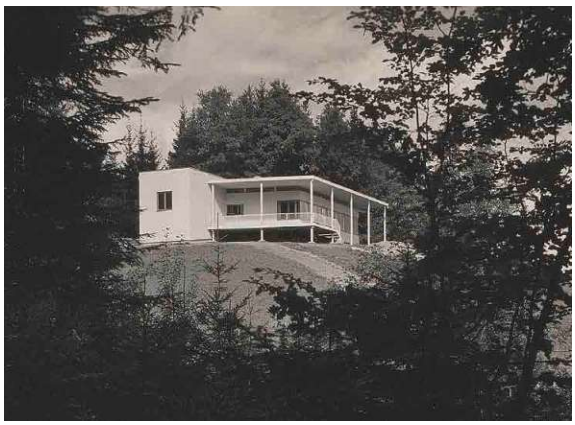


Fig. 39 - Haus Gamerith, 1934 - contrast with forest

Fig. 38 - Haus Gamerith, 1934 - view from veranda

House Henderson (1950)

A teacher approached Plischke to design a house for her family, after she read Plischke's bestseller "Design and Living." The house is located in Central Otago on New Zealand's South Island. The site sits on relatively high terrain in the town of Alexandra, and it is equally blessed with a beautiful view overlooking the Clutha River valley with the Dunstan and Hawkdun mountain ranges on the horizon.

Stone and wood are the two dominant materials in this house. Stone that was excavated to make room for the cellar was broken down into building blocks and used to construct the masonry walls.[34] It remains unconcealed on the interior, as well as the exterior merging the building with the surrounding landscape. Stone as a construction material was chosen, because of Central Otago's continental climate. The stone wall's thickness insulates the house during cold winter months and in hot summer months the stone's high thermal mass cools the building down. Slotted in between the thick stone walls is a light-weight timber frame construction. As we are now in the Southern hemisphere, all the south facing walls are composed of the masonry construction, whilst the façades facing north received the highest amount of glazing.

In the exterior environment, there is a sheltered terrace on the eastern end of the house and an open terrace facing north, receiving daylight throughout the year. For the hot summer months, there are adaptable ventilation shutters integrated into the ceiling

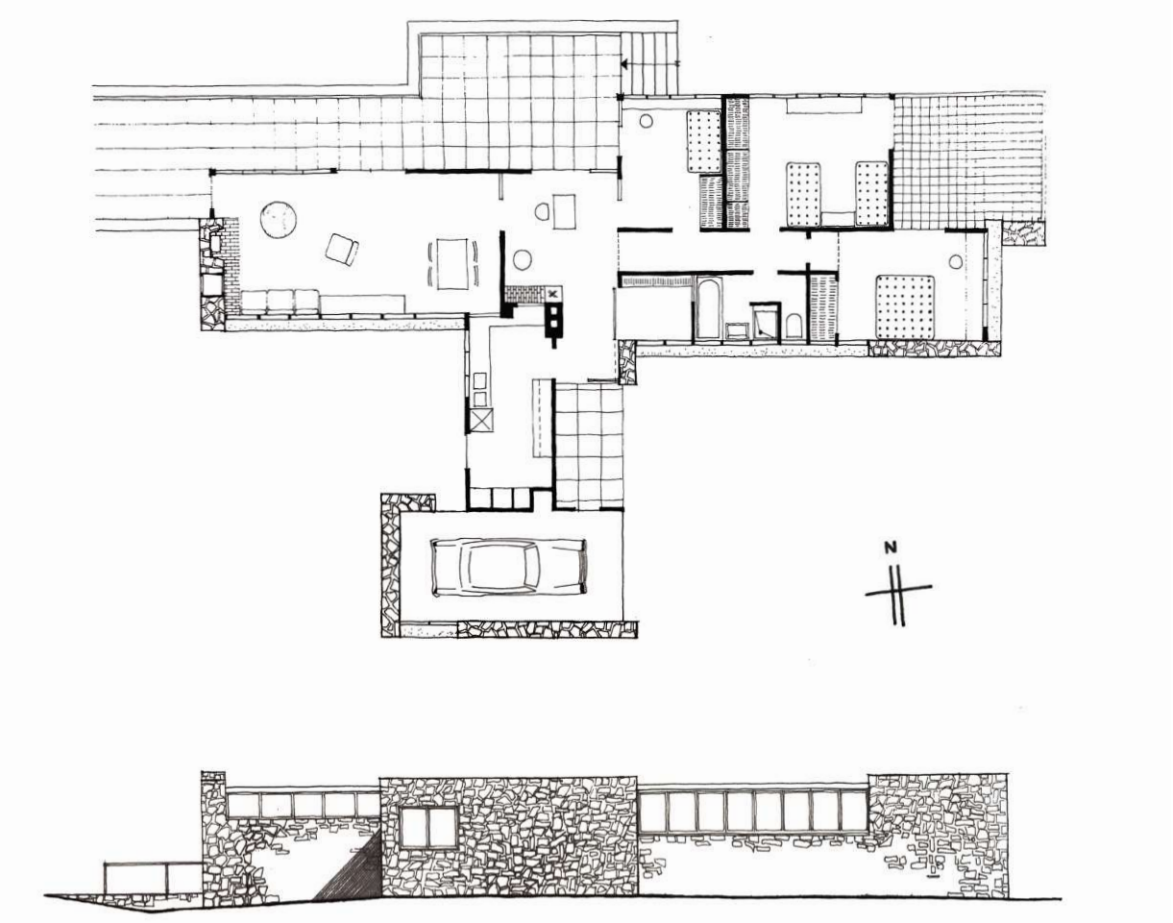


Fig. 40 - House Henderson, 1950 - floorplan & elevation

structure to facilitate more cooling airflow.[35] To capture the view directly into the valley, the corners in the living room and one of the bedrooms are fully glazed.

In essence the "House Henderson" represents the perfect prospect and refuge situation.

The prospect is the valley and the house with its heavy masonry walls is the refuge. The masonry walls provide a solid continuous boundary towards the south. Towards the north, most of the façade is transparent allowing residents to comfortably immerse themselves in the prospect of the valley.

Fig. 41 - House Henderson, 1950 - construction phase

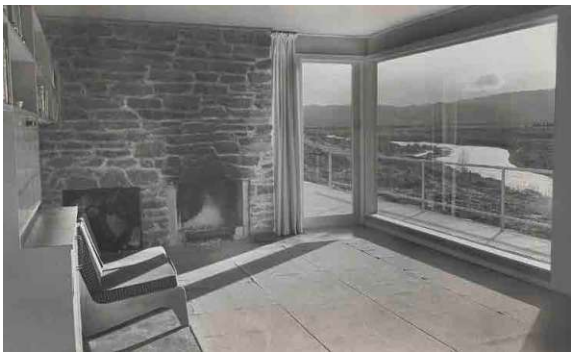


Fig. 42 - House Henderson, 1950 - living room view

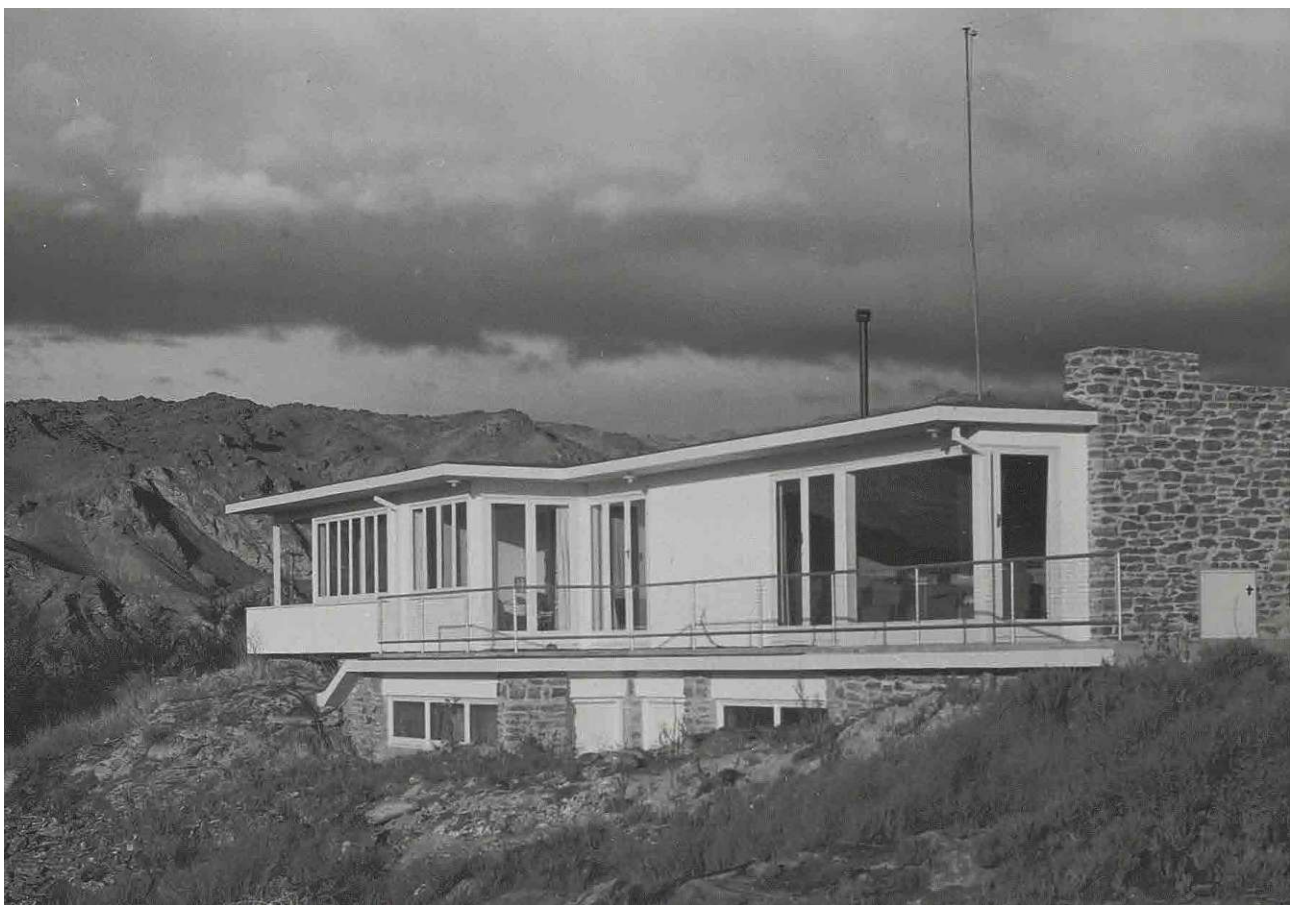


Fig. 43 - House Henderson, 1950 - north facing façade

Haus Frey

Lenz, Graz

1970-1973

Fig. 44 - view from garden

Client/ Brief/ Location

Dr Frey and his wife commissioned Plischke to design a detached single-family home on a site in Graz in 1970. Prior to Plischke's involvement, Dr. Frey's brother, who was an architect, began working on an initial proposal. This initial attempt was unsuccessful, as Dr. Frey's brother was considered too controlling. Plischke first caught the Frey couple's attention when they attended one of his lectures. They were so impressed by his lecture; they knew he would the ideal architect to work with. Plischke was considered more approachable, which helped him to secure the commission.[36]

The brief called for a large home to accommodate Dr. Frey, his wife and their three children at the time. During the design process, the Plischke couple would meet the Frey couple for a "Jause." Anna would prepare the "Jause" and then they had informal discussions, during which Ernst would sketch out ideas. Dr. Frey regarded their cooperation with the Plischke's as very pleasant, remarking that Ernst and Anna were equally engaged throughout the design process.[37]

"Haus Frey" is situated on a generous site (approx. 2500 m²) in the 4th district of Graz, called Lenz. Lenz is an inner-city district to the West of Graz's historic centre, separated from it by the river Mur. The site borders the Bunsengasse to the north and the Mühlriegel to the East. It belonged to Dr. Heinrich Frey's employer, and it was offered to him when he relocated to Graz from Vienna.[38]

"Durch solche Umstände entstand zu Beginn der siebziger Jahre in Graz ein Haus, das die beste Tradition der Wiener dreißiger Jahre fortsetzt und, in einem gewissen Sinne, die Bautradition eines Adolf Loos oder Josef Frank zu einem Höhepunkt und Abschluß bringt. Plischke, der in den dreißiger Jahren als einziger gegen die Resignation und Skepsis der älteren Generation in Wien mit Erfolg einen optimistischen, radikalen ‚Internationalen Stil' vertrat und dem in den Jahren der Emigration in Neuseeland eine Synthese mit der angelsächsischen Wohnkultur gelang, stellt hier ein Haus zur Diskussion, das in seiner Konzeption geradezu mit einer entwaffnenden Selbstverständlichkeit und Klarheit Qualitäten realisiert, von denen sonst nur in klugen Abhandlungen oder tendenziösen Forderungen die Rede ist."[39]

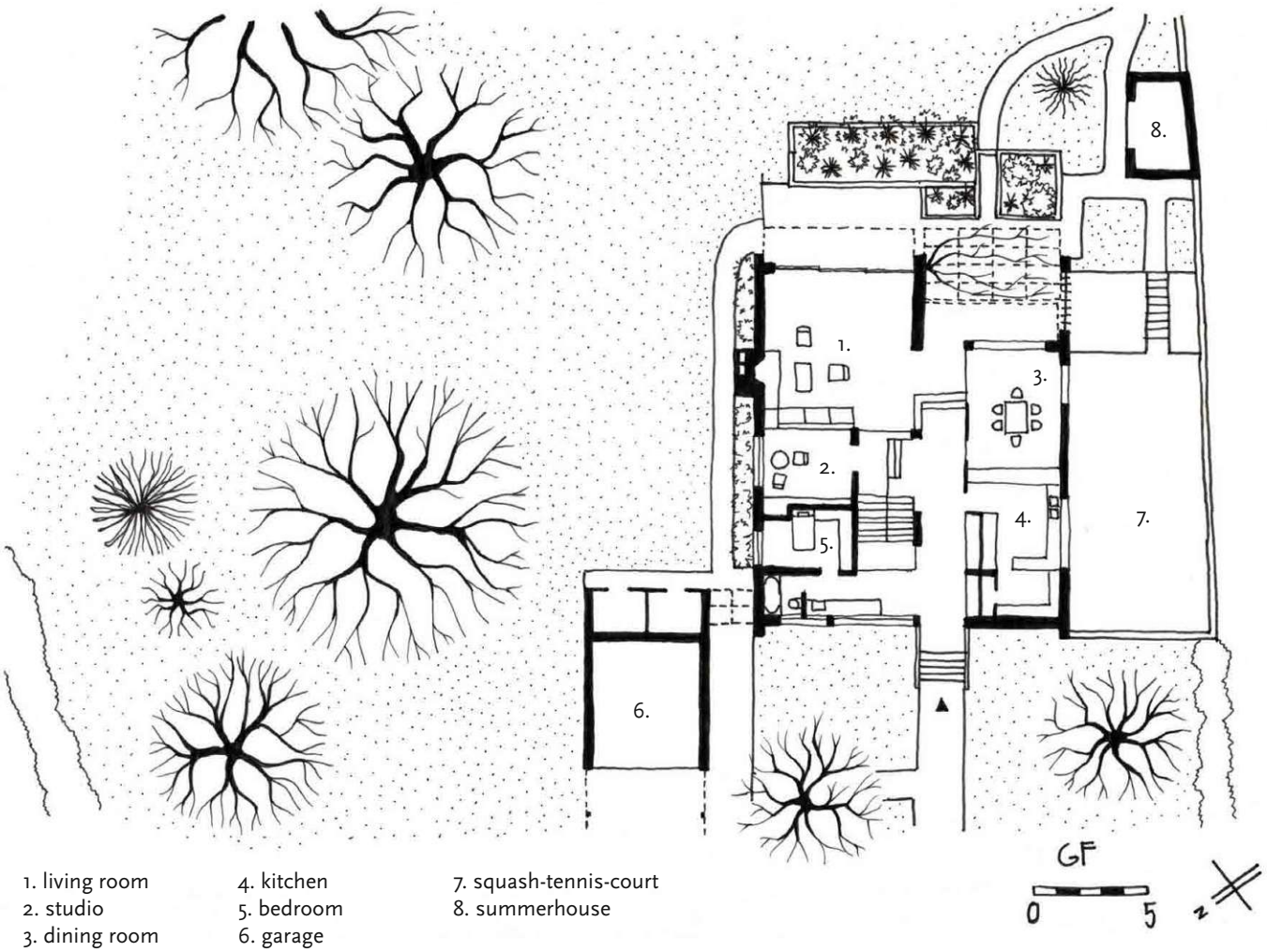
This a quote from the architecture critic Friedrich Achleitner, from a feature he wrote on "Haus Frey" published in "bauforum" in 1974. Achleitner describes "Haus Frey" as the pinnacle of Austrian modernist architecture, as a house defined by the fundamental principles of modernism, discovered at the beginning of the century but developed further into a refined conclusion. The house represents Austrian modernism at its full maturity.

Building Description

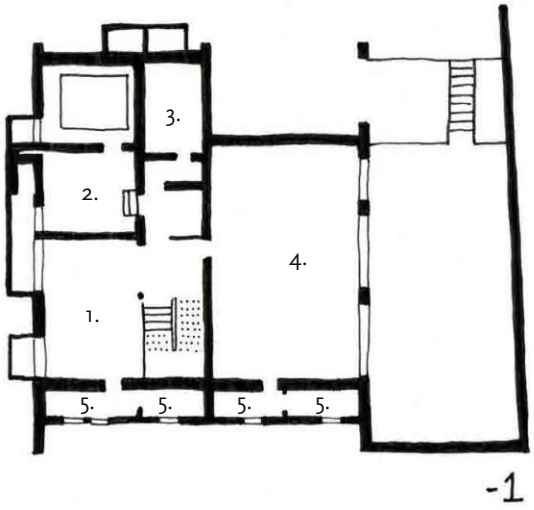
"Haus Frey" is a detached single-family home with three floors comprising a total floor area of approximately 430 m². The site's original terrain was fairly flat, so only minor earthworks were necessary to level out parts of the garden. The north facing façade houses the main entrance, which is accessed via Bunsengasse. The garage is a separate building positioned next to the northeastern corner of the house, also accessed via Bunsengasse. By the west facing façade there is a sunken pit that was used as a squash-tennis-court. A terrace adjoining the south facing façade is 30 cm higher than the southern part of the garden and a part of it is sheltered by a pergola. From this terrace two steps lead down into the garden flanked on either side by raised beds. From these steps a pathway leads down towards the southern end of the garden. A fork in the path provides access to the summerhouse, a later addition completed in 1976, and the squash-tennis-court. The eastern part of the garden is free from construction and populated with trees.

The cellar is accessed via the central staircase. Branching off from the central staircase to the east was the music room and to the west a games room. Otherwise, the cellar houses a bomb shelter, storage space and the heating infrastructure, including a boiler room and a separate room for the oil tank. The ground floor features three different levels. Steps in the front garden lead up to the front door, which stands approximately 80 cm higher than the garden pathway. This level has access to a kitchen and dining room on the western end of the house, and a bathroom and bedroom on the eastern end. Two steps lead down to the living room on the southeastern corner of the floorplan. The living room is level with the garden terrace, facilitating direct access into the garden. Two steps from the entrance level lead up to a studio, as well as providing access to the central staircase. The first floor contains five bedrooms, two bathrooms, a toilet, and a walk-in closet. The main bedroom lies on the southeastern corner of the floorplan. It has access to the walk-in closet, an ensuite bathroom and the terrace covering part of the living room below. A further bedroom also has access to this terrace.

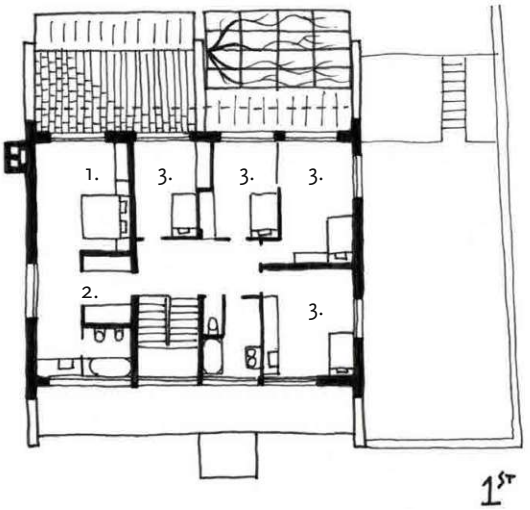
Fig. 45 - „Haus Frey“ floorplans



1. living room
2. studio
3. dining room
4. kitchen
5. bedroom
6. garage
7. squash-tennis-court
8. summerhouse



1. music room
2. boiler room
3. bomb shelter
4. games room
5. storage room



1. main bedroom
2. walk-in closet
3. bedroom

Biophilic Criteria Evaluation

Environmental Features

Reinforced concrete was used for the foundations, cellar walls and all the floor slabs. The structural walls above ground are a brickwork construction that was whitewashed on the exterior. The dominant materials used in "Haus Frey's" structural elements are artificial materials and it is rather different from the timber frame construction method Plischke employed on many of his other projects, such as he did in "Haus Gamerith" and "House Henderson." Nonetheless, Plischke used 50 mm thick "Heraklith" boards for roof insulation, as well as insulation on the inside of all the exterior walls. "Heraklith" is a cement-bonded wood wool panel made from wood shavings to which water and a mix of cement and lime is added.[40] It is predominantly used for thermal and sound insulation. Although these panels go through a chemical process to reach their ultimate form, proportionately the main material in its composition is wood wool, which is a natural building material. A further natural building material used for insulation were 30- and 50-mm thick cork panels. Otherwise,

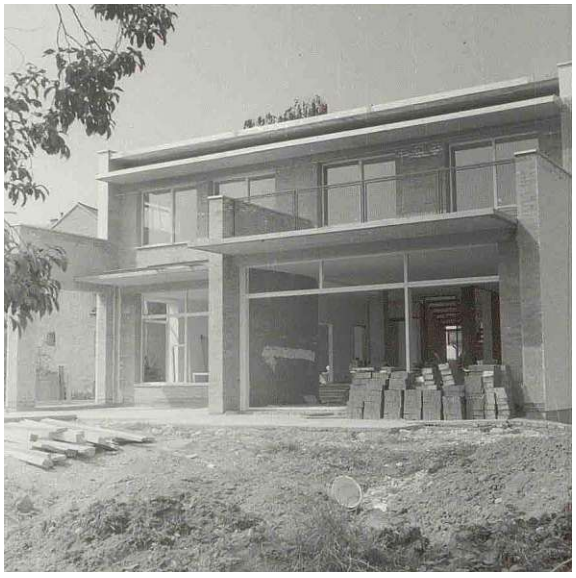
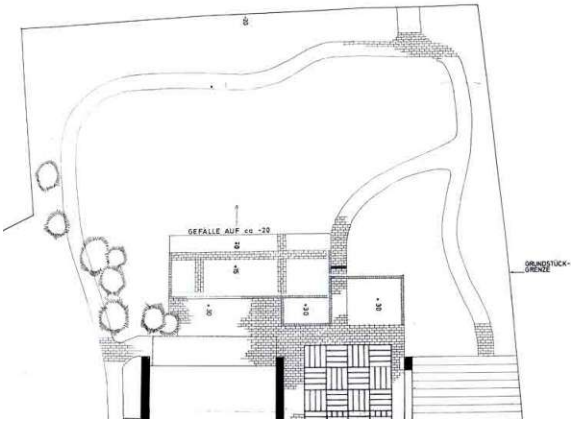


Fig. 46 - construction phase

Fig. 47 - proposed pathway system, Anna Plischke



Plischke used natural building materials for the floor surface on the 1st floor and ground floor. He used stone slabs on the ground floor and oak panels for the 1st floor. Further, most of the built-in furniture and steps, as well as the handrail of the central staircase were also constructed using oak.

The house benefits from the large garden that surrounds it, consequently immersing the building in a biodiverse setting. To the East of the building the landscaping design is minimal, resembling a parklike landscape dotted with trees. The southern part of the garden received more attention. The raised beds bordering onto the garden terrace respond to the interior floorplan, maximising their visibility from the living room and the dining room. A kiwi tree was planted within the sheltered part of the terrace, encouraged to grow up into the pergola construction above. This kiwi tree continues to flourish to this day, fully engulfing the pergola construction. Additionally, plant growth was also encouraged on the east facing façade. In Anna's original garden design there was an intricate pathway system, including a loop leading down to the southern border of the garden and back up to the garden terrace. This loop was never completed, and the pathway now leads to an exit on the site's southern border. On the interior, Anna also designed a "Blumenfenster" for the dining room.[41]

Fig. 48 - east facing façade

Fig. 49 - raised beds bordering garden terrace

Unfortunately, the garden design fails to include the element of water. The sealed area of the site includes the house's floorplan, the sunken squash-tennis-court, the garden terrace and all the garden pathways. Originally rainwater runoff from the roof was collected in the middle of the roof, then directed into a pipe that led down through the centre of the house until it was redirected through the foundations into the canal system. Ultimately, this proved to be a design flaw, as heavy rainfall, which is becoming more frequent with climate change, consistently led to flooding in the cellar. Consequently, stormwater runoff from the roof is now directed along the exterior façade into Graz's canal system.[42] This could have been an opportunity to deal with stormwater runoff, whilst adding the element of water into the garden. By directing heavy rainfall into a retention pond situated in the eastern part of the garden, where there is ample space to do so, the "Haus Frey" could have benefited from a wetland environment, whilst easing the strain on Graz's canal network.

As Achleitner pointed out in his previous quote, "Haus Frey" represents a direct continuation of Austrian modernism from the 1930s era. He mentions Josef Frank as one of this era's key proponents and if we take a closer look at the building orientation of "Haus Frey" and Frank's "Villa Beer," completed in 1930, there are many similarities. In both cases, the façade facing north away from the sun faces the street. Frank and Plischke both chose to create a non-representative façade with more opaque than transparent surfaces. On the opposite end facing the garden and the sun, both facades dissolve into large areas of glazing,

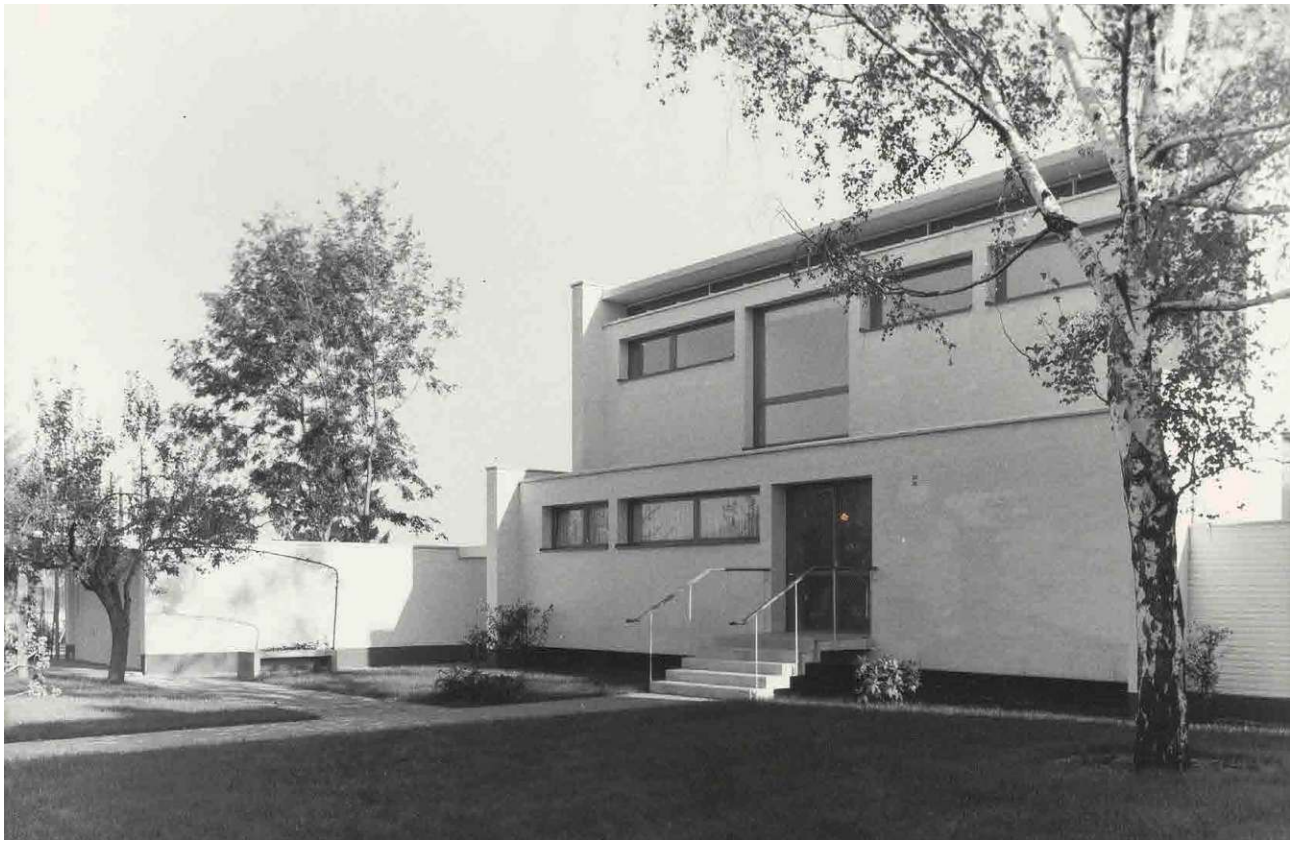


Fig. 50 - north facing façade

especially on the ground floor, strengthening the relationship between the interior and the garden. Otherwise, Plischke designed the ground floor plan to respond to the sun's trajectory. A large window on the east facing façade allows the studio to bask in the morning sun. The living room facing south enjoys the midday sun and finally the dining room receives sunlight in the evening. Consequently, each room receives direct daylight when it is most likely to be used. Access to daylight has been considered in every corner of the house. Even most of the rooms in the cellar benefit from ample daylight thanks to clerestory windows. The games room on the western end receives most daylight, as it borders the sunken squash-tennis-court on the exterior. The staircase is another effective feature that distributes light to the darker areas of the house. The gaps between the steps and the balustrade composed of a semi-transparent wire-mesh allow daylight to permeate into the cellar and towards the entrance.

Plischke employed passive solar design on the south facing façade to provide protection from the sun. A horizontal fixed shading element spans the entire width of the house on the first floor. A similar horizontal fixed shading element spans the entire width of the living room. As always, Plischke calculated the depth of the shading elements to stop the midday summer sun from entering the interior, evident in the fact the depth of the living room shading element is larger due to the room height difference. The pergola construction along with the kiwi tree provide all the shading required for the dining room.

„In making the plan for a house it will be necessary to banish from one's mind the

Fig. 51 - south facing façade

Fig. 52 - view from staircase

conception of its interior as a mere group of isolated compartments, and to think of it rather as a central room surrounded by subordinated ones, some of which in many cases form either recesses in the central apartment or communicate with it either by folding or sliding doors. In a house of average size it has been suggested that this central room may often be two storeys in height, thus giving a large central air space counteracting any feeling of confinement which might be experienced in a house where all the rooms should be a low as possible."[43]

In Plischke's autobiography he mentions Baillie-Scott as an influential figure during his time at the "Kunstgewerbeschule." The previous quote is an excerpt from Baillie-Scott's "Houses and Gardens" publication. Baillie-Scott believed the most important room in a house should be "the hall." The primitive home consisted of one room, where residents would cook, eat, sleep, and socialise. Baillie-Scott refers to this single room constituting the primitive home as "the hall." As civilisation advanced, further rooms were added to "the hall," depriving it of its many functions, reducing its area and volume and degrading it to the sole function of circulation. Baillie-Scott speculates that humans still have an instinctual desire for a "hall" to be included within the home. He encourages architects to prioritise "the hall," by reducing the size of subordinate rooms, such as the dining room or a studio. However, by arranging the subordinate rooms around "the hall" and using flexible partitions, "the hall" can be further enlarged, whilst the subordinate rooms can benefit from "the hall's" grandeur.[44] Plischke created a similar situation in "Haus Frey," where the living room represents "the hall." The level of the living room is the lowest

on the ground floor, thus creating a generous volume with the highest room height. Adjoining the living room is the dining room and the study, as well as the entrance hallway. The partitions separating these individual rooms are all sliding doors. Therefore, Plischke enables residents to seal off the living room or enlarge this space by connecting it with the studio and/ or the dining room. The play of levels is most certainly inspired by Adolf Loos' "Raumplan" theory and as the subordinate spaces lie on different levels, the living room in its expanded adaptation benefits from a varied landscape. This treatment of the living room partitions, as well as the play of levels facilitates the distribution of daylight throughout the ground floor, creating varied lighting situations in the process. Further, the reflective surface of the stone floor slabs increases the illumination of these rooms.

Exterior

Plischke was interested in constructing the south facing façade as transparent as possible for two reasons. Firstly, to maximise daylight entering the interior, and secondly to break down the boundary separating the interior from the garden. The glazing in the living room is particularly successful at strengthening the relationship between the interior and exterior. It is divided twice vertically and once horizontally. Two of the bottom window segments can slide across horizontally, allowing more than half of the glazed area separating the interior from the exterior to disappear entirely. If the living room is transformed into its enlarged adaptation, a view out into the garden unobstructed by glazing is even captured from the central staircase at the northern end of the house. The pergola adjoining the dining room and

Fig. 53 - view from living room

Fig. 54 - view through living room to staircase

the hallway creates a transitional space along the boundary, separating the house from the garden. The nature of the construction creates a semi-permeable barrier. A steel-frame structure provides shelter from above, whilst to the west Plischke dissolved the wall into vertically oriented wooden slats. As mentioned previously, a kiwi tree was planted beneath the pergola, allowing nature to intertwine with the construction. Consequently, the borders of this transitional space are composed of both natural and built elements, blurring the boundary separating architecture from nature. The structured landscaping bordering the southern facing façade also gradually reduces as we approach the southern end of the garden. On the ground plane, it transitions from the brick flooring to the raised beds that protrude into the garden at different depths and heights, and finally onto the grass lawn.

Almost every room in "Haus Frey" benefits from large areas of glazing, capturing views of the garden and maximising daylight in the interior. As the different elevations demonstrate, there is no rigid system determining the placement of windows. It is obvious their placement was based on the interior layout and which view was best to frame. In the studio for example, a large window covering most of the wall space on the eastern facing façade captures the view of the trees in the eastern end of the garden. This window is non-operable, possibly to reduce any mullions disturbing this view. However, this aspect has been criticised by a current resident, as it can lead to discomfort in summer months.[45] The only way to ventilate the study is through the sliding doors leading out onto the terrace from the living room. The freedom to adapt to climatic conditions

Fig. 55 - view into sheltered part of garden terrace

has been traded off for the comforting unobstructed view of trees.

The transitional space beneath the pergola construction provides shelter from the wind and sun. The 1st floor terrace provides access to the exterior environment above ground level, with both adjoining bedrooms receiving floor to ceiling windows. When “Haus Frey” was completed in 1973, an outdoor space sheltering residents from rain was lacking. Perhaps the summer house was added later in 1976 to cater to this need.

Symbolic Design

Plischke's attention to detail was always immaculate. A good example in "Haus Frey" is the treatment of the staircase handrail. Instead of using a standard tubular or rectangular form, Plischke specified an unusual shape, that is ergonomically suited to its function. The section is curvilinear, providing a convex surface for your palm to rest and a concave surface for your fingers to grip. The choice of wood as a material enhances the haptic quality of this surface. It shows Plischke considered the sensory stimulation residents receive from such a small detail. Although small, it is an important one, due to how frequently it will be used.

The ground floor of "Haus Frey" is filled with enticing moments. Although there is a direct route through to the garden, the changing levels entice the resident to go and discover other parts of the house. Due to the transparency of most design elements, you can catch glimpses of bordering rooms, but their interlocking nature still conceals most parts enticing the resident to go and explore. As each room receives so much daylight, branching out from the central staircase in every direction is a bright space that beckons, the brightest being the living room. In a sense, the ground floor feels like a 3-dimensional labyrinth, there is no defined circulation route, no monotonous hallway with rooms concealed behind shut doors, there is light, rooms can be accessed from the hallway space or through other rooms, and the resident has the freedom of choice as to how he or she wishes to interact with the house. They can slide away a door here and open another there, the options are limitless.

Fig. 56 - staircase handrail detail, Ernst A. Plischke

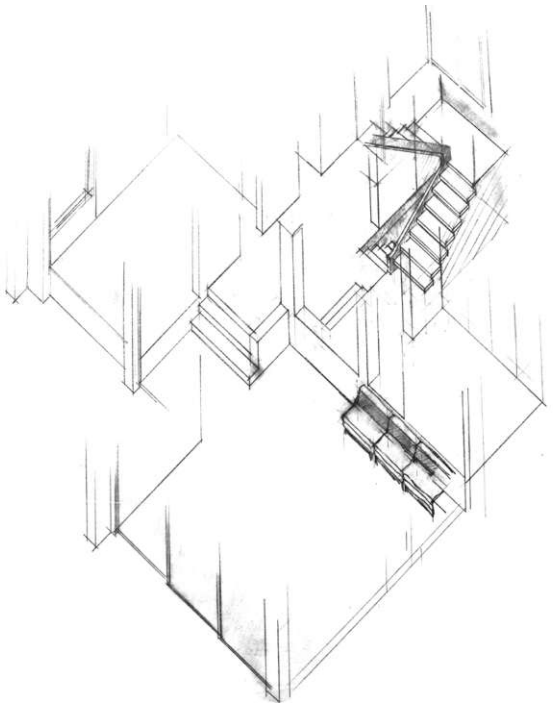


Fig. 57 - axonometric ground floor, Ernst A. Plischke

Post-Occupancy Evaluation

Dr. Frey and his wife moved into the house with their three children as early as 1971. They remained there for the next 30 years, welcoming two more children into their home. Once the children had grown up, the size of the house and its extensive garden was no longer practical for the Frey couple, so they decided to relocate back to Vienna.[46] For a short period of time the house was used as a gallery and since 2013 the charitable organisation "Die Schwalbe" uses the house to provide supported accommodation for women, who have recently been discharged from a psychiatric clinic. The goal is to provide a safe space for residents to recover and regain independence.[47]

The current supported accommodation function of "Haus Frey" is particularly relevant to this thesis, as studies on the restorative effects of nature, described in a previous chapter, show how biophilic design is particularly effective in a healthcare environment. Mrs. Vanek-Enyinnaya founded „Die Schwalbe" after her own experience in a psychiatric clinic, where she became aware of how unnerving the discharge date for female patients is, as many of them have nowhere safe to go. This fear amongst patients encouraged her to found "Die Schwalbe."[48] During the search to find a suitable building there were three main criterions: The building had to be large enough to accommodate as many residents as possible, it had to be close to the city centre, so that residents could easily access care in other clinics and finally a building with a large garden was the top priority.[49]

Fig. 58 - Wohnhaus „Die Schwalbe"

For over a decade "Haus Frey" has fulfilled its role as supported accommodation for over 100 former residents.[50] The garden is now used for cultivation and harvest from the kiwi tree under the pergola construction is converted into jam. Mrs. Vanek-Enyinnaya describes the access to daylight, along with the close visual connection to the garden as the most comforting aspect of the building. She also compliments the "magnetic attraction" of the living room as a helpful feature that encourages residents to socialise and engage with each other. Unfortunately, the view from the living room into the garden has been weakened, because of the construction of a new housing development on the site bordering "Haus Frey" to the south. Before this housing development, this site was home to a villa with an extensive garden full of trees. Now the view looks out onto the interior courtyard of the new housing development. Finally, the only aspect of "Haus Frey" that Mrs. Vanek-Enyinnaya would change is the oil heating system, so that the house no longer relies on fossil fuel.[51]

References

1. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 23

2. http://wandervogel.at/lib/exe/fetch.php?media=djwv:kefermarkter_erklaerung.pdf *(last visited 01.02.2024)*

3. http://wandervogel.at/lib/exe/fetch.php?media=djwv:kefermarkter_erklaerung.pdf *(last visited 01.02.2024)*

4. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, pp. 33-34

5. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 41

6. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, pp. 41-43

7. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 45

8. Mackay H. BAILLIE-SCOTT, Houses and Gardens, London (George Newnes Ltd.) 1906, p. 8

9. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 55

10. https://www.architektenlexikon.at/de/468.htm *(last visited 01.02.2024)*

11. Ernst A. PLISCHKE, Vom Menschlichen im Neuen Bauen = On the human aspect in modern architecture, Vienna (Wedl) 1969, pp. 18-19

12. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, pp. 85-86

13. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 91

14. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 103

15. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 114

16. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 121

17. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 199

18. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 181

19. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 229

20. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 233

21. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 249

22. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 377

23. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 423

24. Ernst A. PLISCHKE, Design and Living, Wellington (Department of Internal Affairs) 1947, p. 2

25. Ernst A. PLISCHKE, Vom Menschlichen im Neuen Bauen = On the human aspect in modern architecture, Vienna (Wedl) 1969, p. 13

26. Ernst A. PLISCHKE, Design and Living, Wellington (Department of Internal Affairs) 1947, p. 24

27. Ernst A. PLISCHKE, Design and Living, Wellington (Department of Internal Affairs) 1947, p. 24

28. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 451

29. Ernst A. PLISCHKE, Design and Living, Wellington (Department of Internal Affairs) 1947, p. 82

30. Ernst A. PLISCHKE, Vom Menschlichen im Neuen Bauen = On the human aspect in modern architecture, Vienna (Wedl) 1969, p. 7

31. Ernst A. PLISCHKE, Vom Menschlichen im Neuen Bauen = On the human aspect in modern architecture, Vienna (Wedl) 1969, p. 91

32. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 185

33. Ernst A. PLISCHKE, Design and Living, Wellington (Department of Internal Affairs) 1947, p. 42

34. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 351

35. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 351

36. Dialogue with Dr. Frey 21.11.2023

37. Dialogue with Dr. Frey 21.11.2023

38. Christina RAUTER, Haus Frey: Nutzungsstrategien für ein Einfamilienhaus der Nachkriegsmoderne, Diploma Thesis (TU Wien) 2019, p. 89

39. Friedrich ACHLEITNER, Das Haus als Lebens- und Erlebnisraum, bauforum, 7. Jg., (May - June) 1974, p. 37

40. https://www.knaufinsulation.co.uk/wood-wool-insulation *(last visited 01.02.2024)*

41. Christina RAUTER, Haus Frey: Nutzungsstrategien für ein Einfamilienhaus der Nachkriegsmoderne, Diploma Thesis (TU Wien) 2019, p. 115

42. Dialogue with Mrs. Vanek-Enyinnaya 06.11.2023

43. Mackay H. BAILLIE-SCOTT, Houses and Gardens, London (George Newnes Ltd.) 1906, p. 14

44. Mackay H. BAILLIE SCOTT, Houses and Gardens, London (George Newnes Ltd.) 1906, pp. 17-19

45. Dialogue with Mrs. Vanek-Enyinnaya 06.11.2023

46. Christina RAUTER, Haus Frey: Nutzungsstrategien für ein Einfamilienhaus der Nachkriegsmoderne, Diploma Thesis (TU Wien) 2019, p. 90

47. https://www.dieschwalbe.at/ *(last visited 01.02.2024)*

48. https://www.dieschwalbe.at/eine-krise-als-chance-meine-gruendungsgeschichte-der-schwalbe/ *(last visited 01.02.2024)*

49. Dialogue with Mrs. Vanek-Enyinnaya 06.11.2023

50. https://www.dieschwalbe.at/ *(last visited 01.02.2024)*

51. Dialogue with Mrs. Vanek-Enyinnaya 06.11.2023

4.2

Eugen Wörle

03.01.1909 - 14.12.1996

Bio

Eugen Wörle was born on the 3rd of January 1909 in Bregenz. After completing his schooling in Vorarlberg, he moved to Tirol to study at the "Kunstgewerbeschule" in Innsbruck. In 1927, he moved to Vienna to attend Clemens Holzmeister's "Meisterschule" at the "Akademie der bildenden Künste." He completed his studies in 1930, gaining two awards in the process, the "Hansen-Preis" and "Meisterschulpreis." Following his studies, he gained professional experience with Ernst Lichtblau and his former professor Clemens Holzmeister, as well as starting to take on independent commissions with Max Fellerer and his older brother Paul Wörle. Some of his independent commissions were published in "Moderne Bauformen," such as an interior design for a three-room flat in Vienna. This design was a collaboration with his brother, published in 1936. The design was praised for its minimalist approach that was both functional and beautiful.[1] Unfortunately, the cooperation with his brother was to be short-lived as he passed away in 1942, presumably during fighting in WWII. His partnership with Max Fellerer was to become more permanent. Fellerer was 20 years older than Wörle and they met at Holzmeister's atelier, where he was a senior architect. The first major project they collaborated on was the conversion and extension of a former lumberjack lodge into a luxury hotel called "Hotel Tulbingerkogel" from 1931 - 1932. The restaurant is of particular interest as it creates a successful balance between interior and exterior space. It is situated on the ground floor of the extension and a corner of the cubic building volume is cut out, creating a covered outdoor space which connects to the restaurant terrace. Sliding doors provide the opportunity to unite the interior of the restaurant with the exterior terrace, blurring the boundaries between the landscape and the interior seating.

Fig. 59 - Restaurant Berghotel Tulbingerkogel, 1932

In 1934, Wörle and Fellerer began to work as a professional partnership. The early years were defined by interior designs for fashion boutiques. In the latter half of WWII, their collaboration was paused due to Wörle's enlistment. In the reconstruction years, Wörle and Fellerer were able to successfully attract and complete several prominent commissions. The most well-known amongst these; were the reconstruction of the Austrian Parliament (1945-1956), the "Gänsehäufel" lido (1948-1950) and the second "Haas-Haus" (1951-1953). During their partnership they also worked on many social housing projects. Fellerer died in 1957 ending their successful cooperation. Ten years later, an exhibition was held in honour of Fellerer by the Austrian Society for Architecture. Wörle wrote the introduction on Fellerer for the exhibition catalogue. Here, he describes Fellerer's development, beginning his studies at the "Technische Hochschule Wien," completing them at the "Akademie der bildenden Künste" under Otto Wagner and starting his professional career in Josef Hoffmann's atelier. Wörle mentions Fellerer was an admirer of Hoffmann's noblesse and Wagner's structural clarity, but that he rejected the decorative aspects of their architecture. Supposedly, Fellerer was much more a supporter of Hoffmann's nemesis, Adolf Loos. Personally, Wörle describes Fellerer as a collaborative personality, a constructive critic, someone prepared to take on a concept better than his own or persuade someone of his own position through clear and concise arguments.[2]

"Ich glaube, daß wir die Weiterentwicklung der Architektur nicht nur dem Gefühl und der Phantasie allein überlassen dürfen, sondern uns ständig Rechenschaft geben müssen, ob wir uns an der Oberfläche der reinen Ästhetik, des geistreichen Einfalls oder der Mode bewegen, ob wir uns einem Avantgardismus hingeben, aus Furcht, etwa nicht modern genug zu sein, ob wir überalterte, nicht lebendige Formen gebrauchen, oder ob wir das Leben, den Menschen mit Körper und Seele, sein ‚In der Welt stehen' und seine Beziehung zur Umwelt, in ihrer ganzen Vielfalt, zur Grundlage unseres Ordnens und Gestaltens machen."[3]

This is a quote from a presentation Fellerer held in 1952, referenced by Wörle in his introduction. It shows how Fellerer believed in progress in architecture, in the renunciation of historical styles or the avoidance of purely aesthetic elements of design. These are all fundamental principles of modernism, but he stresses a humanist approach should remain the top priority. In another quote from a presentation held in 1936, also referenced by Wörle, he talks of the correct relationship architecture should have to technology, explaining that it shouldn't be dominated by it:

"Das künstlerische Element ist der geistige Ausdruckswille, wohl unterbaut und möglich gemacht, aber nicht getragen vom Willen der Technik."[4]

Following Fellerer's death, Wörle continued the practice they built up. Most well-known projects attributed to Wörle were completed together with Fellerer, but he continued to take on commissions for social housing, educational facilities, and an extension for a hotel. The "Goldene Stiege" housing development completed in Mödling, Lower Austria in 1970 received widespread acclaim.

A further defining aspect of Wörle's career was his role in the "Zentralvereinigung der ArchitektInnen Österreichs." He became a member of the ZV in 1935 and from 1961 up until his death in 1996 he was the president. He began his presidency at a time when the reconstruction years were beginning to end and the architectural scene in Austria was beginning to expand its view beyond its borders. During the early years of his presidency the ZV implemented several changes. In 1965 "der Bau" magazine underwent a radical restructuring encouraged

by Wörle and Ferdinand Kitt, a further prominent member of the ZV. It was renamed "Bau," and the editorial role was handed over to Hans Hollein, Günther Feuerstein, Sokratis Dimitriou and Gustav Peichel.

"Nach einem halben Jahrhundert des Kampfes der Zentralvereinigung für die Ordnung des Berufsstandes der Architekten soll diese neue Schrift der neuen Aufgabe der Zentralvereinigung als kulturelle Organisation gerecht werden. Die Aufgabe der neuen Zeitschrift wird die vergleichende Information so wie die konstruktive Kritik sein, gestellt auf das progressive Denken der jungen Generation, auf fundierte Sachkenntnis, auf Fairneß und auf kultivierte Formulierung. Die Zentralvereinigung hat nie Einfluß auf die Redaktion genommen. Es gibt nur ein gemeinsames Programm, das ist die zeitgenössische Architektur."[5]

This was Wörle's introduction to the revamped magazine. It shows his intention to allow the younger generation freedom to take on more responsibility. On the ZV's 100th anniversary in 2007, Hans Hollein mentions how important this was to allow a progressive scene to emerge in Austria, consequently increasing Austrian architecture's international relevance once more.[6] 1967 was another important year during Wörle's presidency, as the ZV celebrated its 60th anniversary. Many influential personalities from across the globe were invited to Austria for presentations. The most famous of all, was the presentation held by Buckminster Fuller in the "Wiener Stadthalle" followed by 1500 attendees. This was also the year the "Bauherrenpreis" was introduced, an award used to this day to honour clients, that show exceptionally high standards in their engagement towards society and innovation. Wörle died on the 14th of December 1996 in Vienna.

Philosophy/ Biophilic Tendencies

"Architektur ist keine Kunstform im isolierten Sinn, sie ist eine Tätigkeit zur Gestaltung unserer sichtbaren Umwelt, zur Räumlichkeit natürlichen menschlichen Wohnens und Lebens, mit der Spannweite vom Städtebau bis zum Gerät. Hollein: ‚Alles ist Architektur.' Architektur ist kein Kunstwerk an sich mehr wie Malerei oder Plastik. Architektur ist ein vielschichtiger Prozeß geworden, in dem Funktion, Technik und Wirtschaft Grundlagen sind."[7]

This a quote from the foreword Wörle wrote in "Baujahre, österreichische Architektur 1967-1991" published in 1992. It describes his opinion on what architecture stands for. He explains how architecture is fundamentally based on function, technology, and economics, but that the process behind creating architecture is still an art. In an essay titled "Ist Architektur Kunst?" published in 1961, he further elaborates on this point.

"Unbeeinflußt durch ihre Zweckerfüllung und die Lösung funktioneller Probleme erzweckt die Architektur Stimmungen, Befriedigungen im Seelischen, die der Architekt durch Form und Gestaltung zu präzisieren in der Lage ist, das ist seine Funktion als Künstler und das ist das Kennzeichen der Architektur als Kunst."[8]

Here, Wörle expresses similar views to his long-term partner Fellerer. He admits architecture is a problem-solving occupation, much like that of an engineer. However, he explains that the environment created by architects has a psychological impact on the people that inhabit it. In this essay he also expresses the role of the architect and how he should act:

"Das entscheidende ist, daß im Team der Spezialisten der Architekt, als ein am Geist und Herz gebildeter Mensch, als der Nichtspezialist, jene Überschau behält, die ihn allein befähigt, die zahlreichen und wichtigen Komponenten zu einem richtigen funktionellen Gefüge zusammendenken und sie zu einem menschlichen Ganzen zu ordnen, zu erfühlen, wo die wirklichen menschlichen Bedürfnisse am besten erfüllt werden können."[9]

Wörle supports a pragmatic approach towards architecture. Still, he argues the emotional experience of a building must remain one of the most important aspects to consider during the design process. In other words, the physiological needs of humans are fulfilled with the fundamental principles of architecture categorized by Wörle as function, technology, and economics. The psychological needs require an architect to consider aspects of architecture defined by desires, wishes, and hopes. Frequently Wörle references Leon Battista Alberti and his concept of creating with "Geist und Herz." In an essay published in "Der Bau" in 1959 he references Alberti, to support his own position.

"Die Baukunst ist jene unter den herrlichsten Künsten, die in keiner Beziehung zu entbehren ist; sie ist es, die Nutzen, verbunden mit Vergnügen und Ansehen, gewährt, und ein Architekt wird der sein, der gelernt hat, mittels eines bestimmten und bewundernswerten Planes und Weges, sowohl in Gedanken und Gefühl zu bestimmen als auch in der Tat auszuführen, was den hervorragendsten menschlichen Bedürfnissen am Ehesten entspricht.
Die Beständigkeit, das Ansehen und die Zier eines Gemeinwesens bedarf am meisten des Architekten, der es bewirkt, daß wir zur Zeit der Muße in Wohlbehagen, Gemütlichkeit und Gesundheit, zur Zeit der Arbeit zu aller Nutz und Frommen, zu jeder Zeit aber gefahrlos und würdevoll leben können."[10]

It is clear Wörle was a supporter of modernist architecture. His oeuvre expresses a rational

approach to structuring facades and floorplans, ornamentation is non-existent. His intentions and writings demonstrate he was a member of the humanist faction of modernism. Always underlining the fact that human needs should be the defining feature of every architectural brief. Rarely did he elaborate further on what the specific needs for humans are, but in the same essay referenced previously, he expresses an opinion on human needs related to residential projects:

"Über allem aber wird die Beziehung zur umgebenden Natur von entscheidender Bedeutung für die menschlichen Wohnanlagen sein.

Die Zuflucht zur Natur ist das wahre Glück des Menschen. Einmal war der Schrebergarten, wie Adolf Loos 1921 sagte, die Revolution des Arbeitenden gegen den Kasernenzwang der Fabriken und Bürohäuser, heute genügt diese Möglichkeit nicht mehr. Die billigen Verkehrsmittel haben diesem Stück Privatnatur die Bedeutung für die Masse genommen. Um so wichtiger aber ist nun die Verbindung von Wohnung und Natur geworden. Man könnte hier fast, wie es Loos noch vom Schrebergarten sagte, nun sagen, ‚sie rettet nicht nur den Menschen, sie rettet den Staat.'"[11]

In this quote, Wörle clearly expresses biophilic tendencies. He categorizes the relationship of human living conditions to nature as a human need, one that will lead to humanity's true happiness. He concludes this essay mentioning the architect's responsibility to fulfilling the psychological needs of humanity.

"Wenn im vergangenen Jahrhundert die Mediziner und Hygieniker durch ihre Erkenntnisse das Durchschnittsalter des Menschen verlängern konnten, werden ab nun diese Aufgabe vor allem die Architekten mit einer Hygiene der Psyche zu übernehmen haben."[12]

Biophilic Construction

Per Albin Hansson-Siedlung (1947-1951)

The "Per Albin Hansson-Siedlung" was one of the first major housing developments completed after WWII. The leading figure behind this development was Franz Schuster. Schuster was responsible for the urban plan and he was a staunch supporter of garden cities.

Situated on the outskirts of the 10th district in Vienna, the development includes two-storey terraced houses with private gardens, and multi-storey apartment buildings. In total, the first phase provided 280 flats and 660 terraced houses for a population of 3500 residents.[13] Ample green space was integrated between the buildings or in the form of urban parks populated with seating areas and playgrounds. The terraced houses were positioned a few metres away from the road to allow space for a front garden without fences, enlarging the public circulation routes, whilst providing the possibility for trees to enhance the public realm. Small-scale pedestrian routes were positioned between the terraced housing gardens. The intention was to allow residents safer circulation routes better suited to the human scale.

Furthermore, the development was designed as a self-sufficient community. Public amenities, such as a school, Kindergartens, a gardening centre, a community centre, as well as sports facilities were all planned within walking distance. Wörle and Fellerer's contribution were designs for terraced housing units, as well as multi-storey apartment units. Their involvement in this project is a clear representation of Wörle's interest in strengthening the relationship of residential areas to nature.

Fig. 60 - Per Albin Hansson-Siedlung, 1951

Fig. 61 - Gänsehäufel Lido, 1950 - elevated walkway

Gänsehäufel Lido (1948-1950)

The "Gänsehäufel" is a large lido situated on an island in the Old Danube in Vienna. When the Danube was regulated towards the end of the 19th century, a large former arm north of the newly regulated Danube was transformed into a lake and subsequently named the Old Danube. Soon after the river's regulation, as early as 1900, people began to use the "Gänsehäufel" island for recreational purposes.[14] Popularity for the "Gänsehäufel" grew rapidly and many facilities were constructed in wood to provide the necessary infrastructure for a large-scale lido. During WWII these facilities were damaged beyond repair. Soon after the war ended, the city of Vienna decided to allocate funding towards the reconstruction of the lido. A competition was announced in 1946 and Fellerer and Wörle's proposal received the commission.

"Die Architekten waren vor allem von der Überlegung geleitet, daß die Natur, der schöne Baumbestand, der Au-charakter in möglichst großen Flächen für die Badenden erhalten bleiben und in die Bauwerke eingebunden werden sollten. Aus diesem Grunde sind diese, mit Ausnahme der Saisonkabinen, möglichst konzentriert ungefähr in die Mitte der Insel gesetzt, so daß die Entfernungen von der Zugangsbrücke für die noch Angekleideten möglichst verkürzt sind. Der Weg zum Strand und zum Wasser ist dadurch allerdings länger geworden, als wenn man zum Beispiel die Ankleidestellen entlang des Strandes aufgereiht

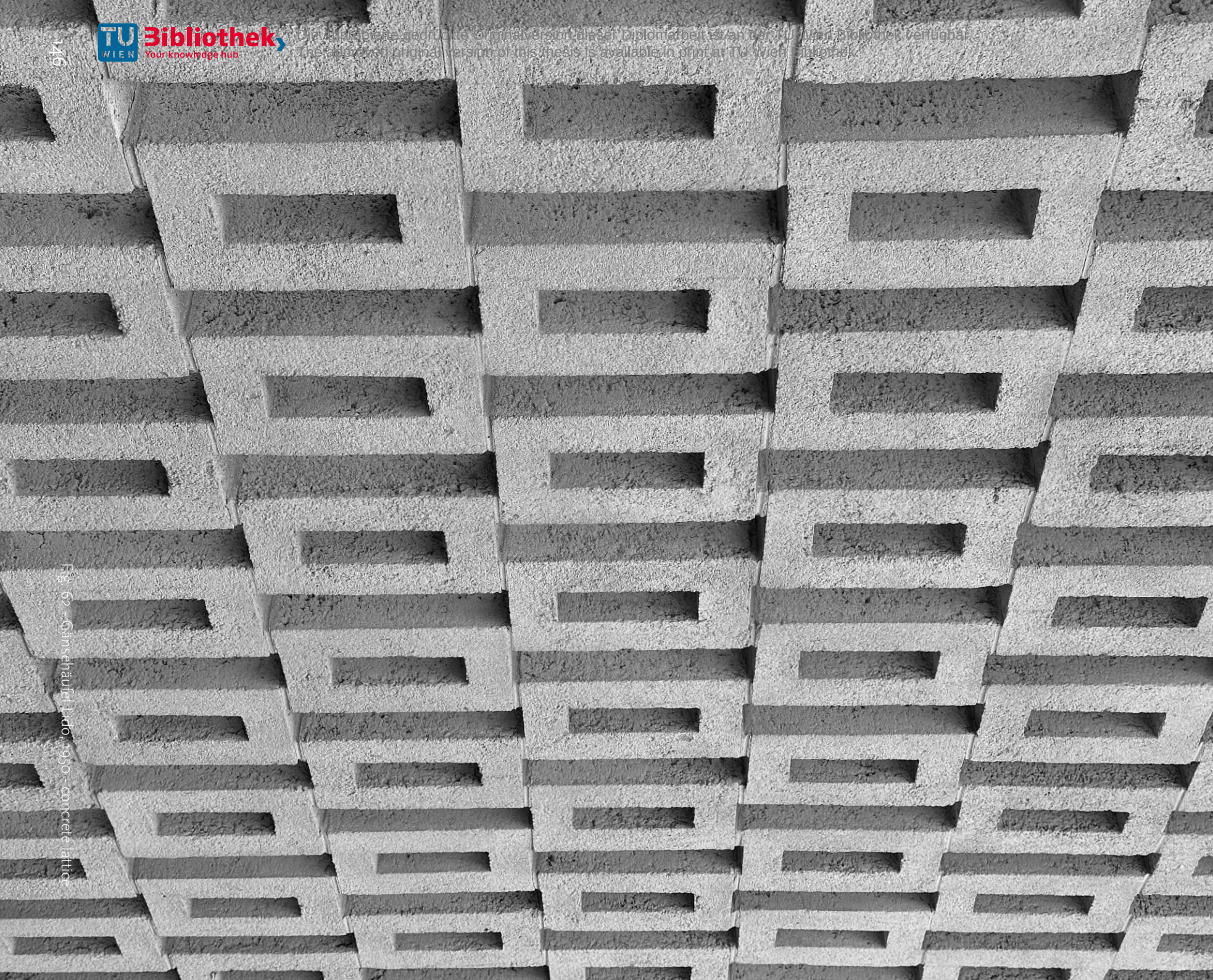


Fig. 62 - Ganserhäufel Lido, 1950 - concrete lattice

hätte; dann aber wären die Wiesen und die Wege unter den Bäumen, die doch zum Sonnen und zum Lustwandeln der Badenden dienen sollen, an die Eingangsseite der Badekabinen, also quasi außerhalb der Badeanlage zu liegen gekommen, und es wäre eine starke Vermischung der noch angekleideten mit den schon ausgekleideten Besuchern entstanden."[15]

This a quote from a description provided by Fellerer and Wörle published in "der Aufbau" in 1951. Preserving the existing biodiversity of the island is highlighted as the main priority defining this project. The existing trees determined the placement of the buildings, they were also integrated into the building complex in the form of courtyards, and they provide the necessary shade for visitors. The sequence of entering the lido and walking to the shores of the Old Danube was also carefully considered to create an immersive experience further connecting the visitor to nature.

Fig. 63 - Gänsehäufel Lido, 1950 - changing rooms

"Der Mensch soll – abgehetzt und erfrischungsbedürftig, wie er kommt – nicht durch eine steife symmetrische Haltung aufgenommen werden, er soll in einen natürlichen, wenn gepflegten Garten treten, in dem die Gebäude ohne Pathos, zu dem kein Anlaß vorliegt, aneinandergereiht sind."[16]

This quote further describes Wörle and Fellerer's intention of prioritising nature. The architects specifically avoided creating a grand representative architectural ensemble, so as not to compete with the merits of the natural surroundings. Further, all the slim concrete walls set up along the necessary boundaries of the lido were consciously blurred with the natural landscape, using climbing plants or bushes.[17] Similarly in the changing facilities, much of the facade was made of a permeable skin in the form of louvres or concrete lattices, to filter in the outdoors whilst providing the necessary privacy inside. To minimise the area that was sealed Wörle and Fellerer developed many facilities vertically. To access changing rooms above ground level an intricate elevated circulation system was designed, providing additional vistas into the tree canopy. The main criticism directed at the "Gänsehäufel" in this day and age is why was so much concrete used. At the time of construction using concrete as the dominant material was a conscious decision. As the original wooden facilities suffered so much damage during WWII, it was an ideological motive to use a material that is more durable.[18]

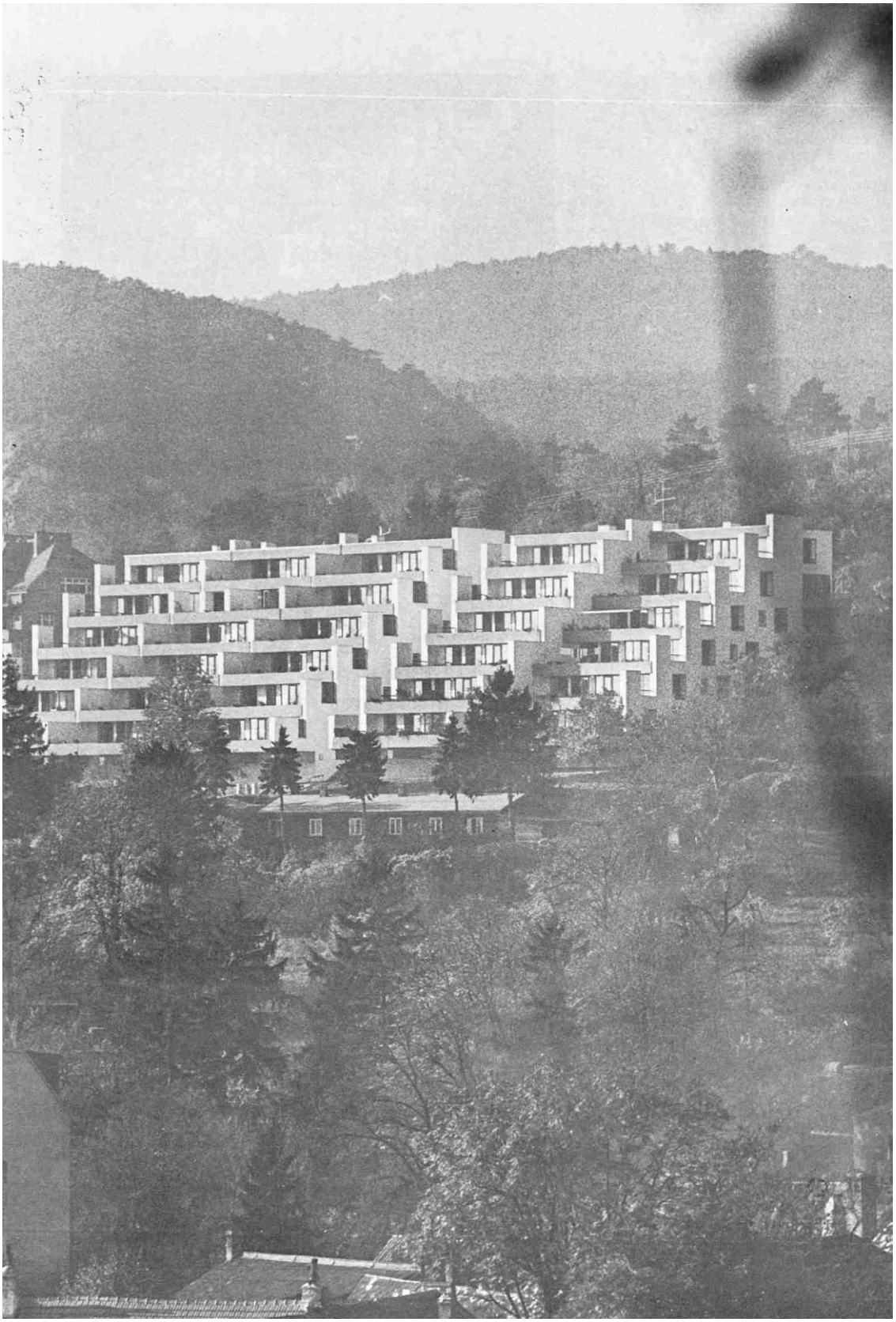


Fig. 64 - „Goldene Stiege“, 1969

„Goldene Stiege“ (1967-1969)

The “Goldene Stiege” is a housing development designed by Wörle in Mödling, a city close to Vienna’s southern border. The site is on a hillside to the west of the historic centre. The eastern half of the site has a relatively flat elevation, whilst the western part is steep. Therefore, a combination of detached and terraced houses was distributed on the flat side of the hill and stepping apartment buildings were integrated into the steep side. These stepping apartment buildings allowed each apartment to gain a terrace on top of the apartment space below and they are credited as the first example of this typology in Austria.[19] On the site, which comprised an area of 16’000 m², 65 apartments were built with a total floor area of 6’650 m² and a terrace area of 2’100 m².[20] This equates to an approximate 3:1 ratio of interior to exterior space. Every apartment received undisturbed views towards the east over Mödling and the surrounding landscape.

“Privater Freiraum
Der Wunsch nach privatem Freiraum in Form von Terrassen oder Dachgärten als Freifläche ähnlich einem Gartenhof, einem allseitig geschlossenen Wohnhof (Atrium), mit Fernsicht auf Landschaft und Ausblick auf die Natur ergibt eine neue Forderung heutigen städtischen Lebens. Alle Vorzüge der Wohnformen des Einfamilienhauses mit Garten und Wohnhof und die Vorteile des Stockwerkbaues oder Hochhauses mit weitem Horizont können durch neue terrassierte Bebauungsstrukturen und Hausformen erreicht werden. Der Balkon und die Loggia als Forderungen gestrigen Wohnens genügen unseren Wohnansprüchen nicht mehr.“[21]

This quote was written in 1967 by Viktor Hufnagl in the introduction to an exhibition catalogue, featuring the “Goldene Stiege” amongst many other exemplary Austrian housing projects. The exhibition was called “Neue Städtische Wohnformen” and Hufnagl classified this need for private exterior space as one of the essential needs for residential projects. Judging by his description, Wörle was still a pioneering figure even in his later career and fulfilled this need successfully. Amongst the successful use of terraces, the “Goldene Stiege” also provided several other communal amenities, such as an indoor and outdoor pool, a sauna, as well as a fitness room.

Haus in Salmannsdorf

Währing, Vienna

1959

Fig. 65 - section view of west-facing façade

Client/ Brief/ Location

In 1959 Wörle's design for a detached single-family home was published in the 6th issue of "Der Bau." It was an issue dedicated to single-family homes and Wörle's design, amongst other notable architects' designs was published following their inclusion in an exhibition on detached single-family homes arranged by the "Zentralvereinigung der ArchitektInnen Österreichs." On a full-page feature, there was a model photograph, a floorplan, and a short description. Unfortunately, this project remained unbuilt, and no information could be found on who the client could have possibly been, as none of the drawings are addressed to anyone.

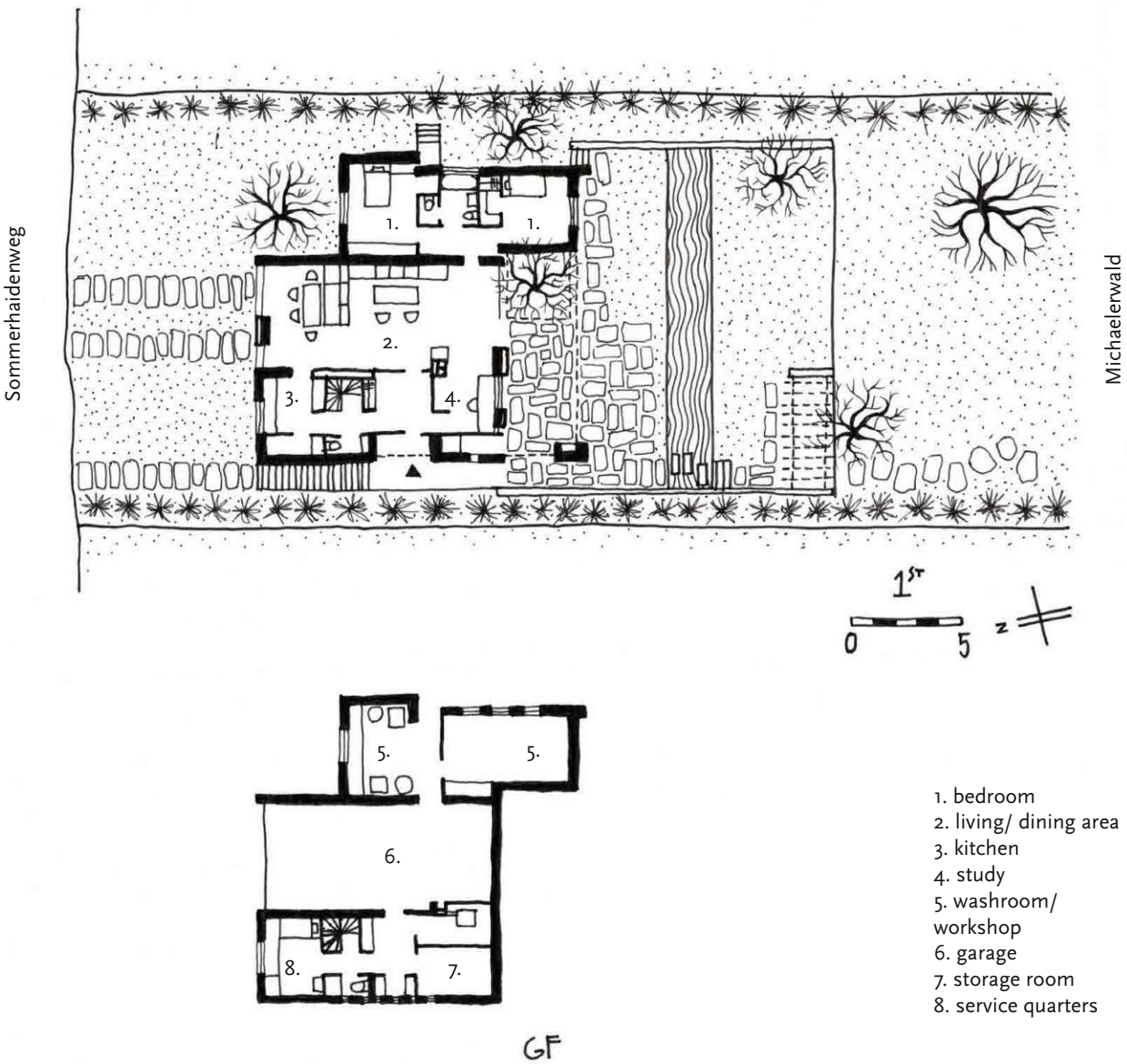
The location is more specific and Wörle likely worked on a site that existed in real life. The site is located in Salmannsdorf, which is part of the 19th district of Vienna. However, the site is officially part of the 18th district, as it is located right on the border. The site is long and narrow, bordering onto the Michaelerwald to the south and the Sommerhaidenweg to the north. It represents a site on the edge of the urban environment, as the Michaelerwald belongs to the Wienerwald, the closest it gets to true wilderness in the vicinity of Vienna. There is no way of pinpointing the exact location, as none of the drawings include the street number on Sommerhaidenweg. However, comparing the site's dimensions to Vienna's development plan suggests the site lies on the southern side of Sommerhaidenweg between the street numbers 55-63.

Building Description

The “Haus in Salmannsdorf” is a two-storey detached single-family home comprising a total floor area of approximately 250 m². It is a long and narrow site (20 m x 80 m), and the short sides face north and south. There is a steady inclination from the lowest point in the north by the Sommerhaidenweg towards the highest point in the south. The inclination continues further past the site’s southern boundary, as the site lies on the northern slope of the Michaelerwald. Due to the site’s inclination, the ground floor is level with the street and the 1st floor has direct access to the garden on the southern facing façade. Two garden walls extend out by the southern facing façade parallel to the site’s western and eastern boundaries. This creates a southern facing courtyard that remains open towards the Michaelerwald above. Here a pond in the form of a thin strip of water spans the entire width between the two garden walls. Behind the pond lies a pergola construction adjoining the western garden wall. There is a terrace on the southern facing façade, sheltered by a roof overhang with access to an outdoor fireplace and an outdoor shower. On the western end of the house, an outdoor staircase leads up to the first floor providing access to the main entrance.

The ground floor encompasses the functional side of the programme. There is a garage, a washroom/ workshop space, a boiler room, a storage room, and the service quarters. A spiral staircase leads up to the first floor, which encompasses the residential side of the programme. On the eastern end, there are two bedrooms separated by a bathroom. The central space on the first floor is a living/ dining area, which spans the entire length of the house from the southern to the northern facing façade. On the western end, lies the kitchen, a study, as well as a toilet.

Fig. 66 - „Haus in Salmannsdorf“ floorplans



1. bedroom
2. living/ dining area
3. kitchen
4. study
5. washroom/ workshop
6. garage
7. storage room
8. service quarters

Biophilic Criteria Evaluation

Environmental Features

As the "Haus in Salmannsdorf" never progressed much further than the early design phase, it is unclear which materials were intended for construction. A section study suggests a ribbed concrete floor slab would have supported the first floor. Otherwise, the wall construction was not specified, but it would have likely either been a concrete or brickwork construction. In the final model, the garden walls appear to have the same construction as the house's exterior walls. However, early perspective studies suggest the garden walls were originally intended to be an exposed masonry construction. Judging by the final model and the early perspective studies the exterior walls would have had a rough textured render. A further dominant material decipherable on the final model are panels that have been used for window shutters, the garage door, as well as cladding on the northern and southern facing façade. These panelled elements are clearly illustrated on the final model and the material best suited for this construction method would have to be wood. All garden pathways, as well as the driveway and the sheltered terrace by the southern façade appear to be composed of stone slabs, as their form is irregular, and the shape of the individual elements is varied. The pergola adjoining the western garden wall appears to be a wooden construction. According to the section studies and the final model, the timber structural elements are round in section, resonating with the biophilic approach, as it suggests the use of wood in its most natural form. Criticising the use of artificial materials in the "Haus in Salmannsdorf" is irrelevant, as the previously mentioned construction materials are based on speculation. Nonetheless, in the feature published in "Der Bau," Wörle specified:

"Das Dach wird flach gedeckt und mit Rasen begrünt."[22]

The use of a green roof is by no means a usual construction method at the time, and it showcases Wörle's intention to include natural building materials in his design. A green roof is also a great method of promoting biodiversity. The site represents an existing biodiverse natural setting, as it lies on the fringe of the Michaelerwald. The top of the site remains untouched, retaining the existing forest. The density of trees gradually reduces, from the top of the site to the Sommerhaidenweg. There are multiple trees positioned in close proximity to the house, as well as a tree included within the roof structure on the southern facing façade, allowing the Michaelerwald to slowly dissipate and in essence border onto the Sommerhaidenweg. The sites natural topographic situation has been retained throughout the garden except for the southern courtyard, where the inclination is subtly bridged using terraces.

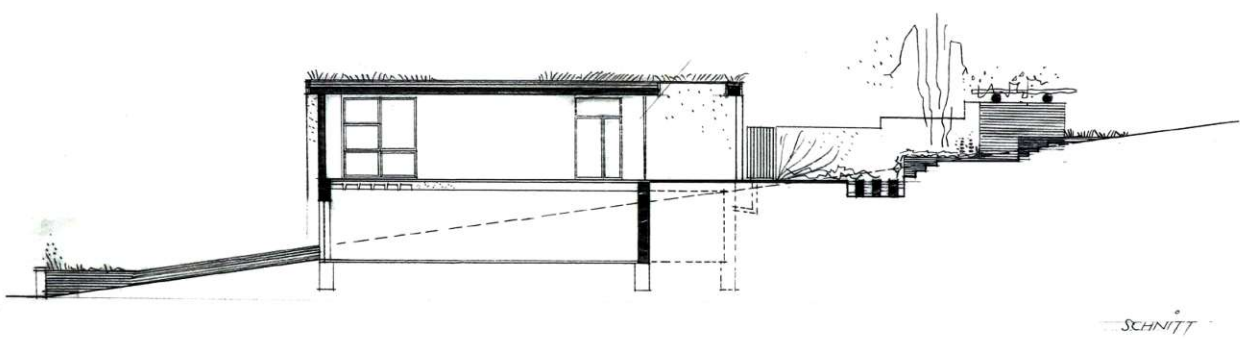


Fig. 67 - section study, Eugen Wörle

Fig. 68 - bird's eye view from west

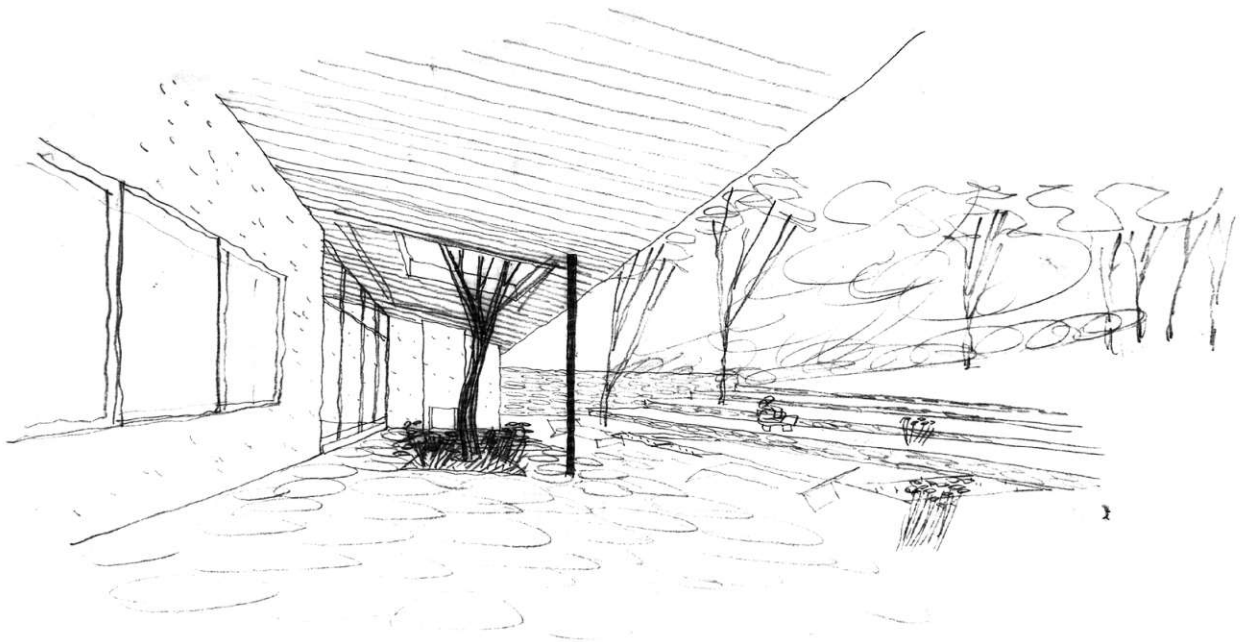


Fig. 69 - perspective study, Eugen Wörle

All the surfaces in the garden are permeable as they are composed of stone slabs. The exterior staircase leading up to the main entrance on the first-floor cantilevers out into the garden reducing the sealed area of the site. On top of that, the green roof is an effective means of managing stormwater runoff, as it can store a certain amount of water, allowing it to runoff at a slower rate. The element of water is visibly introduced with the long narrow pond, intended to separate the residential from the wild part of the garden.[23]

The floorplan responds to the site's topographic situation. Positioning the residential programme on the first floor allows access to direct sunlight from the south, as opposed to positioning it on the ground floor, which can only provide glazing on the northern, western, and eastern facing façade, as the southern facing façade is fully submerged within the hill. On the first floor the generous living/ dining area gains access to daylight from the northern and southern façade. On both ends floor to ceiling windows maximise the amount of daylight that can enter this space. The remaining rooms received smaller windows and there were shutters to block out the sunlight. The tree integrated within the roof structure on the southern facing façade provides an effective natural shading element for the dining/ living area. The study receives shade from the roof overhang sheltering the outdoor terrace. This roof overhang extends out by 3,5 m providing effective shading in summer months. However, in winter the length of the roof overhang and the fact the study lacks floor to ceiling windows means the preferable winter sun is also prevented from entering this room. In the bedroom on the opposite end of the southern façade, the only way to provide shelter from the sun is by closing the shutters.

Fig. 70 - view from Sommerhaidenweg

Unfortunately, this would block out the sun entirely and force people to use this space with artificial light or suffer from excessive solar gain.

Exterior

The living/ dining area benefits from a continuous view towards the south and the north. As the site lies on a northern slope, the view towards the south benefits from an expansive vista of the 19th district and the natural setting of the Salmannsdorfer Höhe on the horizon. The north facing view captures the natural setting of the garden and the Michaelerwald above. As a tree has been planted within the roof structure in front of the living/ dining area, the previously mentioned view gains from such a close connection to a natural element. By adapting the building to the sites inclination and working with terraces in the southern facing courtyard the living/ dining area has direct access to the garden. The garden walls, although rational in their form, respond to the sites natural topography by gently stepping up from the house towards the Michaelerwald.

"Nachdem man vom oberen Gartenende auf das Dach des Hauses sieht, ist dieses begrünt angenommen."[24]

This is a quote from a building description Wörle wrote, demonstrating it was a conscious decision to have a green roof, so that the house blends in with the surrounding garden from the view at the top of the site. The roof is a green rectangular surface with a square cutout on the northeastern corner and a square cutout in a central position on the southern end. By planting a tree within both cutouts and another tree next to the eastern façade, the green roof combined with the trees effectively merges the house with the forest

Fig. 71 - view from Michaelerwald

landscape, when observed from the highest viewpoint.

The garden pergola, with an integrated seating area, provides a space sheltered from the sun in the wild part of the garden. Further, this seating area is sheltered from the wind on two sides. By the western garden wall on one end and a short wall on the other, that supports the timber structure of the pergola. The southern terrace gains shelter from the sun and rain by the roof overhang on the southern facing façade, whilst the garden walls provide shelter from the wind. The terrace has access to an outdoor fireplace, an element that facilitates longer stays in the exterior environment.

Symbolic Design

On the final model, all the panelled elements are green. This suggests Wörle aimed to paint these elements and the colour green was likely chosen, to blend in with the surrounding natural environment. As mentioned previously, the materiality of the final model and the early perspective studies insinuate that the exterior walls had a rough textured render. The choice of a rough texture as opposed to a smooth one could be a conscious decision to avoid creating an artificial impression, helping the façade to blend in with its surroundings in a more preferable manner.

The pond separating the residential part of the garden from the wild one resonates with our instinctual memory of bodies of water that nourish and protect us. The Michaelerwald, although rich in attractive natural elements, still represents a space that lacks good visual surveillance, so there are many potential threats that can hide from us. The body of water spanning the entire width of the southern courtyard provides a symbolic barrier and a sense of security for the residents, protecting them from the creatures that may be lurking in the dark forest above.

The most enticing element of Wörle's design is evident in the frontal view of the house. The two windows of the dining/ living area are aligned, so it is possible to see right through the house into the southern courtyard. The tree integrated within the roof structure has been planted on the same axis. The translucent silhouette of the trunk is visible through the house and the canopy stretches out over the roofline. This image entices the viewer to discover how this tree interacts with the building, as it appears to be both within and outside the building at the same time.

Fig. 72 - front elevation view

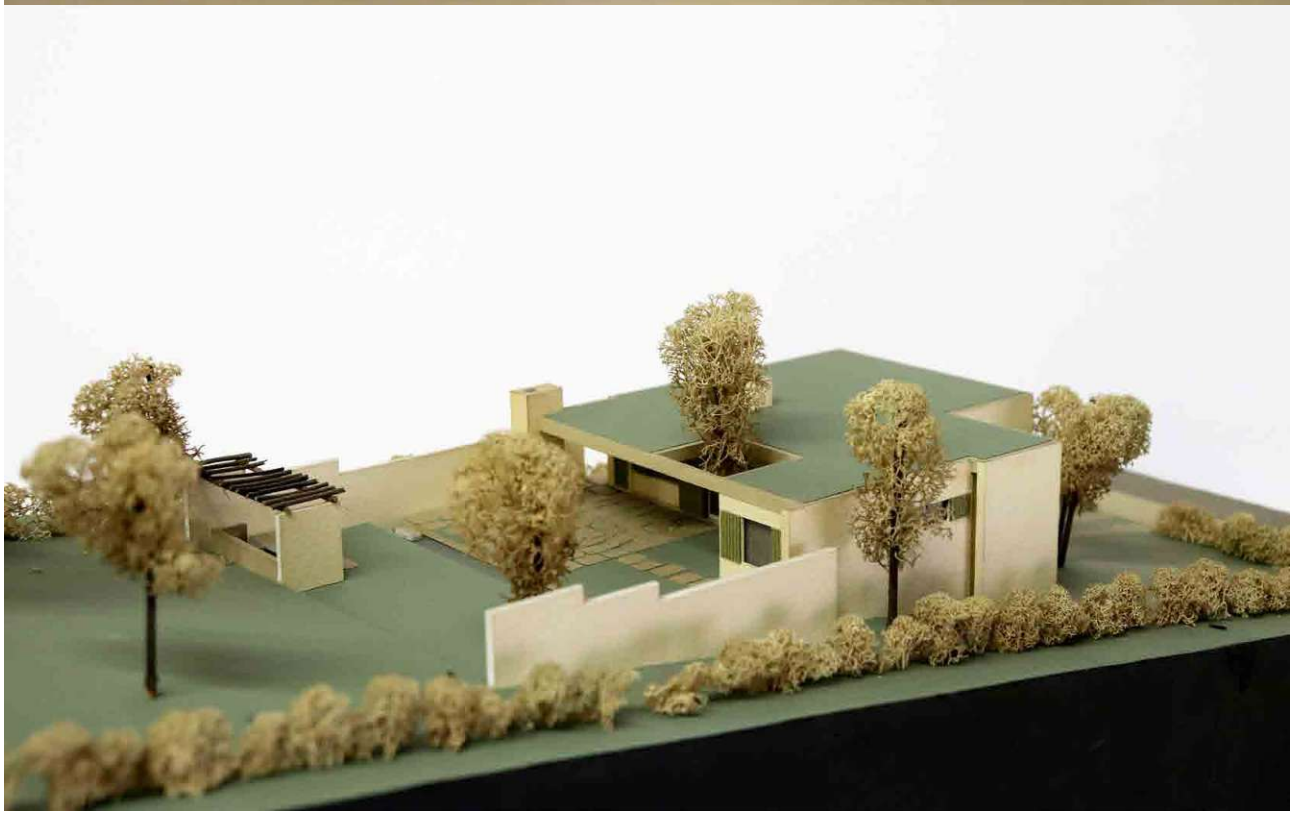


Fig. 73 - bird's eye view from west

References

1.Herbert HOFFMANN, Eine Dreizimmerwohnung von Eugen und Paul Wörle, Wien, Moderne Bauformen, (December) 1936, p. 709

2. Eugen WÖRLE, 1967, Max Fellerer, ÖGFA, 29 April – 24 May. [Exhibiton Catalogue]

3. Eugen WÖRLE, 1967, Max Fellerer, ÖGFA, 29 April – 24 May. [Exhibiton Catalogue]

4. Eugen WÖRLE, 1967, Max Fellerer, ÖGFA, 29 April – 24 May. [Exhibiton Catalogue]

5. Eugen WÖRLE, Der Bau, 20. Jg. Heft I, (March) 1965, p. 1

6. Hans HOLLEIN, 100 Jahre ZV 40 Jahre Bauherrenpreis, Vienna (Zentralvereinigung der Architekten Österreichs) 2007, p. 6

7. Eugen WÖRLE, Baujahre, österreichische Architektur 1967-1991, Vienna (Zentralvereinigung der Architekten Österreichs) 1992

8. Eugen WÖRLE, Ist Architektur Kunst?, Der Bau, 16. Jg. Heft 3, (March) 1961, p. 127

9. Eugen WÖRLE, Ist Architektur Kunst?, Der Bau, 16. Jg. Heft 3, (March) 1961, p. 127

10. Eugen WÖRLE, Zum Publikum Geredet, Der Bau, 14. Jg. Heft 4, (April) 1959, p. 192

11. Eugen WÖRLE, Zum Publikum Geredet, Der Bau, 14. Jg. Heft 4, (April) 1959, p. 192

12. Eugen WÖRLE, Zum Publikum Geredet, Der Bau, 14. Jg. Heft 4, (April) 1959, p. 192

13. Die Per Albin Hansson-Siedlung, Der Aufbau, 4.Jg. Heft 3, (March) 1949, p. 107

14. Karl JOST, Das Strandbad „Gänsehäufel" Gestern und Heute, Der Aufbau, 6. Jg. Nr. 8, (August) 1951, p. 282

15. Max FELLERER & Eugen WÖRLE, Der Neubau des „Gänsehäufels", Der Aufbau, 6. Jg. Nr. 8, (August) 1951, p. 286

16. Max FELLERER & Eugen WÖRLE, Der Neubau des „Gänsehäufels", Der Aufbau, 6. Jg. Nr. 8, (August) 1951, p. 286

17. Karl JOST, Das Strandbad „Gänsehäufel" Gestern und Heute, Der Aufbau, 6. Jg. Nr. 8, (August) 1951, p. 283

18. Karl JOST, Das Strandbad „Gänsehäufel" Gestern und Heute, Der Aufbau, 6. Jg. Nr. 8, (August) 1951, p. 282

19. https://www.azw.at/de/artikel/sammlung/die-goldene-stiege-von-eugen-woerle/
(last visited 01.02.2024)

20. Eugen WÖRLE, 1967, Neue Städtische Wohnformen, ÖGFA [Exhibition Catalogue]

21. Viktor HUFNAGL, 1967, Neue Städtische Wohnformen, ÖGFA [Exhibition Catalogue]

22. Eugen WÖRLE, Zwischen Wald und Stadt, Der Bau, 14. Jg. Heft 6, (June) 1959, p. 295

23. Eugen WÖRLE, Project Description, Vienna (21.09.1959), Architekturzentrum Wien, Sammlung

24. Eugen WÖRLE, Project Description, Vienna (21.09.1959), Architekturzentrum Wien, Sammlung

4.3

Roland Rainer

01.05.1910 - 10.04.2004

Bio

Roland Rainer was born on the 1st of May 1910 in Klagenfurt. At a young age, Rainers family moved to Vienna. In 1928 Rainer completed his schooling and began his architectural studies at the "Technische Hochschule" in Vienna. He completed his studies in 1935, writing his thesis on the urban planning issues surrounding Karlsplatz.

In the following year, Rainer first became a member of the "NSDAP," as well as moving to Berlin, where he would remain until the outbreak of WWII. During most of his time there, he worked for the "Deutsche Akademie für Städtebau, Reichs- und Landesplanung (DASRL)." Much of the research Rainer conducted there would form a basis for later publications, and he would continue to support and research many of the fundamental principles, first encountered at the "DASRL" for the rest of his life. The exhibition "Roland Rainer. (Un)Umstritten. Neue Erkenntnisse zum Werk (1936-1963)" held at the AzW (20.10.2018-07.01.2019) showed how research documents from his time at the "DASRL" were adopted for his later seminal publication "Die gegliederte und aufgelockerte Stadt." Phrases and paragraphs with ideological references were eliminated or adapted to the current times before the updated version of "Die gegliederte und aufgelockerte Stadt" was officially published in 1957.[1]

In 1939, Rainer was enlisted to fight in the "Wehrmacht." He was a part of campaigns in France, Russia, Poland, and Lithuania. In 1942 he was promoted to an administrative role in the "technischen Kriegsverwaltungsrat," where he led the "Heeresbauamt" in Glogow, Poland till May 1943. For the remainder of the war Rainer and his first wife worked for the "Technische Planung Ost" department.[2] When the war ended, Rainer and his family moved back to Austria, settling in Yspertal, Lower Austria. During his time in Yspertal Rainer worked independently as an architect, as well as publishing multiple books. In 1949 he relocated to the 13th district in Vienna.

The 1950s represents the decade that Rainers career fully established itself. His first major project was the "Franz-Domes-Lehrlingsheim" in the 4th district of Vienna completed in 1952. On the former grounds of the "Palais Rothschild," Rainer was commissioned to design a housing facility for apprentices after winning a competition in January 1951.[3] He won the competition with a proposal that housed the different functions from the brief in an ensemble of buildings placed along the perimeter of a large central park. The most prominent feature of the design is three parallel facing rectangular housing blocks that stretch out into the large central park. Outdoor sheltered spaces were created beneath the extended mass of the housing blocks, supported on columns. The spaces between each housing block were landscaped,

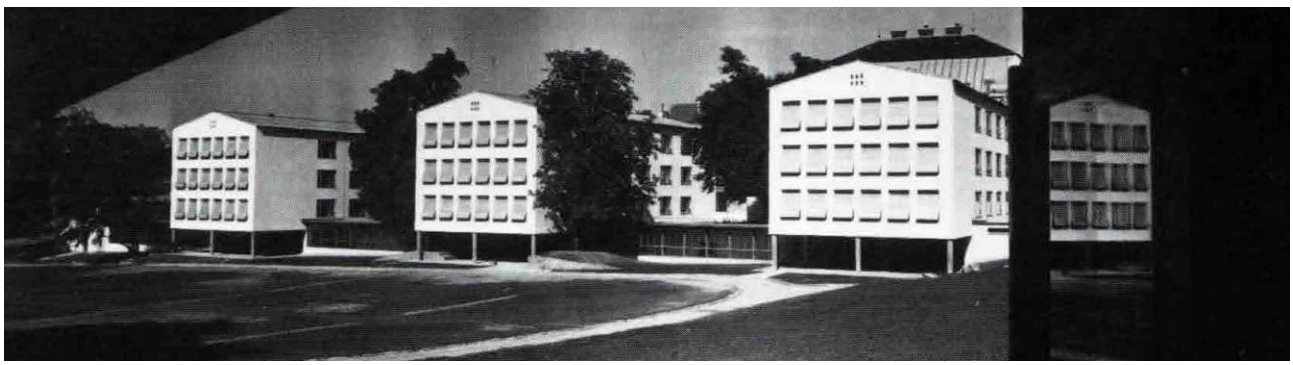


Fig. 74 - Franz-Domes-Lehrlingsheim, 1952

Fig. 75 - Wiener Stadthalle, 1958

which gives the impression the central park extends into the building complex engulfing the housing blocks with vegetation from three sides.

In the same year Rainer completed the "Franz-Domes-Lehrlingsheim," the city of Vienna announced an international competition for a large civic hall on a site in the 15th district. Rainer was invited amongst a total of 14 architects and architectural partnerships to partake. On the 17th of April 1953, Rainer received a joint first place ranking with Alvar Aalto.[5] The jury complimented Rainer's proposal for the clear expression of the concept and economical structuring of the building masses on the site. Further, Rainer's proposal was lauded for its concise arrangement, that facilitated beneficial interrelations between the different functions of the complex programme.[6] After the competition Rainer's project was chosen for construction due to economic reasons.[7] Construction work began later in 1953 and after five years, the "Wiener Stadthalle" was officially opened on the 21st of June 1958. Rainer received widespread acclaim and it proved his capability of executing such complex and technically challenging schemes. Further commissions for civic halls, most notably in Bremen (1961-1964) and Ludwigshafen (1962-1965), followed on from the success of the "Wiener Stadthalle." The "ORF-Zenturm" (1968-1976) later in his career is also a testament to Rainer's skill in executing such complex programmes in a functional and seamless manner.

Amongst Rainer's substantial oeuvre, residential projects played a very important

role. He completed countless commissions for single-family homes, as well as manifesting his theories on housing in the many housing development commissions he received. Rainer's first Viennese residential project was situated in a very significant location, the "Werkbund Siedlung." During WWII two model houses designed by Hugo Häring were destroyed by bombs. On the former site of one of these houses, Rainer designed and built a house from 1950 - 1954. Just opposite the "Werkbund Siedlung" is Rainer's second major residential project in Vienna, the "Fertighaussiedlung Veitingergasse" (1953-1954). This was completed soon after the war and it was a clear representation of Rainer's urban planning philosophy. It was designed as a model typology that could be mass produced economically. He experimented with prefabrication, as well as planning the housing development as a low-rise complex with communal green spaces and each unit received a private garden. Most of Rainer's housing developments would follow a similar pattern and he had clear principles that he adhered to. The "Gartenstadt Puchenau" is the ultimate culmination of Rainer's residential work. Designed in three stages (Puchenau I 1965-1967/ Puchenau II 1978-1992/ Puchenau III 1998-2000), it allowed Rainer to demonstrate how his urban planning philosophy could be adapted to an entire city district.

By the end of the 1950s Rainer was able to expand his influence on urban planning when he became the city planner of Vienna. He began his role as city planner in 1958, ending in 1963 due to political differences with the ruling authority.[8] In an essay published in "Der Bau" in 1959 Rainer introduces the main priorities for Vienna's new direction under his leadership. He stresses that mixed typology of housing is important to meet the varying demands of the city's population. For example, he states a family needs a different typology compared to a pensioner. He believed this varied typology would create

Fig. 76 - Fertighaussiedlung Veitingergasse, 1954

a more vibrant and liveable city, especially if districts are developed around communal centres. The next major priority is the correct orientation of buildings to maximise daylight within the built environment. Finally, he suggests the use of green spaces to shield residents from roads and other transport infrastructure, so that residential parts of the city are fully pedestrianised. On top of that, this solution would allow nature to border homes, as opposed to streets.[9] In June 1962 Rainer published the book "Roland Rainer: Planungskonzept Wien." This book summarises Rainer's vision for Vienna along with many texts and diagrams demonstrating the research and many proposals he had in mind.

"Eine besondere Chance kann im Zusammenhang mit dem Hochwasserumfluter im Überschwemmungsgebiet ergriffen werden: wenn die Ufer des Umfluters beziehungsweise die zwischen ihm und der Donau oder dem Hubertusdamm entstehenden hochwasserfreien Dämme bepflanzt und mit Sportangelegenheiten besetzt werden, dann gewinnt Wien statt der öden Überschwemmungsflächen einen zusätzlichen großen Wasserlauf zwischen baumbestandenen Ufern, und die Donau rückt wieder in lebenswürdigerer Form ins Bild der Stadt. Wenn auch die natürliche Linienführung der Donau mit ihren zahlreichen Armen nur mehr aus alten Bildern beziehungsweise an der Alten Donau und am Donaukanal zu erkennen ist, würde doch ein doppeltes Flußgerinne mit baumbepflanzten Ufern dem ursprünglichen Charakter der Donau bei Wien besser entsprechen und einen lebendigeren, reizvolleren Kontakt der Stadt mit ihrem Fluß ergeben als der kanalisierte Flußlauf zwischen baumlosen Ufern heute bietet."[10]

Fig. 77 - Donauinsel - flood protection/ nature reserve

This quote describes Rainer's proposal for dealing with the loss of the Danube's natural landscape when it was first regulated from 1870 to 1875. Since the initial regulation Vienna was still plagued by flooding, so there was a political will to create further infrastructure for flood prevention. Many saw the creation of a further channel of the Danube, divided from the main channel by a long narrow island, as the solution. Rainer was the first to recognise the vast potential green space this island could contribute to the city of Vienna. Later in 1972 Rainers dream began to be implemented and in 1984 the Donauinsel and Neue Donau were introduced to the Viennese public. The Donauinsel and Neue Donau now offer countless trails, swimming spots and areas for aquatic sports, where the residents of Vienna can benefit from such experiences immersed in a natural setting.

The final defining feature of Rainer's career was his role as an educator. His first experiences as a teacher were at the "Technische Hochschule Hannover" from 1953-1954, followed by a role as a professor at the "Technische Hochschule Graz" from 1955-1956. After his relatively short stints in Graz and Hannover, he moved on to the Academy of Fine Arts in Vienna. In 1958 Rainer was appointed as the leader to a Masterclass, which he would lead up until 1980 and from 1960 to 1962 he was the vice-chancellor of the Academy. Throughout his Masterclass Rainer would educate and inspire countless generations of architects and many of his students would go on to have leading roles in the Austrian architectural scene. Rainer died on the 10th of April 2004 in Vienna.

Philosophy/ Biophilic Tendencies

"Dieses Buch ist nicht von einem Fachmann, von keinem Gärtner, Gartenarchitekten oder Landschaftsgestalter, von keinem Botaniker oder Kunsthistoriker geschrieben, sondern von einem Laien, den freilich von früher Jugend an Pflanzen und Gärten fasziniert haben, der sie daher immer wieder aufgesucht, studiert und anzulegen und zu erhalten versucht hat und dem bei seiner Architektenarbeit die Gestaltung der Räume zwischen den Gebäuden nicht weniger wichtig ist als das Bauen selbst, der Außen- und Innenräume immer als Einheit aufzufassen versucht."[11]

This is the first paragraph from Rainer's book titled "Gärten: Lebensräume, Sinnbilder, Kunstwerke" published in 1982. Here he firmly expresses his adoration for gardens and nature, stating that this passion developed from an early age. Although he makes it clear that he is not a trained landscape architect, he shows a keen interest in the exterior environment and describes his willingness to develop a strong understanding for how to preserve and cultivate natural settings. His focus is not only on the interior and the building itself, but in equal measure the surroundings within which the buildings are situated. This aligns with the biophilic approach, where nature and the exterior environment are prioritised just as much as architecture and the interior environment.

"Wie sich die Stadt und der Städter künftig mit der Landschaft auseinandersetzen, davon hängt ihr Schicksal ab. Er kann sich dieser Aufgabe nicht entziehen, indem er sie in einem ‚ursprünglichen' Zustand zum Tabu erklären versucht. Er wird sich also mit Landschaftsfragen als Fragen seines Lebensraumes gründlich auseinanderzusetzen haben – davon wird sogar die weitere Existenz dieser Welt in hohem Grade abhängen. Der Großstädter wird das alles aber am besten erkennen und erlernen durch jene eigenen Erlebnisse im Umgang mit gesunder Vegetation, die ihm am besten ein eigener Garten, die ihm Gartenarbeit, Gartenkultur bietet."[12]

Rainer was an early supporter of environmentalism, prophesizing many climate change issues well before they were put onto any political agenda. He believed the city and its residents needed to reconcile their relationship with nature to understand what they are missing out on and what they could lose entirely. In the previous quote he introduces one of his main arguments, which is every resident should have access to a private garden. Rainer presumes that residents in the city will best be able to reconcile with nature in a garden where their privacy cannot be disturbed. In such a situation, people feel comfortable enough to interact personally with nature and thereby learn of the value and benefits it can bring.

"Wer ein ebenerdiges Haus bewohnt, kann mit einem Schritte eine größere, unter freiem Himmel liegende Wohnung betreten – die ‚Freilichtstube,' (...) Seine Räume können kleiner und auch niedriger sein, man kann an umbautem Raum sparen, wenn er sich unmittelbar in den eigenen Garten hinaus fortsetzt."[13]

This quote introduces Rainer's next major principle of designing residential districts as low-rise complexes, preferably consisting of single-storey buildings. By doing so, every resident has direct access to a garden, as opposed to living in a high-rise apartment building, where access to a green space is prolonged due to the journey via a staircase or lift. He also argues that living space can become more compact, as the garden provides the inhabitant the necessary extent to feel comfortable.

"Auch die Benutzbarkeit eines Wohnhauses wird durch seine Höhe nicht verbessert – während im Gegensatz dazu Bürohäuser, Hotels, Krankenhäuser usw. durch das Zusammenwirken zahlreicher verschiedener Räume funktionieren, die am besten mit Aufzügen miteinander verbunden werden, so daß für solche Zwecke Hochhäuser vielfach schon aus den inneren Organisationsbedürfnissen zweckmäßig sind."[14]

Rainer had a clear opinion on what typologies best suit a residential district. He argued that high-rise building typologies had a place in the built environment, less so in residential districts, as this deprives residents of their access to a private garden. Therefore, it is clear Rainer was an advocate for the single-family home. Nonetheless he was aware of the criticism aimed at the emerging typology associated with the single-family home and he felt the definition had become obscured:

"Er verwechselt das 'Einfamilienhaus' mit dem auf einer großen Parzelle allseits frei stehenden Einzelhaus, dem ‚Eigenheim' landläufiger Vorstellung. In dieser städtebaulich unwirtschaftlichen Form entstehen Einfamilienhäuser aber erst seit etwa fünfzig Jahren. Vorher haben sie in ganz anderer Art, nämlich als durchwegs aneinandergebaute Häuser auf sehr kleinen Parzellen mehrere tausend Jahre lang den Städtebau fast aller großen Kulturen beherrscht – sei es als Atriumhäuser des Mittelmeerkreises oder der mohammedanischen Großstädte West- und Zentralasiens, sei es als chinesische Hofhäuser, sei es als Reihenhäuser der west-, nord- und mitteleuropäischen Städte; Einfamilienreihenhäuser prägen auch heute das Wohnungswesen der sehr gut funktionierenden holländischen und englischen Städte aller Größen, einschließlich Londons."[15]

Fig. 78 - terraced house typology, Muswell Hill, London

Rainer argues that when you look back to the vernacular single-family home, it is a far cry from the free-standing suburban typology, which fully took over control following WWII. The main criticism aimed at the detached single-family home is the wasteful use of land. In an apartment building, land can be developed densely, by adding more storeys and therefore more homes. Rainer points to the high-dense, but low-rise typologies that still provide access to private outdoor space, such as terraced housing, atrium-house-, or courtyard-house typologies. Rainers theory for how the obscured definition of the single-family home emerged, originates in the "verkleinerte Nachahmung jener feudalen Landsitze der Renaissance."[16]

"War schon die ‚Villa' der ‚Oberen Zehntausend' eine Nachahmung dieses Typus im verkleinerten Maßstab und in ganz anderen gesellschaftlichen und örtlichen – großstädtischen – Verhältnissen, so ist fünfzig Jahre später das Eigenheim wieder als Kümmerform der Villa, sozusagen als zweite Degenerationsstufe, aus dem Wunsch entstanden, die ‚vornehme' Hausform einer möglichst breiten Schicht zugänglich zu machen, die sich ja auch sonst von der Vorstellung repräsentativen Wohnens nicht lösen konnte und Repräsentation in kleinstem Stil bis heute weiterzuführen versucht."[17]

Rainer argues that emulating this Renaissance desire on a miniature scale is a futile pursuit. On top of that, he criticizes the manipulation of nature in many baroque or renaissance gardens:

"Wenn der Stadtplan so behandelt ist wie der Gartenplan, dann wird klar, daß die meisten außerhalb der Bebauung entstandenen Schloßgärten nicht in erster Linie der Erholung gedient haben, sondern vielmehr als Traumresidenzen gebaut worden sind, deren grüne Wände die Macht und den Geist der Zeit, unbehindert durch Zwecke und Finanzen, zum Ausdruck zu bringen hatten."[18]

Rainer, like many others in the past, suggests that „Schloßgärten," although created with nature simply replicate architecture by manipulating nature. Hedges are sheared to create tall imposing walls; long straight lines of sight are carved into the landscape, predominantly guiding the eye towards the home of an autocratic, aristocratic ruler, "... not a twig is suffered to grow as nature directs; nor is a form admitted but what is scientific, and determinable by the rule or compass."[19] This is obviously contradictory to the biophilic approach, as natural landscape promotion is encouraged with minimal management. Rainer implies that the restorative effects of nature were never appreciated, and these gardens were laid out to instil awe and veneration for the aristocratic ruler that exploited enough people to create his paradise on earth.

"Sie lösen sich auch von den natürlichen Voraussetzungen nicht ganz – man hütet sich, diese zu vergewaltigen: Wasserläufen bewahrt man auch dann, wenn sie strenge Palast- oder Klosteranlagen durchziehen, ihre natürliche Krümmung, Bäume bleiben in unregelmäßiger Verteilung stehen – ganz im Gegenteil zu westlichen barocken Schlössern und Parks, wo man mit diesen wichtigen Elementen natürlicher Umwelt nicht anders umgeht als mit Ziegeln oder Bausteinen."[20]

Rainer agreed with the traditional East-Asian approach to dealing with nature and he had a particular admiration for Chinese gardens and the importance of nature in Chinese culture.

"Gleichgültig ob diese tiefe Naturverbundenheit Chinas, wie sie auch im Taoismus zum Ausdruck kommt, die Folge seiner großartigen landschaftlichen Schönheit und des märchenhaften Reichtums an Vegetation ist – wie er sich ja sogar noch in jedem unserer Gartenkataloge spiegelt! – oder ob sie erst

durch den Taoismus geweckt wurde – Tatsache bleibt jedenfalls, daß Landschaft in keiner anderen Hochkultur so früh eine beherrschende Rolle gespielt hat.“[21]

Rainer advocates looking towards the Middle East and further east to gain inspiration for creating low-rise housing, that still provides the desirable private garden, as well as steering away from representative imitations. The traditional Chinese courtyard-house was a major influence for Rainer and many of the fundamental principles of this typology are discovered in Rainer’s many housing developments.

“Gemeinsam ist all diesen Hofhäusern ein wichtiges Merkmal, das die Einheit von Haus und Hof und die Abgeschlossenheit beider nach außen deutlich zum Ausdruck bringt: gegen die Umgebung sind Häuser und Grundstücke mit dicken, hohe, meist fensterlosen Mauern abgeschlossen, während dagegen Haus und Hof nur durch leichte Holzfachwerkwände voneinander getrennt sind, die zu einem großen Teil in zarte Gitterwerke aufgelöst sind, deren Öffnungen mit Papier bzw. neuerdings mit Glas verschlossen sind.“[22]

The main potential Rainer saw in the Chinese courtyard-house typology is the level of privacy the outdoor space receives, because it is enclosed from all sides. By creating solid walls on the outside of the house, it allows the walls bordering the courtyard to become as transparent as possible, increasing the inhabitant’s connection to the exterior environment, whilst maintaining a comfortable level of privacy. Further, the public space is no longer dominated by representative facades, the focus lies on the interior of the house with its courtyard. The importance of walls bordering a garden was of particular interest to Rainer. He believed they enclosed and formed exterior space in a similar manner to interior space, the difference being the sky is the ceiling. By enclosing the garden with walls and constructing the interior wall bordering the garden as transparent as possible, he believed the house transforms into a covered recess within the garden. This allows inhabitants to use the space outside as freely and unrestricted as if they were inside.[23]

Fig. 79 - Chinese courtyard-house typology, Suzhou, China

Rainer was a vocal supporter of using nature's free endowments in the built environment. As mentioned previously, he was very much aware of the importance of maximising daylight within the interior of buildings. He repeatedly recommended using the correct orientation, so that frequented spaces don't face north, in the case of buildings situated in the northern hemisphere. In addition, Rainer asserted that the correct building orientation was also an important consideration, when it came to creating comfortable exterior environments. For example, in the "Planungskonzept Wien" Rainer references a study he initiated by the architect Friedrich Pangratz that shows how the orientation of a building mass that is long and rectangular in plan will have a substantial effect on the exterior environment due to the shade it produces. If the long sides are facing east and west, then much larger areas will be shaded throughout the day, compared to an orientation where the long sides are facing north and south.[24]

"Wenn im Hof eines alten Hauses ein Baum steht, dessen Stamm von den Bewohnern immer wieder gekalkt wird wie die Wände des Hauses und Hofes, wirkt er als selbstverständlicher Bestandteil der Behausung, und tatsächlich wird dieser Hof erst durch den Schatten des Baumes ein bewohnbarer Raum, dessen schützendes Dach die Bewohner außerdem mit Früchten, mit Luftfeuchtigkeit und damit Kühlung, vor allem aber mit Sauerstoff versorgt, ihnen Windschutz gibt und sie überdies den Wechsel der Jahreszeiten erleben läßt."[25]

Rainer's view on trees was they should be preserved at all costs. Justifying the removal of existing trees by planting new trees was no excuse for Rainer. He talks of the comparatively short time it takes for a chainsaw to cut down a tree compared to the decades that must pass for a tree to grow and control a micro-climate.[26]

"Angesichts der schweren Umweltsorgen dieser Zeit beginnt man sich allenthalben zu erinnern, wie notwendig Vegetation ist, um leben zu können. Man wird bald allgemein erkannt haben, daß Vegetation, vor allem Bäume, in Städten durch nichts ersetzt werden kann, am wenigsten durch Technik, deren lebensbedrohende Auswirkungen ja im Gegenteil nur durch Vegetation ausgeglichen werden können – oder könnten."[27]

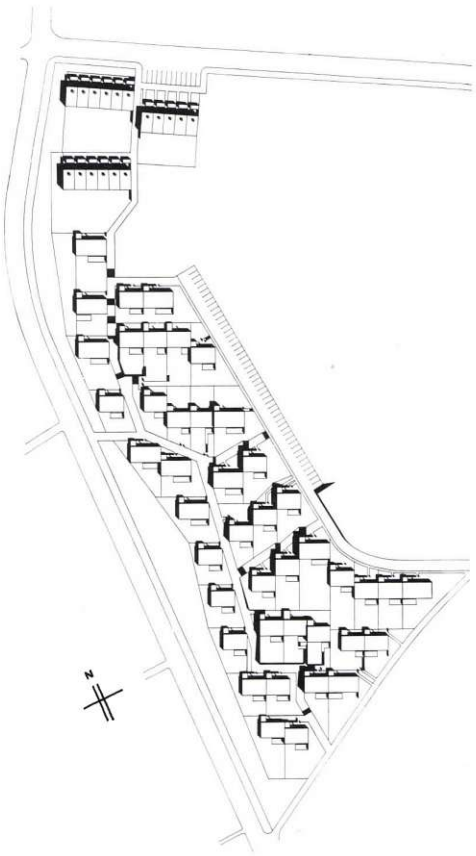
In the 1970s Rainer was already aware of the urban-heat island effect and what value trees have in mitigating this phenomenon. He was aware of the differences in temperature from natural landscapes compared to urban cityscapes and the cooling effect natural landscapes have on the outer districts of a large city, such as Vienna. However, he understood that natural landscapes on the border of a city could only exert an influence up to a certain distance and the only way to mitigate the urban-heat island effect in central parts of the city was to distribute vegetation, especially trees throughout the urban environment.[28] On a micro-level Rainer also saw the many benefits of including and preserving trees in his designs. He thought of them as the most efficient natural air conditioners, as well as the most adaptive passive solar design solutions. When it came to south-facing facades Rainer suggested planting deciduous trees in front of them, so that the branches full of leaves in summer provide the necessary shade and in winter the empty branches let the much-needed sunlight stream through.[29] If there is a desire for shelter from wind, Rainer suggested planting coniferous trees.

"... angesichts der gefährlichen Folgen einseitig technischer Regulierung für Landschaft, Wirtschaft, Klima usw. darf es künftig nicht mehr um die ‚Entwässerung' der Städte und des Landes gehen, nicht mehr um möglichst rasche Ableitung des Wassers, sondern es muß im Gegenteil darum gehen, die Niederschläge

aller Art möglichst an Ort und Stelle zu halten und der Vegetation und dem Grundwasser zuzuführen – sowohl durch Aufforstung im Hochgebirge als auch durch Erhaltung möglichst aller Bach- und Flußschleifen und ihres Bewuchses und durch eine naturnahe Verbauung, sei es durch Versickerung des in den Städten fallenden Regens an Ort und Stelle – kurz, durch ein Mindestmaß an Eingriffen in das natürliche Gleichgewicht oder durch Wiederherstellung desselben."[30]

Rainer was passionate about the element of water and the correct handling of rainwater. He was also an early advocate for reducing the area of non-permeable surfaces in the urban environment. Rainer understood that sealing the ground by covering it in concrete and asphalt was lowering the water table and depleting groundwater sources, as well as increasing the likelihood of flooding. Therefore, Rainer was a staunch supporter of retaining all rainwater on site. Otherwise, the roots of trees can no longer reach to the depths of the underlying groundwater, so the unfortunate alternative is to water the trees with processed chlorinated tap water. He suggests retaining rainwater in cisterns, so it can be used to irrigate plants in a garden or collecting the rainwater in systems that allow it to percolate down to underlying groundwater. He also stresses how important ponds are for their cooling effect, as well as the habitat they can provide for many different species.[31]

Fig. 80 - Siedlung Mauerberggasse masterplan



Biophilic Construction

Siedlung Mauerberggasse (1961-1963)

As the previous paragraphs clearly demonstrate Rainer's residential theories convincingly relate to biophilic principles. He was aware of the restrictions to planning developments in harmony with nature and his aim was to provide solutions to fulfilling this goal, whilst maintaining the required density of urban areas. In a sense, many of his developments are research projects and the first attempt at implementing his vision for an economical dense urban environment closely connected to nature was the "Fertighaussiedlung Veitingergasse." The next opportunity for Rainer to construct his vision in Vienna was the "Siedlung Mauerberggasse," situated in the 23rd district. He was commissioned by the "Zentralsparkasse der Gemeinde Wien" to design a housing development on a steep south-west facing site.

Fig. 81 - Siedlung Mauerberggasse, 1963 - view towards southwest

Fig. 82 - Siedlung Mauerberggasse, 1963 - low-lying development guaranteeing privacy for residents

Rainer planned the development as a mixed typology, consisting of 17 plots for two-storey terraced houses and 43 plots for single-storey houses. Naturally, each plot came with a private garden and all the buildings were oriented towards the south-west. The single-storey houses were distributed around the site in groups, as terraced houses, or free-standing houses.[32] Two parking lots on the edge of the site provide parking spaces for all the residents, reserving the interior of the development for pedestrian use only. Due to the favourable site conditions, Rainer was interested in the use of passive solar design. In the case of the single-storey homes Rainer's design was particularly successful. The entire south-west facing façade was constructed as transparent as possible. In the living room, there were floor to ceiling windows and in the bedrooms approximately half of the wall space was glazed. This allowed Rainer to maximise daylight and solar gain within the interior. On the outside of the south-west-facing façade louvre shading devices were fixed to the wall above the living room window. They extended out horizontally to block the midday summer sun from entering the room, whilst allowing the winter sun to penetrate far into the interior.

Wood was one of the main construction materials. The ceiling structure consisted of visible wooden beams and the south-facing façade was a timber frame construction. The rest of the external walls were constructed with "durisol" bricks. "Durisol" or wood-concrete is a composite material consisting of "wood which is chipped into wood fibre before being mineralised and bonded together with cement."[33] Now it is marketed as a sustainable product, as it can be produced recycling by-products from the timber industry, whilst reducing the amount of concrete needed, as well as the fact most of the construction material is made up of a natural one. Rainer used this construction material in the early days of its development and perhaps he chose it for its environmental credentials.

Fig. 83 - Siedlung Mauerberggasse, 1963 - northeast facing façades single-storey typology

Fig. 84 - Siedlung Mauerberggasse, 1963 - southwest facing façade single-storey typology

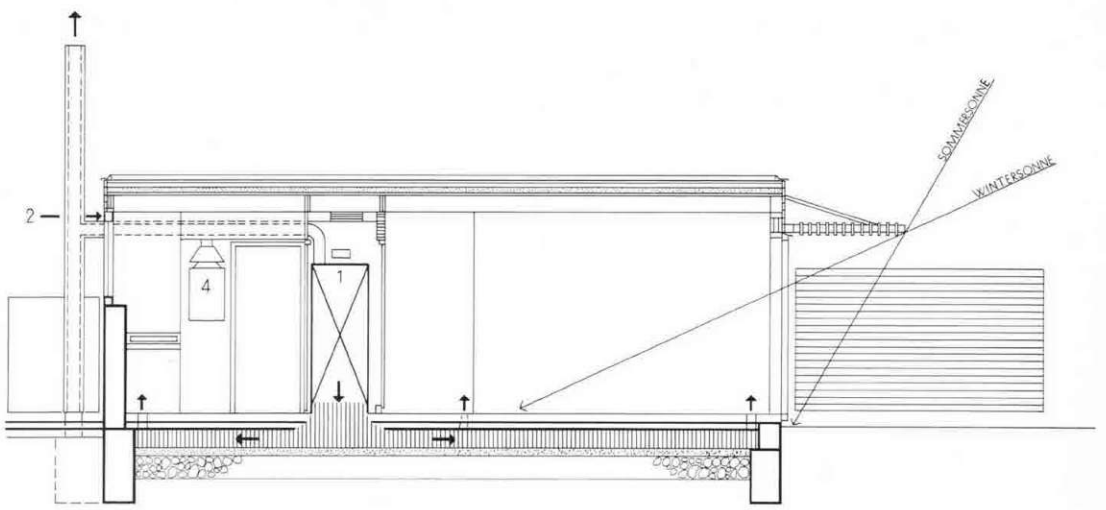


Fig. 85 - Siedlung Mauerberggasse, 1963 - section diagram single-storey typology

Gartenstadt Puchenau (I 1965-1967/ II 1978-1992/ III 1998-2000)

In 1962 Rainer was commissioned by the housing association "Neue Heimat" to design a garden city in the village of "Puchenau" on the outskirts of Linz. "Puchenau I" was the first stage and it presented Rainer with the opportunity to test his urban planning philosophy on a larger scale. He was commissioned to design a mixed typology housing development on a site bordered to the north by a busy main road and to the south by the Danube. Rainer believed the single-family home with a private garden was considered the most desirable typology by the Austrian population. Due to the lack of affordable single-family homes, "Puchenau I" was proposed by Rainer and "Neue Heimat" as the solution to granting the population's wish at an affordable price, without recklessly wasting land in the process.[34]

His original plan featured apartment homes bordering the main road on the northern perimeter of the site to provide a sound barrier. Infront of the apartment homes were rows of two-storey terraced houses, oriented towards the south. This typology represented the majority of homes in the initial urban plan. The rest of the site bordering the Danube was comprised of single-storey homes. The site rises gradually from the Danube in the south to the main road in the north, so the staggered heights of the different typologies ensured that a minimum of buildings adversely shaded their neighbour. Rainer also planned other amenities for the development, such as a church, a school, and a multi-purpose hall. Before construction work fully began, model houses of the different typologies were built for prospective buyers and the public to visit. During this period interest for the single-storey atrium houses grew, so there was a restructuring of the original plan to include

Fig. 86 - Puchenau I, 1967

Fig. 87 - Puchenau II, 1992 - steel structure sheltering pedestrian routes

more houses of this typology instead of the terraced house typology.[35]
Most of the parking spaces for residents were located on the western, eastern, and northern perimeter of the site. There are two roads entering the housing development ending in a dead end before the single-storey homes. Otherwise, the remaining area of the site was reserved for pedestrian use only. Many of these internal pedestrian routes were covered by a steel structure to provide shelter from rain.

"Selbstverständlich müssen Niederschläge, die auf Wege und Terrassen fallen, an Ort und Stelle gehalten, müssen Pflasterungen immer regendurchlässig hergestellt, sollten niemals betoniert oder asphaltiert werden. In der Gartenstadt Puchenau bestehen z.B. alle öffentlichen Fußwege aus 4 cm dicken Waschbetonplatten auf einer 10-cm-Sandschicht; sie sind seitlich von schmalen Streifen begleitet, die teils mit Grobschotter bedeckt, teils mit Bodendeckern und Kleinbäumen bepflanzt wurden, die begreiflicherweise besonders schnell gediehen sind. Diese Art der Erschließung, die Betonplatten, Randsteine und Straßenkanalisation spart, ist unvergleichlich billiger als die übliche."[36]

This quote describes the construction method Rainer employed for the pedestrian circulation routes. It is a testament to Rainer's principles on how to deal with rainwater, and he further justifies this construction method as being more economical than common methods at the time.

The final defining feature of "Puchenau I" are the 1,8 m high walls that enclose all gardens. This most certainly stems from his research on Chinese and Middle Eastern typologies and fulfils the requirement of privacy that Rainer believed to be so important. Many critics strongly disagreed with the use of garden walls in "Puchenau I," referring to the development as Rainer's concentration camp.

Rainer argued the walls clearly defined the space in the exterior public environment and according to a study involving the residents of the "Gartenstadt Puchenau" conducted in 1984:

"79 Prozent der Befragten halten die Mauern als Einfriedung der Gartenhöfe, wie sie derzeit sind, für die beste Lösung."[37]

In 1978 construction work began on "Puchenau II." The second stage was implemented on the site of a former golf course that bordered "Puchenau I" to the west, covering an area more than double the size of the first stage. The aim was to adapt the second stage to the research findings from post-occupancy studies conducted with the residents in "Puchenau I." In hindsight, Rainer admitted the approach in the first stage was perhaps too rational and frugal. He argued there were financial restrictions at the time and their approach had to be radical.[38] For this reason, "Puchenau II" contained even more varied typologies and the urban plan was no longer forced into a single rational grid. Nonetheless due to the similar orientation, there was the same progression of heights from north to south. One of the major interventions differentiating the first stage from the second stage was the use of underground parking. Once again multi-storey apartment buildings, representing the tallest typology, were placed along the northern perimeter of the site to provide a sound barrier from the busy main road. The underground parking was placed beneath these apartment buildings. Consequently, the entire area of "Puchenau II" was reserved for pedestrian-use only and no roads entered the residential areas of the site.

"Bei einer so lang ausgedehnten Siedlung ist es natürlich wichtig, dass man sich orientieren kann. Da gibt es ausser der Höhenstaffelung von Nord nach Süd noch eine grosse Längsrippe, eine Spielstrasse, die auch für Einsatzfahrzeuge und Notfälle ist, und diese Spielstrasse ist weiträumiger, sehr abwechslungsreich mit Schwingungen und Krümmungen, davon zweigen kleine Seitengassen ab. Zusätzlich habe ich versucht durch Bepflanzung zu differenzieren."[39]

The central promenade running the entire length of "Puchenau II" is a clear example of what Rainer learnt from studying the mishaps that occurred in the first stage. Compared to the straight lines and right-angle corners that defined the circulation routes in "Puchenau

Fig. 88 - Puchenau I & II masterplan

I," the central promenade twists and turns, creating a pathway that is more enticing and stimulating. It breaks up the site into multiple complexes that protrude in and contract away from the central promenade, resulting in an urban plan that is less rigid and more varied.

A further adaptation that was initiated by post-occupancy studies was the inclusion of private sheltered outdoor spaces bordering the public-footways. Residents in "Puchenau I" enjoyed the privacy of their private gardens, but they felt it was necessary to increase contact with the public realm and at least provide a sightline into it. Therefore, Rainer also included windows in the kitchen, that enable visible contact with the public circulation routes.[40]

The final stage of the "Gartentstadt Puchenau" represents a fraction of the overall district. It's situated on the final plot of land left between the main road and the Danube towards the west of the former two stages. It was completed in 2000, when Rainer turned 90.

Fig. 89 - Puchenau II, 1992 - view towards Danube

Fig. 90 - Puchenau II, 1992 - central promenade

Sommerhaus St. Margarethen

Burgenland

1957

Fig. 91 - view into southern courtyard

Client/ Brief/ Location

"Niemanden zu stören und selbst nicht gestört zu werden ist der Gedanke dieses Sommerhauses..."[41]

The construction and design of the "Sommerhaus St. Margarethen" coincided with the final construction stages of the "Wiener Stadthalle." Rainer designed this house as a retreat for himself and his family. He felt the urge to design a typological antithesis to the enormous technologically complex building site he encountered whilst working on the "Wiener Stadthalle." For this reason, the "Sommerhaus St. Margarethen" was reduced to the absolute technological minimum, only providing to the fundamental needs of a human shelter.[42]

The site is situated in "St. Margarethen" in "Burgenland," which is particularly famous for its quarry, owned by the House of Esterhazy. This quarry has a historical significance dating back to the Roman times. Rainer acquired a site to the west of the quarry. This area was once home to the "St. Margarethen/ Rust" train station and consequently the landscape was disfigured by railway tracks and dotted with other railway infrastructure. The station was used for passenger trains, as well as the cargo transport of stones collected from the adjacent quarry. "St. Margarethen/ Rust" was the final stop on a short railway line that connected "St. Margarethen" to "Schützen am Gebirge," a stop on the main railway line connecting Bratislava to Sopron. This railway line began operation in 1897 and up until 1949 "St. Margarethen/ Rust" was used for

passenger transport. In 1952 the railway line operation to "Schützen am Gebirge" was cancelled entirely and stone from the quarry was transported using lorries instead. Rainer was introduced to the site by the sculptor Fritz Wotruba. Wotruba had an interest in acquiring the former engine shed and converting it into his atelier. Before doing so, he consulted Rainer and showed him the site. Eventually Wotruba would lose interest, however Rainer was so curious about the landscape and its history, that he decided to build his own holiday home on a field that bordered the former engine shed.[44]

"Nach Auflassung einer Lokalbahn und ihrer Zubringergleise zum Steinbruch waren dort nach dem Zweiten Weltkrieg Brachen entstanden – ein von Disteln und Robinienbüschen überwachsenes Maisfeld des Bahnhofverstehers, große, ebene, mit Schlacke bedeckte Gleisflächen, außerdem eine bizarre Ruine eines riesigen Lokomotivschuppens, aber auch ein tiefer, guter Brunnen..."[45]

This was Rainer's description of the site when he first encountered it. He felt the landscape was scarred from the human industrial occupation and his aim was to nurture the landscape and help nature return to a place she was once taken from. The first step was to pile a thin layer of agricultural soil over the remaining railroad infrastructure and then wait and hope for nature to take its course.[46] Visiting the site more than 60 years after Rainer first settled there is proof that his aim is fulfilled. The summerhouse is surrounded by a prosperous wooded landscape, so that it remains hidden during the approach along the "Am Alten Bahnhof" road.

When Rainer completed his summerhouse, he unknowingly lay the foundation for an ensemble of buildings that would develop around this remarkably small area, now considered a pilgrimage site for Austrian modernist architecture. The next building to join the ensemble emerged when a former resident of "St. Margarethen" was interested in converting the former "St. Margarethen/ Rust" train station into his holiday home. Dr Gruber grew up in "St. Margarethen" and frequently used the train station to go to "Eisenstadt" for his schooling. When the station was put up for sale his mother mentioned to him that it was a good deal.[47] Unaware that a famous architect lived on the property next door, Dr Gruber purchased the former train station, then relatives suggested he consult Rainer for his opinion on how to develop it.[48]

Fig. 92 - St. Margarethen quarry railway entrance

Fig. 93 - St. Margarethen quarry transport carriage

Fig. 94 - „Haus Gruber," 1965 - Roland Rainer

"Als er meinen Vorschlag sah, ein 'Pseudo-Esterhazy' mit Bögen unten und Terrasse oben, da sagte er, das ginge überhaupt nicht, und er würde mir einen Gegenvorschlag machen. Und er fügte hinzu: Würde ich diesen kitschigen Entwurf bauen, dann müsste er wegziehen, denn das könnte er nicht ertragen."[49]

This was the reaction Dr Gruber received when he first consulted Rainer. Eventually Rainer would get a group of students to measure out the site and then Dr Gruber and Rainer proceeded to design the house together.[50] Rainer designed a new-build home on the spot where the former train station once stood, integrating the cellar into the floorplan. Otherwise, the new floorplan extended further out in multiple directions. Rainer made sure to carefully slot the building masses between the existing fully grown trees. The "Haus Gruber" was completed in 1965, representing a direct continuation of Rainers summerhouse, constructed with similar materials, designed following the same principles, although larger and more sophisticated, as the home had to be winterproof.

The next seminal building to join the ensemble was the "Bildhauerunterkünfte Bildhauersymposion St. Margarethen" designed by "Johann Georg Gsteu." This building lies in close proximity to the quarry entrance used to transport goods down to the train station, to the east of the homes Rainer designed. In 1959 an international sculpture symposium spearheaded by "Karl Prantl" was held at the quarry in "St. Margarethen."

Fig. 95 - „Bildhauerunterkünfte," 1968 - Johann Georg Gsteu

It proved to be a success and many symposiums followed. Sculptors from across the world would meet in “St. Margarethen” and produce work using the quarried stone within the towering walls of the quarry itself. After a few years the participants realised they needed some form of shared accommodation, as they were scattered across the village in separate rooms. In 1962 Gsteu was approached by the symposium association to design a shared accommodation space. The former quarry canteen was chosen as an appropriate building to convert into the desired space. Gsteu retained only the walls and cellar, even removing the plaster from the stone walls, so the original stone could see the light of day. Then he designed a new industrial roof consisting of a prefabricated ribbed concrete structure. Underneath every vault he inserted a window, which allowed daylight to filter in from above. Brick walls were constructed to divide the interior space into sleeping compartments. Otherwise, there were few interventions, and the space was sparsely furnished. The building was completed in 1968, contributing to the two earlier modernist icons, all within walking distance of one another.[51]

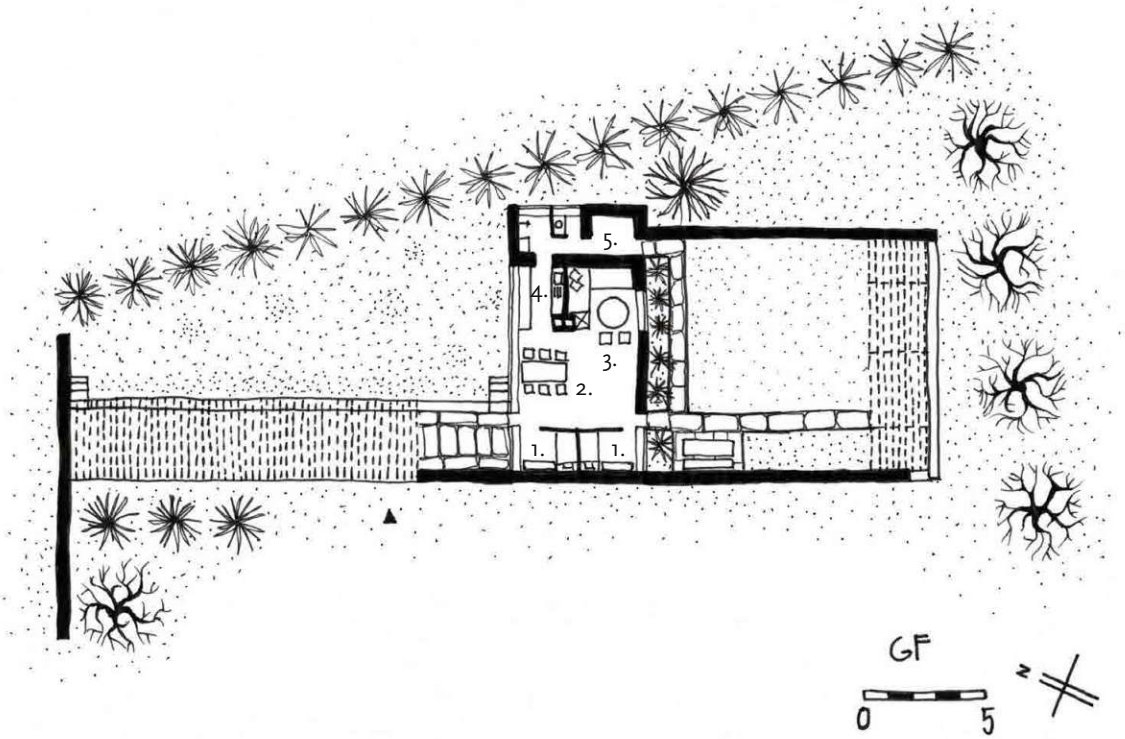
Fig. 96 - sculpture symposium St. Margarethen

Building Description

The “Sommerhaus St. Margarethen” is a single storey building comprising a total floor area of approximately 50 m². It is a compact design, and the interior space is in essence one rectangular room with partition walls generating niches within the overall volume. Curtains substitute solid doors, where an interior separation is necessary. The site lies at the foot of the Koglerberg, so there is a slight inclination from southwest to northeast. Rainer positioned the house within the terrain, so that the long sides of the interior volume face southeast and northwest. Infront of the southern facing façade Rainer created a court by extending the exterior walls on the eastern and western side into the garden. A pergola spans across the edge of the garden from the tips of the exterior walls completing the court. On the opposite side, the exterior wall on the western side extends out into the garden by 3,8 m, adjoining a long narrow pergola which terminates by a garden wall that stands perpendicular to the other exterior walls.

It is a rational floorplan consisting of two small bedrooms, a dining area, a kitchenette, and a lounge area flanked by the iron stove that lies in a central position within the building. Behind the kitchenette lies a storage room, a toilet, as well as a washroom. The room height is also reduced to a minimum with a height of 205 cm from the floor to the underside of the ceiling joist. The majority of the building reaches an overall height of 2,36 m, with the chimney stack extending up to a height of 5 m. The exterior walls are 2 m tall.

Fig. 97 - „Sommerhaus St. Margarethen“ floorplan



1. bedroom
2. dining area
3. seating area
4. kitchenette
5. storage room

Biophilic Criteria Evaluation

Environmental Features

"Aus dem nahen Steinbruch konnten Steine und Sand als Material für alle Haus- und Gartenmauern und die Fußbodenbeläge in- und außerhalb des Hauses herangebracht werden. Der im frisch gebrochenen Zustand weiche Stein kann mit dem Maurerhammer zugerichtet werden, alle Fugen sind mit Steinscherben sorgfältig ausgekeilt, so daß der aus dem Sand des Steinbruchs hergestellte Kalkmörtel kaum sichtbar ist, und nur der poröse Stein selbst zur Wirkung kommt."[52]

The defining feature of Rainer's summerhouse is the stone obtained from the adjacent quarry used for its construction. It is a particularly sustainable choice of a natural building material, as it had to travel such a remarkably short distance to get to the building site. A calcareous sandstone is mined from the quarry, which belongs to the Leitha limestone geologic formation. The stone is predominantly comprised of lagoon sediments, such as mussels or corals that are cemented together with calcite cement.[53] Rainer was particularly interested in showing the natural merits of this stone. For that reason, he concealed the lime mortar, also manufactured using sand from the quarry, by positioning it behind the exterior surface of the wall and filling the joints between each block with shards of stone. On top of that, Rainer mentions how the qualities of this stone make it relatively easy to handle, so he was also interested in revealing the patterns of manual labour that went into producing the stone walls:

Fig. 98 - calcareous sandstone walls from St. Margarethen quarry

"Die so entstehenden natürlichen Unregelmäßigkeiten von Material und Arbeit, die ‚Handschrift' des Steinmaurers, gibt dem Mauerwerk eine lebendige und selbständige Sprache, die gewollte Unregelmäßigkeiten ebenso spart wie das Schneiden und Schleifen gewachsenen Materials zu abstrakten, regelmäßigen Flächen und mit natürlicher Umgebung von selbst eine Einheit eingeht, die mit dem Wachstum von Flechten, Moosen und Gräsern von Jahr zu Jahr fühlbarer wird."[54]

In this quote Rainer also touches on the fact these stone walls were designed to embrace nature by helping plant life take root in the many cracks and crevices. However, not only were the walls designed to welcome in flora. Rainer was also proud of the fauna, the lizards that were able to make their home there.[55]

The second most dominant material is spruce wood. All the window frames, door frames, most of the furniture and the roof structure was constructed using spruce. On the outside the wood was treated with a mixture of linseed oil and turpentine, allowing the wood to take on a black stain over time. This treatment was consciously chosen, so that the wood appears to age naturally, whilst remaining resistant to the elements.[56] Further natural building materials include hemp strands, used to seal the window and door frame joints, sheets of thatched reed included in the roof insulation and all the interior walls were limewashed. The artificial materials used in Rainer's summerhouse are concrete for the foundations, bitumen used in the tar paper on the roof to provide a vapour seal, steel used for the pergolas and a layer of glass wool included in the roof insulation.

Fig. 99 - view of north facing façade

"Darüber hinaus können und sollten im Garten auch gefährdete oder ausgerottete Pflanzen wieder angesiedelt werden – das ist bei entsprechend sorgfältiger Beachtung der Standortbedingungen, von Boden und Klima, leicht möglich. So breitet sich (...) im Burgenland die dort so gut wie ausgerottete Zwergmandel neben iris pumila, verbascum phoenizicum, adonis vernalis usw., während sich (...) datura stramonium von selbst angesiedelt hat."[57]

As mentioned previously, Rainer's stated aim was to allow nature to flourish once again on this small plot of land. He was knowledgeable of the native species to "Burgenland," and he was aware of the biological benefit to including native species in the planting of his garden. To the north of the house Rainer built a raised bed, to even out the slight inclination of the site. He used this raised bed as a kitchen garden and planted several herbs. Further, he planted grape vines at the foot of the pergola structures, allowing them to wind their way along the steel profiles.

Almost all surfaces of the summerhouse, excluding the roof are permeable. Rainer used stone slabs from the quarry for all the exterior pathways and the southern court is covered in gravel. As the house is of such modest size, the rainwater runoff from the roof is directed through a spout into the kitchen garden. This spout appears to be a later addition, as it cannot be seen on early images of Rainer's summerhouse. When it came to developing a drainage system for "Haus Gruber" next door, Rainer had to deal with a much larger roof area. In this situation he distributed drainage shafts filled with stones along the perimeter of the building. Waterspouts extend out of the roof and rainwater cascades into the drainage shafts, where it can collect and subsequently percolate down to the underlying groundwater.[58] Upon completion, no running water was included in Rainer's summerhouse. Water was collected manually from the existing well.[59]

Daylight enters the building from the south, the north and the east, the western façade is devoid of glazing. Small clerestory windows provide daylight in the two bedrooms. On the northern façade a horizontal band of glazing provides daylight for the dining area and kitchenette. On the southern façade there is a large window positioned next to the lounge area. Two small clerestory windows provide daylight to the toilet and washroom. As there are no individual rooms separated by walls, the interior space benefits from multiple sources of daylight creating a charming interplay of light and shadow. The ceiling height is very low, which reduces the amount of possible exposure to daylight. However, by including the majority of glazing on the two longer sides of the interior volume, as opposed to the shorter sides, daylight is still able to penetrate far enough into the interior. On the outside of the southern facing façade Rainer created an adaptable shading device for the large window next to the lounge area. Wooden horizontal louvres slotted into a wooden frame connected to a guard rail, allows residents to slide the shading device in front of the window when needed.

Exterior

Rainer successfully combined the furniture arrangement with the positioning of windows to increase the connection with the exterior environment. For the large window next to the lounge area Rainer positioned the windowsill height at 40 cm above ground with the top of the window adjoining the ceiling. Rainer positioned lounge chairs, as well as an L-shaped bench along the interior walls. Due to the low-lying position of this furniture, the height of the windowsill had to be low enough for the inhabitants to comfortably see outside onto the southern court. By the dining area on the northern facing façade Rainer positioned the windowsill height at 75 cm above ground

Fig. 100 - interior view of dining area

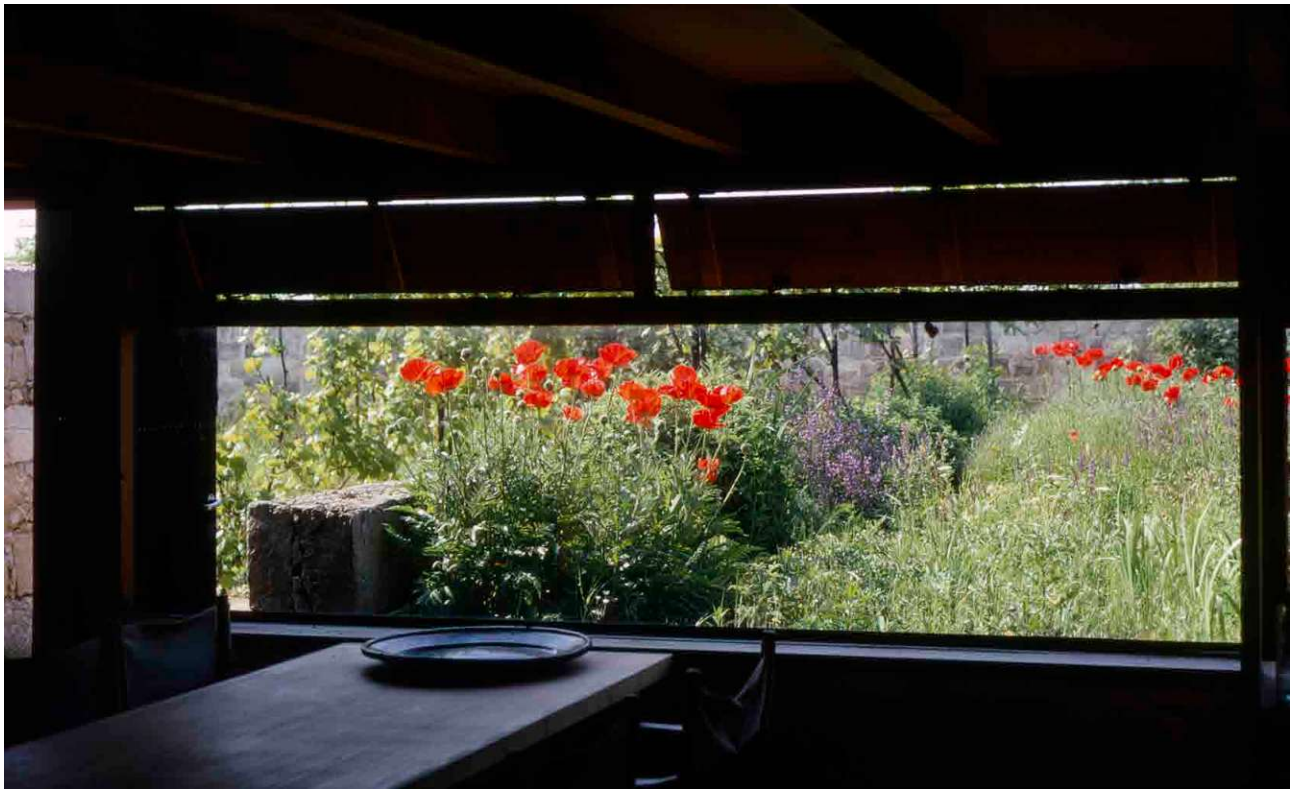


Fig. 101 - interior view of lounge area

coinciding with the height of the dining table. The dining area looks out onto the adjoining raised bed outside, so due to the seating position the line of sight is level with the herbs and plants growing there. To facilitate natural ventilation as well as a cool breeze for hot summer months all the clerestory windows were operable. Otherwise, there were wooden shutters that rotate upwards placed above the horizontal band of windows on the northern façade. This generated a view out onto the raised bed from the dining area uninterrupted by mullions.

"Optische Einheit von Landschaft und Besiedlung ist in der Vergangenheit aus einer durch die Umstände erzwungenen Beschränkung auf die örtlich greifbaren Materialien wohl meist von selbst entstanden; wenn in einer Lehmgegend in der Hauptsache Lehm als Baustoff verwendet wurde oder die Dächer von Dörfern zwischen Getreidefeldern mit Stroh gedeckt waren oder wenn Gebäude aus dunklem Holz vor dunklen Nadelwäldern stehen, wird uns erst bewußt, daß die Einordnung in die Landschaft um so überzeugender erscheint, je unauffälliger, je unscheinbarer und zeitloser Form und Material der Gebäude ist. (...) wenn ein Haus aus demselben Stein besteht wie der Fels an Ort und Stelle, so wird eine volle Übereinstimmung mit der Umgebung erst erreicht, wenn die Bearbeitung dieses Materials auf ein Minimum beschränkt wird, so daß das ganze Gebäude wie eine große, aus Steinblöcken geschichtete Stützmauer oder Weinbergterrasse wirkt, die in ihrer horizontalen Lagerhaftigkeit die Bewegung des Geländes noch unterstreicht oder in der unberührten Vegetation ringsum fast versinkt."[60]

This quote demonstrates Rainer's desire to merge his summerhouse with the surrounding landscape. The stone used to construct the walls is visible throughout. It juts out into the horizon by the peak of the "Koglerberg," the ground is a patchwork of grassland and stone plateaus, and large boulders are scattered across the hillside. The exterior walls of Rainer's summerhouse only represent an anomaly in the natural landscape due to their peculiar regularity. But then again, it could be mistaken for a retaining wall used for vineyard terraces, a sight which is certainly not an anomaly in the cultural landscape of "Burgenland."

"Aber gerade angesichts dieser so tief verstandenen und betonten Wirkung der Landschaft erscheint es wichtig festzuhalten, daß die Bauten und Höfe geometrisch streng und klar geordnet, als Architektur gestaltet sind, in deutlichem Gegensatz zur Unregelmäßigkeit der Topographie und Vegetation, deren Wirkung solcherart nicht nur nicht gestört, sondern im Gegenteil durch Kontrast gesteigert worden ist."[61]

In this quote Rainer is referencing the clear geometric regularity of pavilions in traditional Chinese palace gardens and how they interact with the irregularity and complexity of nature. He believes the rational geometric clarity creates a contrast to the natural landscape that enhances its beauty, rather than destroying it. Therefore, Rainer believed the exterior walls of his summerhouse create a contrast in the natural setting. However, by keeping the form as minimalist as possible and using the material that belongs to the landscape this contrast won't clash with nature. On the contrary, this contrast heightens our awareness and helps us appreciate its beauty.

"Landschaftgebundenes Bauen heißt nicht, steile Dächer zu machen und historische Formen zu sammeln, sondern sich der Landschaft möglichst zurückhaltend, bescheiden und unsichtbar einzuordnen."[62]

Rainer criticises the building regulations encouraging people to design houses with pitched roofs to fit in with the perceived

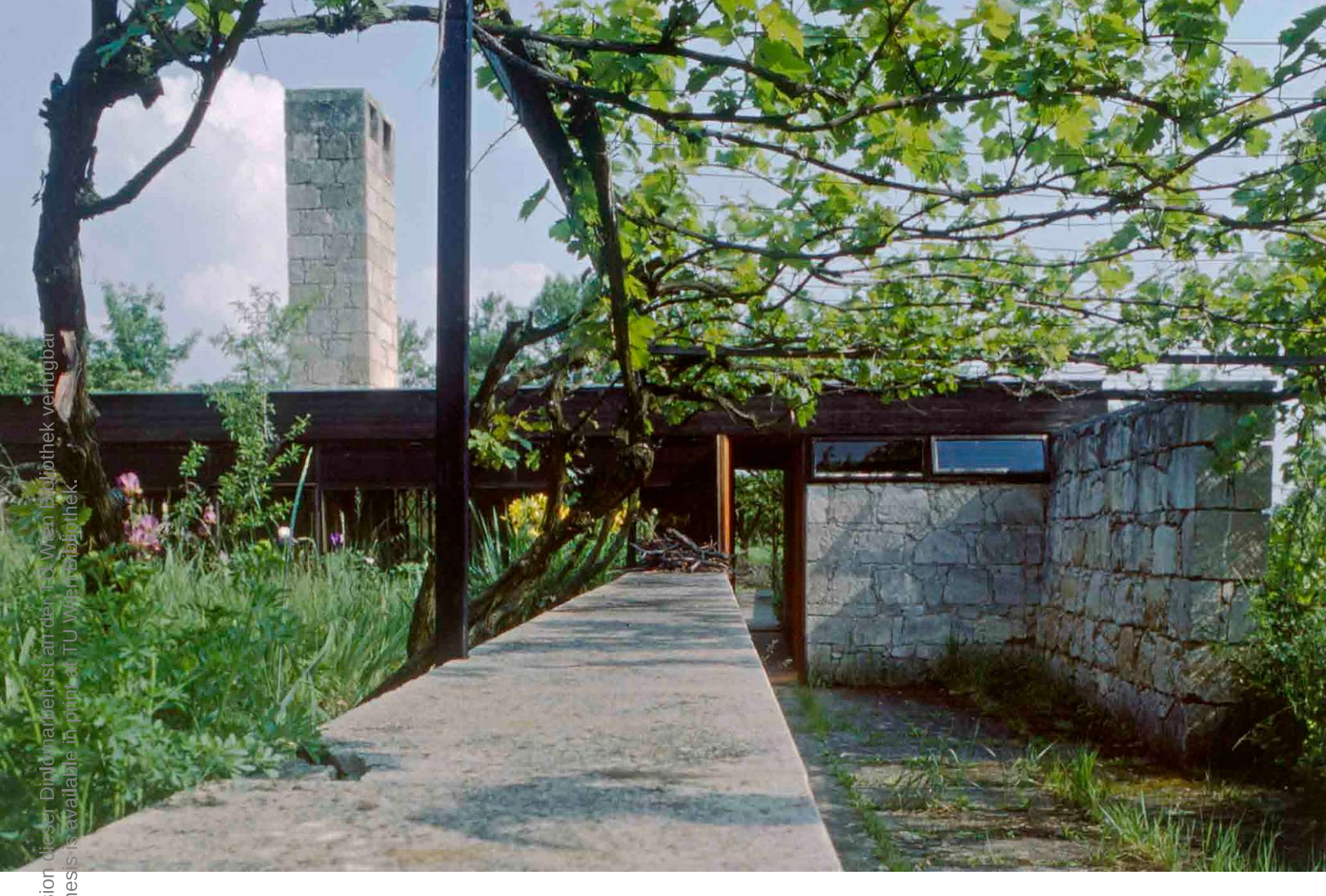


Fig. 102 - view to north facing façade beneath grape vine pergola construction

traditional village aesthetic. The reason he designed his summerhouse as a single storey building with such a low ceiling was to make sure it remained inconspicuous within the landscape. By making sure the building remained close to the ground it stands out less amongst the natural vertices, such as trees or rock formations.

"Wände und Dächer aus beschnittenen und dadurch dichter gewordenen Bäumen und Hecken, berankte Gitterwände und Pergolen haben seit jeher in hohem Grade Raum gebildet – lebendigeren, transparenteren als gebauter Raum sein kann, erfüllt vom lebendigen Spiel von Licht und Schatten, veränderlich mit den Jahres- und Tageszeiten, kühl und erfrischend; Raum, der fast ohne jene engen Bindungen entstehen kann, die Zwecke, Funktionen und Finanzen den gebauten Räumen auferlegen..."[63]

Rainer planted grapevines at the bottom of the pergolas to promote the growth of a plant canopy to provide shaded areas within the garden. He used a very slim steel construction, so that it almost disappears within the plant growth. As the previous quote describes, Rainer believed the use of plant life to create space in the exterior environment was far more fascinating than any interior space within the built environment could be, due to the everchanging conditions within such a space. As the wind passes through the pergola the patterns of light on the stone floor slabs will sway from side to side and the plants will invite insects and birds to share the space with you. The second major element defining exterior space are the 2 m tall stone

garden walls. Inspired by the many typologies from China and the Middle East, Rainer's summerhouse is a great example of how he would use garden walls to enclose exterior space. The southern court is fully enclosed on the western and eastern side. The garden walls provide protection from the wind and on the western side Rainer positioned a small seating area that receives daylight in the morning, and shade in the afternoon due to the height of the garden wall.

The single criticism directed at Rainer's summerhouse in terms of exterior architecture is the lack of a specific outdoor sheltered space. Whilst there is ample opportunity to find shelter from the sun or wind, there is no covered outdoor space that can shelter you from the rain. According to the principles of biophilic design this could be considered a fault in Rainers otherwise faultless iconic design. However, one could argue that Rainers summerhouse is of such simple means, with such a close connection to the exterior environment that the house itself provides the necessary shelter from rain, whilst maintaining the perception that we are still outdoors. Nonetheless, in "Haus Gruber" next door a large area of the roof spans over an outdoor terrace providing the type of outdoor sheltered space that is missing in Rainer's summerhouse.

Symbolic Design

Rainer wasn't interested in replicating natural forms, his floorplans were predominantly strict and rational. With the summerhouse his focus lay on implementing environmental features within the design and creating an opposing environment to the city.[64] In other words, an environment where he could spend as much time as possible outdoors immersed in nature. The total lack of technology creates a sensory rich environment. There was no running water in the house, no access to electricity and the only way to heat the building was an iron stove. Spending a weekend in this summerhouse forces you to live in a similar way that our evolutionary ancestors once did. Candles in the evening, woodfire in the stove to generate heat, trips to the well for water, everything about the house reminds us of a time before we could have such easy access to all these fundamental basics.

The garden walls cater to the instinctual desire for refuge. Rainer always assured the garden walls were necessary to provide privacy. A desire for privacy is not too far off from a desire for security, which characterizes a space of refuge. The garden walls in Rainer's summerhouse are particularly solid, because they are constructed using stone which speaks to our instinctual memory of the caves, we once dwelled in. Therefore, the seating area close to the doorway leading out onto the southern court could be considered a suitable refuge space and the prospect is the view out onto the court and further into the landscape towards the quarry. Further, the house itself represents a cosy refuge due to the low ceiling height. The prospects are the garden courts on either side of the house, which are both easy to survey from the inside of the house.

Finally, when it comes to enticing elements in Rainers design, the chimney stack is particularly successful. It is the single vertical element in a building that is otherwise a low-lying horizontally defined structure. The tall narrow chimney stack is the only element that alludes to a human construction upon approaching the house, as the rest of it is so adeptly concealed by vegetation. This concealment has grown greater and greater over time, but the chimney stack is the landmark that entices you to discover this iconic house. As you get closer to the house first you notice the garden wall, which is another concealing element. Only once you step through the garden wall does the full picture finally reveal itself.

Fig. 103 - exterior view from west

Post-Occupancy Evaluation

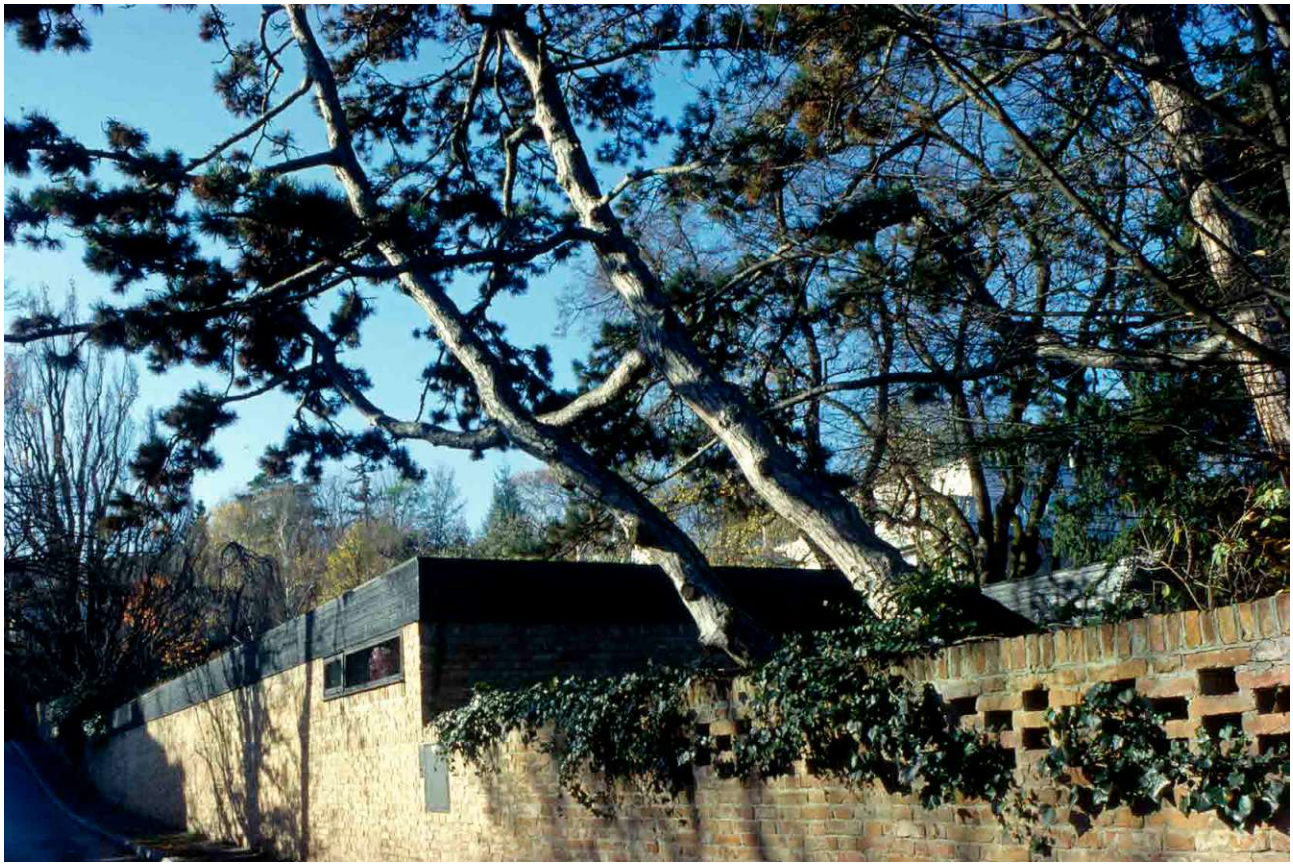
A visit to "Haus Gruber" upon invitation from Mrs. Gruber gave valuable insight into how this specific Rainer typology has performed over more than half a century. All in all, no major repairs have been necessary since construction was completed. As mentioned previously, the building was carefully planned around the existing trees and although one tree in the southern court is situated particularly close to the building, there has been no damage to the foundations from root growth as of the time of writing. There has been no need to restore the exterior stone walls, they have remained solid even with such a close connection to nature. The only conflict with nature is birds flying into windows. Perhaps the house is too well concealed, as it is necessary to stick cutouts of birds on the windowpane to stop this from happening.

Mrs. Gruber describes the house as a secure and comfortable dwelling. If someone enjoys time on their own, the privacy and calming connection with nature is the perfect balance. She believes the house, with all its natural merits encouraged her to become more environmentally friendly. Rainer was also influential in this regard. For the design of "Haus Gruber" Rainer performed all the tasks of a landscape architect himself. Mrs. Gruber describes Rainer as being as close as it gets to a biologist, particularly knowledgeable in gardening and other environmentalist practices. The major fault in "Haus Gruber" is the oil heating system. Unfortunately, exchanging this heating system for a non-fossil-fuel reliant modern alternative requires a large investment, which is not an economically viable option.[65]

Haus unter Bäumen

Hietzing, Vienna 1964-1966

Fig. 104 - view along east facing façade



Client/ Brief/ Location

Rainer completed "Haus unter Bäumen" in 1966 for his own family in the 13th district of Vienna. As the name suggests the site first attracted Rainer, because of its many existing fully-grown trees. Rainer recognised the potential of the site, envisioning his next home with an intimate connection to nature, although this time in an urban environment. The site is a remnant of a larger site, which was parcelled up by the former owner and sold individually.[66] Rainer's property lies on the corner of Weidlichgasse and a side street, which leads up to a cul-de-sac providing access to properties above.

The site directly bordering Rainer's property to the south was owned by Dr. Bösch. He commissioned Rainer to design his own home in 1968, two years after "Haus unter Bäumen" was completed. This presented Rainer with his next opportunity to design a neighbour's home and thus arrange his immediate surroundings. As was the case with "Haus Gruber," Rainer chose the same material palette for "Haus Dr. Bösch" as he did for "Haus unter Bäumen" to achieve a coherent built ensemble. In section, the homes are quite different, as the part of the site bordering onto Rainer's property has a much steeper inclination. Therefore, Rainer split "Haus Dr. Bösch" into four different levels and the landscaping bordering the eastern end of the home was terraced. The southern end of the site was more level. This part of the site was free from construction and an orchard was planted there. The defining feature of the interior is the atrium placed on the second highest level.

Fig. 105 - „Haus Dr. Bösch," 1970 - Roland Rainer

"Seine Wirkung beruht (...) auf dem Kontrast zwischen der Vegetation unter freiem Himmel und den bewohnten Räumen ringsum, ein Kontrast, der besonders überraschend im Winter zum Ausdruck kommen kann, wenn plötzlich verschneite Pflanzen mitten im Hause stehen."[67]

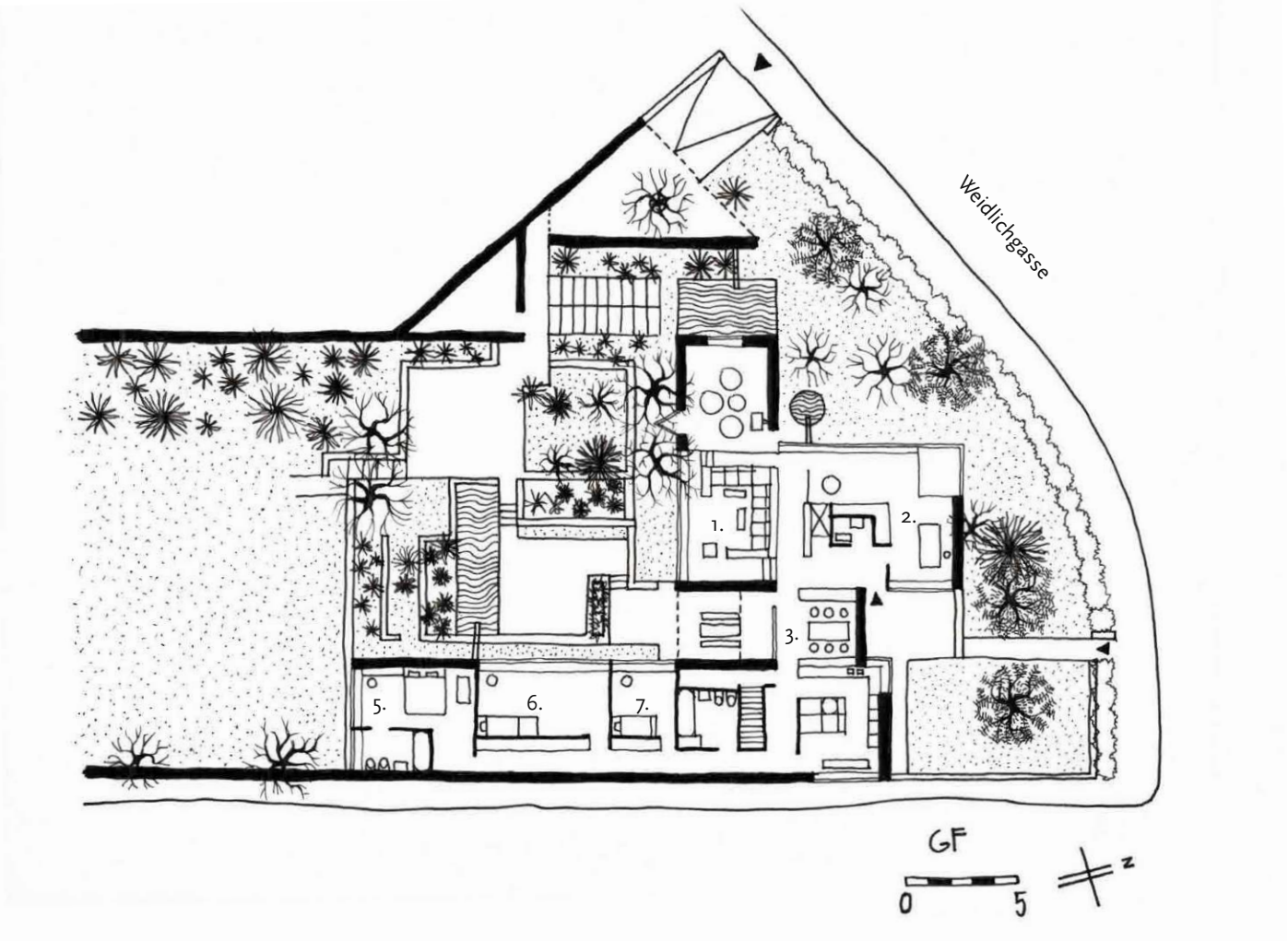
Within this atrium Rainer planted a small tree and there was an L-shaped pathway along the perimeter providing a route through the exterior environment to the other side of the house. The borders facing the atrium are predominantly glazed increasing the interior connection to this natural element.

Building Description

"Haus unter Bäumen" is a two-storey detached single-family home comprising a total floor area of approximately 260 m². There is a minor inclination from north to south. The southern end of the garden has a width of approximately 20 m, whilst a kink on the site's western boundary enlarges the site's width along Weidlichgasse. There are two access points from Weidlichgasse into the site. The access point on the site's eastern boundary leads to the house's main entrance and the access point on the site's western boundary leads into the garage. Bushes represent the boundary of the site along most of Weidlichgasse, whilst the rest of the site's boundaries excluding the border to Dr. Bösch's property are brick walls. The southern end of the garden immediately bordering onto the home is an arrangement of brickwork terraces and raised beds, including a pond. Following on from the terraced landscape is a meadow, whilst the southern end of the garden bordering onto Dr. Bösch's property is also terraced. The top part of the garden was used for cultivating vegetables and there is a pergola construction on the southeastern edge of the site.[68]

The entrance leads directly into an open plan living space featuring two levels. Rainer's study facing north, and west was positioned behind this open plan living space, separated by a toilet. A bedroom wing, comprising a children's room, a guest room, the main bedroom with an ensuite bathroom, and a further bathroom, was positioned along the eastern garden wall. The kitchen, with an adjoining dining room functions as a link between the bedroom wing and the open plan living space. Next to the kitchen there is a staircase leading down into the cellar. The cellar houses storage space, as well as the heating infrastructure, including a boiler room and a separate room for the oil tank. On the ground floor, the room height was 2,25 m to the underside of the ceiling joist and there was a 30 cm height difference on the lower level in the open plan living space.

Fig. 106 - „Haus unter Bäumen“ floorplan



1. open plan living space
2. study
3. dining room
4. kitchen
5. main bedroom
6. children‘s room
7. guest room

Biophilic Criteria Evaluation

Environmental Features

The dominant construction material in "Haus unter Bäumen" is brick. Rainer was inspired to choose brick, as there was an existing brick wall on the site which had acquired a colourful patina.[69] Therefore, there was no render on the exterior of Rainer's home revealing the patchwork of grey, white, red, ochre, pink and brown bricks. Although brick predominantly consists of clay, a natural building material, its environmental credentials are severely weakened by the firing process that is necessary to ensure its durability. The bricks Rainer chose for his home and "Haus Dr. Bösch" are repurposed bricks from the demolition of old Viennese "Mietskasernen," effectively reducing the carbon footprint of the home's dominant construction material.[70] Upon closer inspection of parts of the garden wall, the imprint of initials and a double-headed eagle are decipherable on top of the bricks. This is a clear indication they were manufactured by the "Wienerberg" factory in southern Vienna during the 19th century.

The second dominant construction material is wood. The roof structure, doors and window frames were all constructed of a dark stained wood to blend in with the surrounding tree trunks. On the interior, ash wood was used for most of the floorboards and furniture.[71] Artificial materials were used for insulation and vapour seals, however once more Rainer used hemp strands to seal the window and door frame joints. Further artificial materials include concrete for the foundations, terracotta tiles in the bathrooms, the kitchen/dining area, as well as Rainer's study and bricks were laid on the cellar floor. Finally, the roof was a flat roof construction, and the top layer was gravel. At a later stage it was converted into a green roof.

As mentioned previously, Rainer's fascination for this site was aroused by the existing trees. As preserving existing trees is one of Rainer's main doctrines, he meticulously arranged the floorplan around them. The position of the individual trees on the site presented Rainer with the perfect opportunity to include coniferous trees by the north-facing façade increasing protection from the wind and deciduous trees by the south-facing façade enabling protection from the sun. Most of the trees along Weidlichgasse are coniferous trees. For example, the prominent trees by the main entrance extending their branches over the house and into the side street leading up to Dr. Bösch's property are pine trees. The prevailing wind direction in Vienna is from the west and northwest.[72] Due to the curve in Weidlichgasse bordering Rainer's home, the coniferous trees are effectively positioned to shelter the property from the northwest wind. As they retain their needles throughout the year, this protection is maintained during the cold windy Viennese winter months, when it is most needed.

"Meine Linden spenden im Sommer Schatten und Sauerstoff, regulieren die Luftfeuchtigkeit, sorgen für Kühlung, und die Blüten erfreuen durch ihren Duft und die Farbenpracht. Im Winter fällt das Laub und läßt die Sonnenstrahlen durch – eine natürliche Klimaanlage, deren Anschaffung fast nichts kostet und die von Jahr zu Jahr schöner wird."[73]

In this quote, Rainer is referencing the two large Linden trees by the south-facing façade in front of the open-plan living space. He compliments them for the micro-climate they control and the effective shading they provide during summer months. As Lindens are deciduous trees, they lose their leaves in winter, allowing the sunlight to stream through the branches into the interior.

Fig. 107 - Rainer‘s two cherished Linden trees by south facing façade

Clearly, Rainer spotted the potential of each individual tree and wisely adapted the floorplan to their individual merits. However, inserting the house between these trees required an innovative structural solution. A conventional foundation was impossible, as this would have disturbed the roots of the trees, likely killing them in the process. Instead, Rainer devised a bridge-like construction for the foundations with concrete piers on either side of the tree's roots supporting a concrete beam that spans the distance between the two piers above the roots.[74] This structural solution allowed Rainer to build his home as close as possible to his two cherished Linden trees.

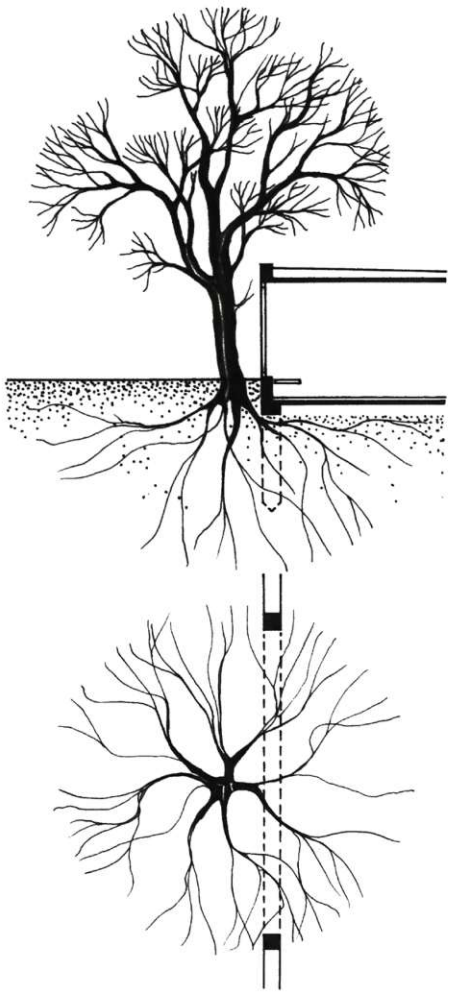


Fig. 108 - diagram bridge foundation, Roland Rainer

Besides preserving all the fully-grown trees on site, Rainer was also interested in increasing biodiversity through planting. The raised beds bordering the home to the south are planted with a vast array of flowers and bushes promoting ecological complexity. Further, Rainer introduced the wild tulip into his garden, a native endangered species.[75]

"Vor einem Südfenster können sie schon dann zur Blüte kommen, wenn ringsum noch Schnee liegt, sofern der Wohnraum etwas eingegraben ist, so daß das Erdreich ein wenig von der Wärme der Heizkörper, die Pflanzen darüber von der Reflexion und der Strahlung der Fensterscheiben gewinnen, wie überhaupt die Pflanzen umso näher beim Haus stehen sollten, je früher – oder später – sie blühen, um während kühler Jahreszeit besser aus dem Fenster gesehen zu werden."[76]

This quote demonstrates Rainer even used architecture to stimulate growth in his garden. A further element promoting biodiversity were the many ponds distributed throughout the garden. Besides introducing the element of water, these ponds captured rainwater runoff from the roof through copper waterspouts extending out into the garden. All rainwater was retained on site.[77]

Exterior

The bedroom wing borders the arrangement of raised beds and terraces to the east and the open plan living space, as well as the dining area borders this arrangement to the north. In essence, these spaces form an L-shaped plan around this arrangement of raised beds and terraces and all the rooms, excluding the main bedroom are clearly oriented towards this part of the garden. The bedroom wing features no glazing on the exterior wall bordering the side street, whereas the façade facing the garden is largely glazed. This is another example of Rainer drawing inspiration from the traditional Chinese courtyard-house. He constructed a

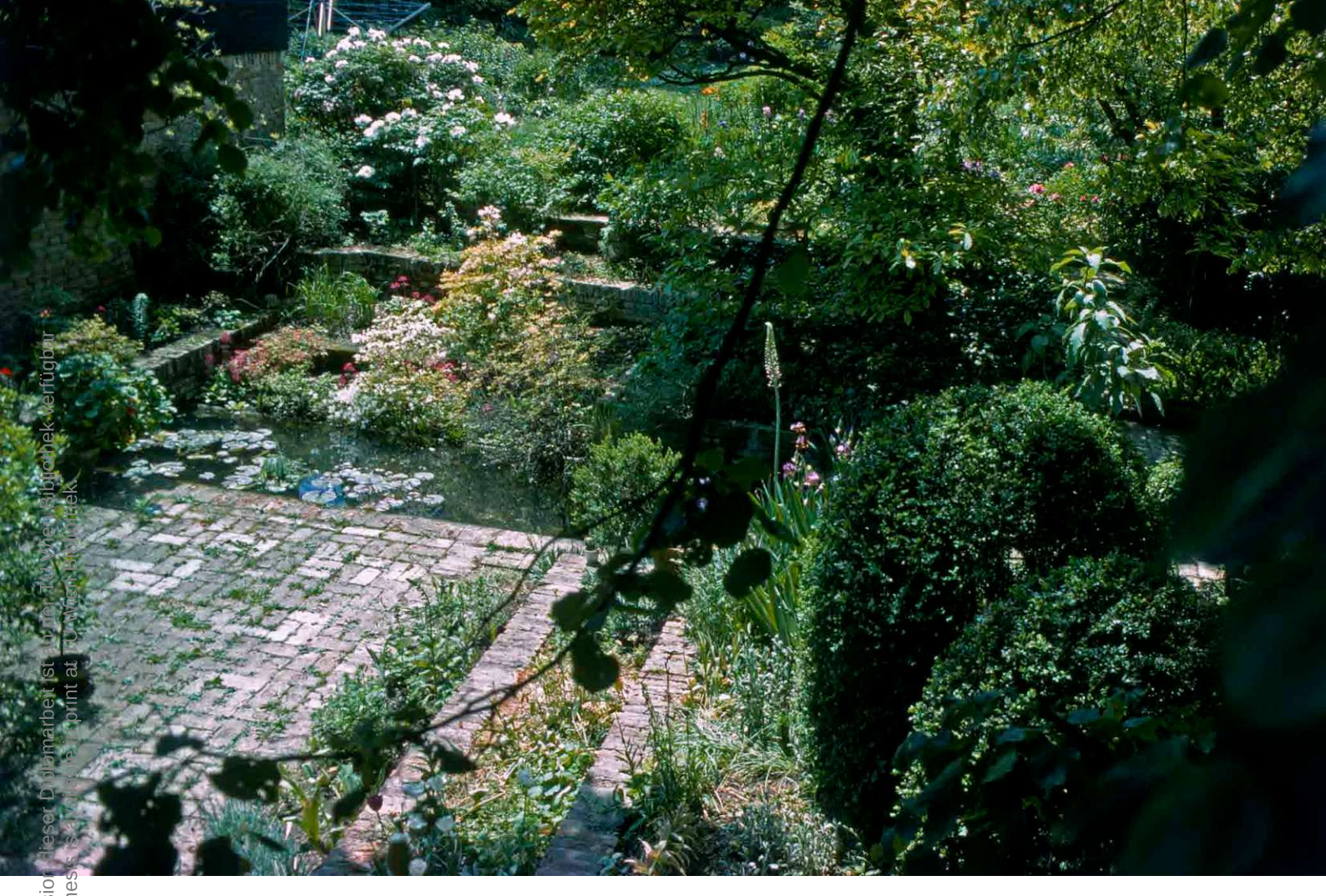


Fig. 109 - ecological complexity in the arrangement of raised beds and terraces

solid wall facing the public realm, whilst the façade facing the garden was constructed as transparent as possible, satisfying his desire for privacy and an intimate connection with the garden.

The open plan living space undoubtedly shares the closest connection to the exterior. A large seating area is integrated within the sunken level, clearly oriented towards the garden. The façade facing the garden is glazed from the higher level up until the underside of the ceiling joist, and it is divided once vertically. The larger non-operable window segment covers approximately three quarters of this glazed area, whilst the smaller operable window segment is divided once horizontally, supporting adaptive opportunity, whilst enabling increased ventilation in the open plan living space. The larger non-operable window segment grants residents an undisturbed view into a rich biodiverse landscape.

"Die innere Gliederung des Hauses kann und soll in einer entsprechenden Gliederung des Gartens ihre Entsprechung finden, wenn z.B. der Mulde des Wohngartens eine vertiefte Gartenterrasse vorgelagert ist, wenn Gartenräume durch Mauern gebildet werden, die in Material und Maßstab denen des Hauses entsprechen oder sie fortsetzen, wenn der Garten in verschiedene Raumabschnitte gegliedert ist oder durch Mauern oder Baumgruppen getrennt und durch Tore verbunden wird, die die Bäume über Wegen bilden, die man zwischen ihnen hindurchgeführt hat."[78]

This quote demonstrates Rainer's desire to merge the interior with the exterior environment and create a transitional architecturally structured space within the garden. Many of the points he outlines are manifested in "Haus unter Bäumen." For example, he talks of extending exterior walls into the garden, maintaining the same dimensions and materiality. In the case of "Haus unter Bäumen" all the exterior and garden walls, as well as the terraces and raised beds are constructed using the same repurposed bricks. Further, the dimensions of the brick terraces mirror the dimensions of the open plan living spaces and as Rainer advises, there are multiple terraces with raised beds along the perimeter, creating varied enclosed spaces within the garden.

Finally, the bridge-like foundation construction allowed Rainer to literally build his home on top of the two Linden trees by the south-facing façade. Consequently, the Linden trees are clearly visible from the interior, they seem to be an integral part of the open-plan living space. Rainer constructed a triangular oriel window between the two tree trunks further strengthening the interior relationship with these majestic natural elements.

In the exterior environment, an outdoor dining area is sheltered from the rain by a roof spanned between the exterior wall of the bedroom wing and the exterior wall of the open-plan living space. As this outdoor dining area is flanked on either side by exterior walls, it also receives ample protection from the

Fig. 110 - interior view into garden from open plan living space

Fig. 111 - interior view of „moon window“ open plan living space

wind. On the southern tip of the garden there is a pergola construction with an integrated seating area providing shelter from the sun. The pergola construction is situated beneath the canopy of a huge oak tree, with the leaves in summer months providing added protection. There are many other spots to find shelter from the sun, because of the dense population of trees on the site.

Symbolic Design

A feature in “Haus unter Bäumen,” which breaks free from the rational structuring of the floorplans and elevations is the circular window on the west-facing façade of the open-plan living space. Rainer likely included this feature, as a reference to Chinese architecture and gardens. He refers to such a circular window or opening as a “moon window”[79] and the view framed is of bamboos, a plant that Europeans undoubtedly associate with East-Asian landscapes.

Two instinctual memories are stimulated in the open-plan living space. First of all, the furniture arrangement in the sunken seating area represents a refuge, as it is sunken into the ground, so behind it we sense the solidity of the floor on the higher level. The prospect is the undisturbed view out into the arrangement of brickwork terraces and raised beds and further into the southern part of the garden. Part of the open-plan living space also represents a situation of peril, due to the sheer proximity to the two Linden trees. It is an unusual situation, as it is not common to build a home so close to such large trees. A stranger would be unaware of the foundation construction that enables this situation, so

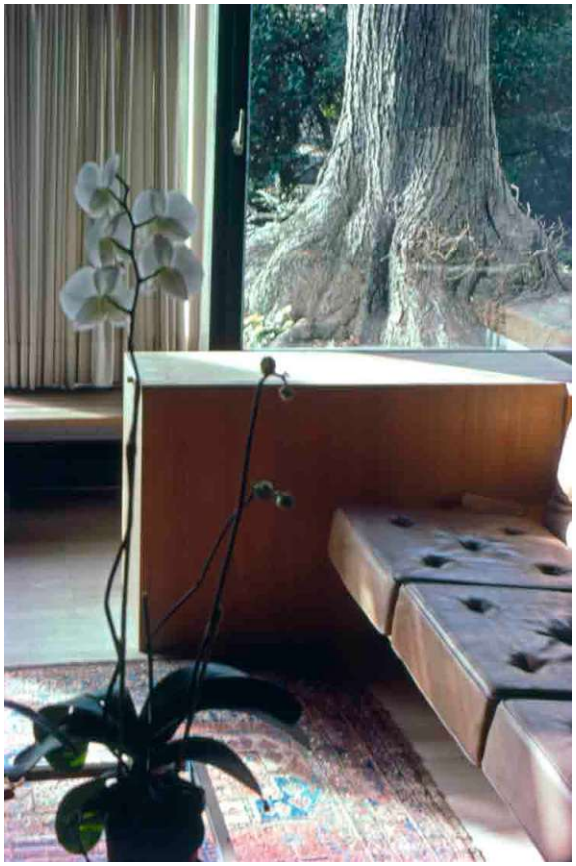


Fig. 112 - interior view of Linden tree trunk

this stranger's initial reaction might be one of confusion and shock, as it seems like the home has been abandoned and nature has begun to take over. Obviously, this would be an initial reaction, and once a stranger becomes accustomed to the room, a level of control is established through the widows providing sufficient shelter from this exterior environment.

"Besonders englische und chinesische Gärten zeigen anschaulich, daß die Größe eines Gartengrundstücks nicht zur Vergrößerung der Raumdimensionen, sondern zur reicheren Gliederung, zur Bildung mehrere Abschnitte, also zur Vermehrung und Differenzierung der Raumerlebnisse genutzt werden kann."[80]

Inspired by English and Chinese gardens, Rainer was keen to create varied landscapes within his own garden. The alternating levels in the arrangement of brick terraces and raised beds effectively packs countless views and enclosed spaces in the exterior environment on a relatively small area. The route leading from the home through this arrangement up to the meadow above passes through several enticing situations. Firstly, this route is not direct, it guides residents back and forth through the alternating levels. The plants and bushes in the raised beds conceal the different sections of the pathway, enticing the resident to discover what lies behind the next corner. The final steps of this pathway leading up into the meadow above are flanked on either side by magnolia trees. This creates an ideal situation of enticement, as the resident transitions from a dimly lit space, shaded by the magnolia canopy, into a bright space, the sunny meadow above.

Post-Occupancy Evaluation

More than half a century after Rainer completed "Haus unter Bäumen," the significant trees continue to flourish, including Rainer's cherished Linden trees. The patina on the brick walls has become more pronounced and a patina has emerged on all the copper elements of the roof structure adding a subtle splash of green and blue to the exterior. The dark stained wooden cladding on the roof structure is beginning to weather and certain panels are beginning to show signs of rotting.

References

1. https://www.derstandard.at/story/2000090521472/roland-rainer-unumstritten-ideen-und-ideologien *(last visited 01.02.2024)*

2. Theresa KNOSP, Sinnbild unserer Stadt in dieser unserer Zeit. Roland Rainer und die Wiener Stadthalle, 1952-1958, Diploma Thesis (TU Wien) September 2020, p. 97

3. Das Franz-Domes-Lehrlingsheim, Der Aufbau, (November) 1952, p. 441

4. Das Franz-Domes-Lehrlingsheim, Der Aufbau, (November) 1952, p. 441

5. Theresa KNOSP, Sinnbild unserer Stadt in dieser unserer Zeit. Roland Rainer und die Wiener Stadthalle, 1952-1958, Diploma Thesis (TU Wien) September 2020, p. 54

6. Theresa KNOSP, Sinnbild unserer Stadt in dieser unserer Zeit. Roland Rainer und die Wiener Stadthalle, 1952-1958, Diploma Thesis (TU Wien) September 2020, p. 80

7. Theresa KNOSP, Sinnbild unserer Stadt in dieser unserer Zeit. Roland Rainer und die Wiener Stadthalle, 1952-1958, Diploma Thesis (TU Wien) September 2020, p. 86

8. https://www.derstandard.at/story/1630203/roland-rainer-1910-2004 *(last visited 01.02.2024)*

9. Roland RAINER, Wandlung des Bebauungsplanes, Der Bau, 14. Jg. Heft 3, (March) 1959, p. 125

10. Roland RAINER, Planungskonzept Wien, Vienna (Jugend und Volk GmbH) 1962, p. 175

11. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, foreword

12. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, p. 47

13. Roland RAINER, Ebenerdige Wohnhäuser, Wien (Berglandverlag) 1948, p. 12

14. Roland RAINER, Lebensgerechte Außenräume = Livable environments = Les extérieurs vivants, Zurich (Artemis Verlag) 1972, pp. 8-10

15. Roland RAINER, Lebensgerechte Außenräume = Livable environments = Les extérieurs vivants, Zurich (Artemis Verlag) 1972, p. 25

16. Roland RAINER, Lebensgerechte Außenräume = Livable environments = Les extérieurs vivants, Zurich (Artemis Verlag) 1972, p. 25

17. Roland RAINER, Lebensgerechte Außenräume = Livable environments = Les extérieurs vivants, Zurich (Artemis Verlag) 1972, pp. 25-26

18. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, pp. 209-213

19. Sir William CHAMBERS, A Dissertation on Oriental Gardening, London (W. Griffin) 1772, preface

20. Roland RAINER, Die Welt als Garten – China, Graz (Akademische Druck- und Verlagsanstalt) 1979, p. 113

21. Roland RAINER, Die Welt als Garten – China, Graz (Akademische Druck- und Verlagsanstalt) 1979, p. 143

22. Roland RAINER, Die Welt als Garten – China, Graz (Akademische Druck- und Verlagsanstalt) 1979, p. 58

23. Roland RAINER, Das Erreichbare Wohnideal, Der Aufbau, 4. Jg. Heft 1, (January) 1949, pp. 17-18

24. Roland RAINER, Planungskonzept Wien, Vienna (Jugend und Volk GmbH) 1962, pp. 138-139

25. Roland RAINER, Lebensgerechte Außenräume = Livable environments = Les extérieurs vivants, Zurich (Artemis Verlag) 1972, p. 165

26. Roland RAINER, Lebensgerechte Außenräume = Livable environments = Les extérieurs vivants, Zurich (Artemis Verlag) 1972, p. 188

27. Roland RAINER, Lebensgerechte Außenräume = Livable environments = Les extérieurs vivants, Zurich (Artemis Verlag) 1972, p. 166

28. Roland RAINER, Lebensgerechte Außenräume = Livable environments = Les extérieurs vivants, Zurich (Artemis Verlag) 1972, pp. 177-179

29. Roland RAINER, Lebensgerechte Außenräume = Livable environments = Les extérieurs vivants, Zurich (Artemis Verlag) 1972, p. 48

30. Roland RAINER, Lebensgerechte Außenräume = Livable environments = Les extérieurs vivants, Zurich (Artemis Verlag) 1972, p. 213

31. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, pp. 76-85

32. Roland RAINER, Rudolf KÖNIGSEDER, Nikolaus AMIRAS & NEUE HEIMAT, Forschungsarbeit: Gartenstadt Puchenau II, Vienna (Architektur- und Baufachverlag) 1984, p. 17

33. https://www.durisol.uk/ *(last visited 01.02.2024)*

34. Roland RAINER, Rudolf KÖNIGSEDER, Nikolaus AMIRAS & NEUE HEIMAT, Forschungsarbeit: Gartenstadt Puchenau II, Vienna (Architektur- und Baufachverlag) 1984, p. 21

35. Roland RAINER, Rudolf KÖNIGSEDER, Nikolaus AMIRAS & NEUE HEIMAT, Forschungsarbeit: Gartenstadt Puchenau II, Vienna (Architektur- und Baufachverlag) 1984, p. 22

36. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, p. 85

37. Roland RAINER, Rudolf KÖNIGSEDER, Nikolaus AMIRAS & NEUE HEIMAT, Forschungsarbeit: Gartenstadt Puchenau II, Vienna (Architektur- und Baufachverlag) 1984, p. 26

38. Roland RAINER & Wolf Juergen REITH, Die „Gartenstadt": ein Programm für die Provinz?, Werk, Bauen + Wohnen, Nr. 9, 1983, p. 12

39. Roland RAINER & Wolf Juergen REITH, Die „Gartenstadt": ein Programm für die Provinz?, Werk, Bauen + Wohnen, Nr. 9, 1983, p. 13

40. Roland RAINER & Wolf Juergen REITH, Die „Gartenstadt": ein Programm für die Provinz?, Werk, Bauen + Wohnen, Nr. 9, 1983, p. 12

41. Roland RAINER, Roland Rainer: Arbeiten aus 65 Jahren, Salzburg (Residenz-Verlag) 1990, p. 75

42. Dialogue with Mrs. Gruber 30.09.2023

43. Franz HAAS & Ernst SMETANA, Die Geschichte der Lokalbahn Ödenburg – Preßburg, Vienna (Railway-Media-Group) 2020, p. 82

44. Eva MATTES, Roland Rainers Ruhe, Wohnen, 3/ 1996, p. 70

45. Roland RAINER, Roland Rainer: Arbeiten aus 65 Jahren, Salzburg (Residenz-Verlag) 1990, p. 71

46. Roland RAINER, Roland Rainer: Arbeiten aus 65 Jahren, Salzburg (Residenz-Verlag) 1990, p. 71

47. Albert KIRCHENGAST & Norbert LEHNER, Archaische Moderne: Elf Bauten im Burgenland 1960-2010, Zurich (Park Books) 2015, p. 26

48. Dialogue with Mrs. Gruber 30.09.2023

49. Albert KIRCHENGAST & Norbert LEHNER, Archaische Moderne: Elf Bauten im Burgenland 1960-2010, Zurich (Park Books) 2015, p. 26

50. Dialogue with Mrs. Gruber 30.09.2023

51. Albert KIRCHENGAST & Norbert LEHNER, Archaische Moderne: Elf Bauten im Burgenland 1960-2010, Zurich (Park Books) 2015, pp. 35-36

52. Roland RAINER, Roland Rainer: Arbeiten aus 65 Jahren, Salzburg (Residenz-Verlag) 1990, p. 71

53. https://www.hummel-stein.at/der-steinbruch *(last visited 01.02.2024)*

54. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, p. 64

55. Roland RAINER, Roland Rainer: Arbeiten aus 65 Jahren, Salzburg (Residenz-Verlag) 1990, p. 71

56. Albert KIRCHENGAST & Norbert LEHNER, Archaische Moderne: Elf Bauten im Burgenland 1960-2010, Zurich (Park Books) 2015, p. 10

57. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, p. 18

58. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, p. 80

59. Dialogue with Mrs. Gruber 30.09.2023

60. Roland RAINER, Lebensgerechte Außenräume = Livable environments = Les extérieurs vivants, Zurich (Artemis Verlag) 1972, p. 220

61. Roland RAINER, Die Welt als Garten – China, Graz (Akademische Druck- und Verlagsanstalt) 1979, p. 163

62. Roland RAINER, An den Rand geschrieben: Wohnkultur – Stadtkultur, Vienna (Böhlau) 2000, p. 150

63. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, p. 54

64. Eva MATTES, Roland Rainers Ruhe, Wohnen, 3/ 1996, p. 72

65. Dialogue with Mrs. Gruber 30.09.2023

66. Sokratis DIMITRIOU, Haus Dr. Bösch, Bauforum, 7. Jg., (May - June) 1974, p. 33

67. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, p. 35

68. Sokratis DIMITRIOU, Haus Dr. Bösch, Bauforum, 7. Jg., (May - June) 1974, p. 33

69. Sokratis DIMITRIOU, Haus Dr. Bösch, Bauforum, 7. Jg., (May - June) 1974, p. 33

70. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, p. 66

71. Roland RAINER, Arbeiten aus 65 Jahren, Salzburg (Residenz Verlag) 1990, p. 119

72. https://www.wien.gv.at/stadtentwicklung/grundlagen/stadtforschung/stadtklimaanalyse-messdaten.html *(last visited 01.02.2024)*

73. Brigite GROIHOFER, Der Bau des Architekten: Roland Rainer, Diners Club, Heft 1, 1997, p. 33

74. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, p. 52

75. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, p. 18

76. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, p. 95

77. Sokratis DIMITRIOU, Haus Dr. Bösch, Bauforum, 7. Jg., (May - June) 1974, p. 33

78. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, p. 128

79. Roland RAINER, Die Welt als Garten – China, Graz (Akademische Druck- und Verlagsanstalt) 1979, p. 131

80. Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982, p. 123

4.4

Ernst Hiesmayr

11.07.1920 - 06.08.2006

Bio

Ernst Hiesmayr was born on the 11th of June 1920 in Innsbruck. He remained in Tyrol up until the outbreak of WWII, completing his schooling there and gaining early experience from prominent Tyrolean architects.[1] Hiesmayr was 19 when WWII began, and he decided to enlist rather than study. Once the war was over, he returned to Austria and began his studies in Graz. He was critical of the historicist approach encouraged there. However, the professor Friedrich Zotter would prove to be an influential figure in Hiesmayr's early development. Zotter is credited as the professor that introduced modernism to the architectural school in Graz.[2]

"Als Magier verzaubert Zotter uns für diesen Beruf und entläßt uns ethisch berührt."[3]

Hiesmayr was particularly fond of Zotter's historical lectures. He describes the way Zotter used his artistic talent to portray the history of architecture and engage his students during lectures.[4]

Hiesmayr completed his studies in 1948, however he began his career as an independent architect before graduating. His first client was his brother Hans Hiesmayr. Hans was an entrepreneur that started a building services company in Tyrol in the 1930s. Although the company is no longer owned by the family it still goes by the name Hiesmayr today.[5] Hospitality was the other major sector Hans was invested in. The "Clima" hotels resembled something akin to a joint venture between the brothers. Hans was responsible for the economical operations and Ernst was the creative director, responsible for the design and planning of the hotels. Their collaboration was described as innovative and creative, and Ernst was granted artistic freedom.[6] The first project they collaborated on was the "Hotel Clima" in Innsbruck, beginning during Hiesmayrs studies and

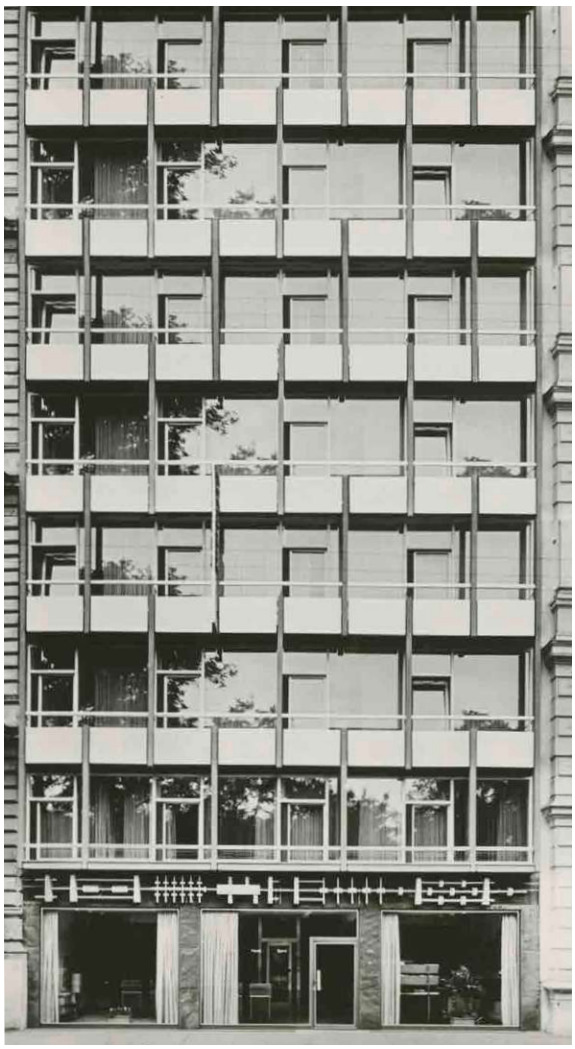


Fig. 113 - Clima City Hotel, 1958

completing soon after he graduated in 1949.[7] The next project was the "Clima City Hotel" in the 4th district in Vienna completed in 1958. The most renowned project the brothers developed together was the "Clima Villenhotel" in the 19th district of Vienna completed in 1965. This project represented an ensemble of villas and apartments catering to business clientele and their families.[8] Amongst other new-build hotel projects the brothers also collaborated on retrofits. The most famous of these is the retrofit of the "Nikolauszeche" in Purbach, Burgenland. The "Nikolauszeche" was founded by a religious

Fig. 114 - Nikolauszeche, 1963 - before revitalisation

guild in the medieval times and parts of the building date back to the 11th century.[9] Hans acquired the property in 1963 in a dilapidated condition, disfigured by many detrimental alterations.

"Das Haus des Kults (die Nikolauszeche) und das Haus für den leibeigenen Bauern sind in die Phase des Verlustes (Abbruch) der historischen Substanz getreten. Die Erhaltung dieser einfachen Objekte ist nur über die Wiederbenützung durch Menschen möglich, was zugleich heißt, vom musealen Denken abzurücken und dem Leben echte Priorität einzuräumen. Um nun die historische Substanz zu verlebendigen und mit den Vitalforderungen unserer Zeit zu verbinden, ist eine in die Zukunft blickende, gestalterische Idee notwendig."[10]

Ernst was passionate about revitalising dilapidated structures, such as the "Nikolauszeche." He was not afraid to remove or add elements, but he warned of the caution and necessary analysis required to understand such a historical building, "denn einmal abgebrochen, wird es nie wieder herstellbar."[11]

The next typology Hiesmayr excelled in were single-family homes in the countryside. The first house he designed was for his own family in Wolfurt, Vorarlberg completed in 1951. The floorplan is long and narrow with a kink on the western end. It is placed on the ridge of a hill and the kink was used to catch the best view of the surrounding landscape. Further, as a contrasting and complimenting element the roofline mirrors the topographical situation of the site. Hiesmayr cites Lois Welzenbacher as a key source of inspiration for his first design in a rural setting.[12]

"... Naturbedürfnis und Naturgefühl will der moderne Mensch in seinem Wohnen ausgedrückt wissen. Die Natur, nicht als Attrappe um das Haus herum, sondern das Haus selbst als Sonne atmenden Organismus, mit seinen Organen den Tageszeiten zugewandt, gelockert in der Gliederung des Grundrisses, mit großen Ausblicken in

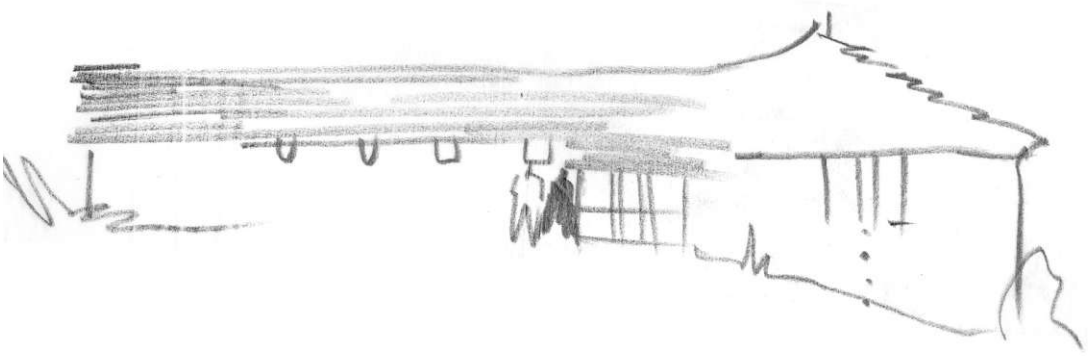


Fig. 115 - House in Wolfurt, 1951 - elevation sketch

Fig. 116 - Haus Settari, 1923 - Lois Welzenbacher

die Landschaft, ein gleichsam zum Wesen erhobener Schnittpunkt all des Schönen außen. Damit hat auch der Architekt ein neues Element gewonnen, das er bewußt im Entwurf des Wohnhausbaues verwendet. Dieses Streben nach Lockerung der Grenzen zwischen Innen und Außen, nach innigster Verbindung des inneren Raumes mit dem großen Raum der Natur entspricht heute unserem Lebensgefühl und findet in der architektonischen Gestaltung des Einzelhauses in der Landschaft eindeutigen Ausdruck. Die Auswertung einer Landschaft in diesem Sinne ist Grundlage des zu formulierenden Baugedankens, einen Bau zu schaffen, der seiner Umgebung organisch verwachsen ist."[13]

Welzenbacher was a Tyrolean architect and perhaps the first Austrian architect to truly practice biophilic design. The previous quote is an excerpt from an article he wrote that was published in "Moderne Bauformen" in 1937. The principles he outlines summarise biophilic principles succinctly. The house in Wolfurt represents Hiesmayrs first attempt at designing houses that are rooted in the landscape, many more would follow.

Early in his career Hiesmayr began participating in competitions together with the architect Otto Gruber. During this professional partnership they managed to secure two commissions. The first was a school in Bregenz completed in 1950 and the second was the "Handelskammer für Vorarlberg" in Feldkirch completed in 1954. In 1956 Hiesmayr participated in the competition for the "Wirtschaftsförderungsinstitut" (WIFI) in Linz. It was also a professional partnership, this time with the architect Hans Aigner. They received first place, and the building was completed in 1967. The WIFI Linz was Hiesmayrs first large-scale commission.

On a site with an area of 31000 m² Hiesmayr and Aigner created a pure rational urban plan, consisting of a long narrow tower that housed all the classrooms and administrative functions, in other words the theoretical programme and a hall covering an area four times larger than the tower, housing all the workshop spaces, the practical programme. To provide daylight into the large workshop hall the roof structure was a saw-tooth construction with glazing allowing light to enter the building from the northeast. The tower was 115 m long and only 11 m wide. By including three circulation blocks within the floorplan Hiesmayr was able to provide six classrooms per floor in the upper storeys that all received daylight from the southwest and northeast. To provide protection from the sun, Hiesmayr and Aigner used a curtain wall system on the southwest facing façade.[14]

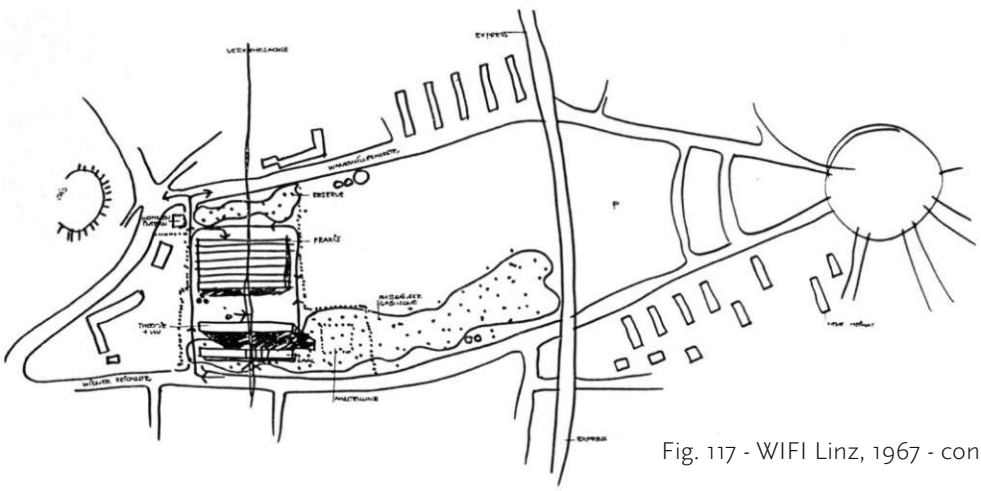


Fig. 117 - WIFI Linz, 1967 - conceptual sketch

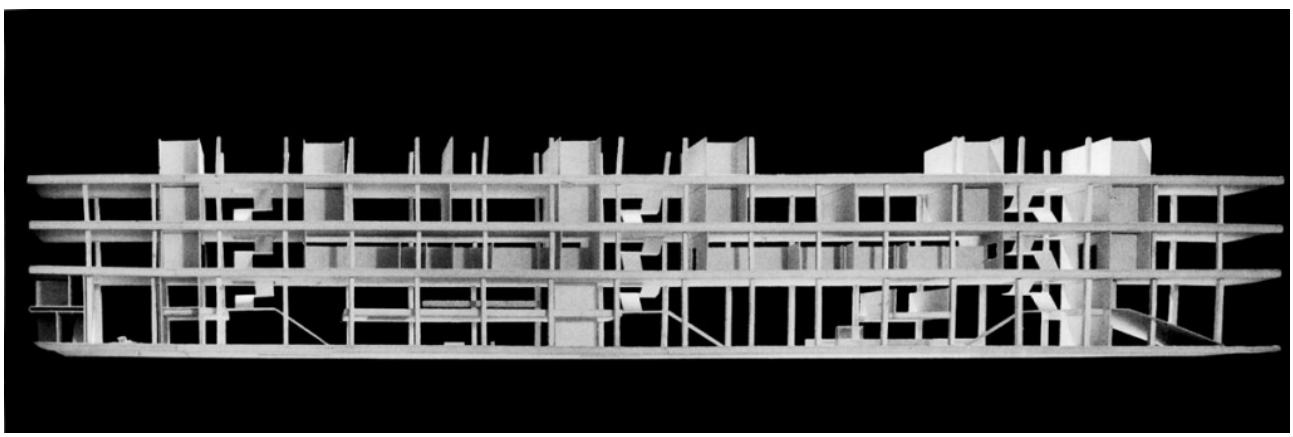


Fig. 118 - WIFI Linz, 1967 - structure model

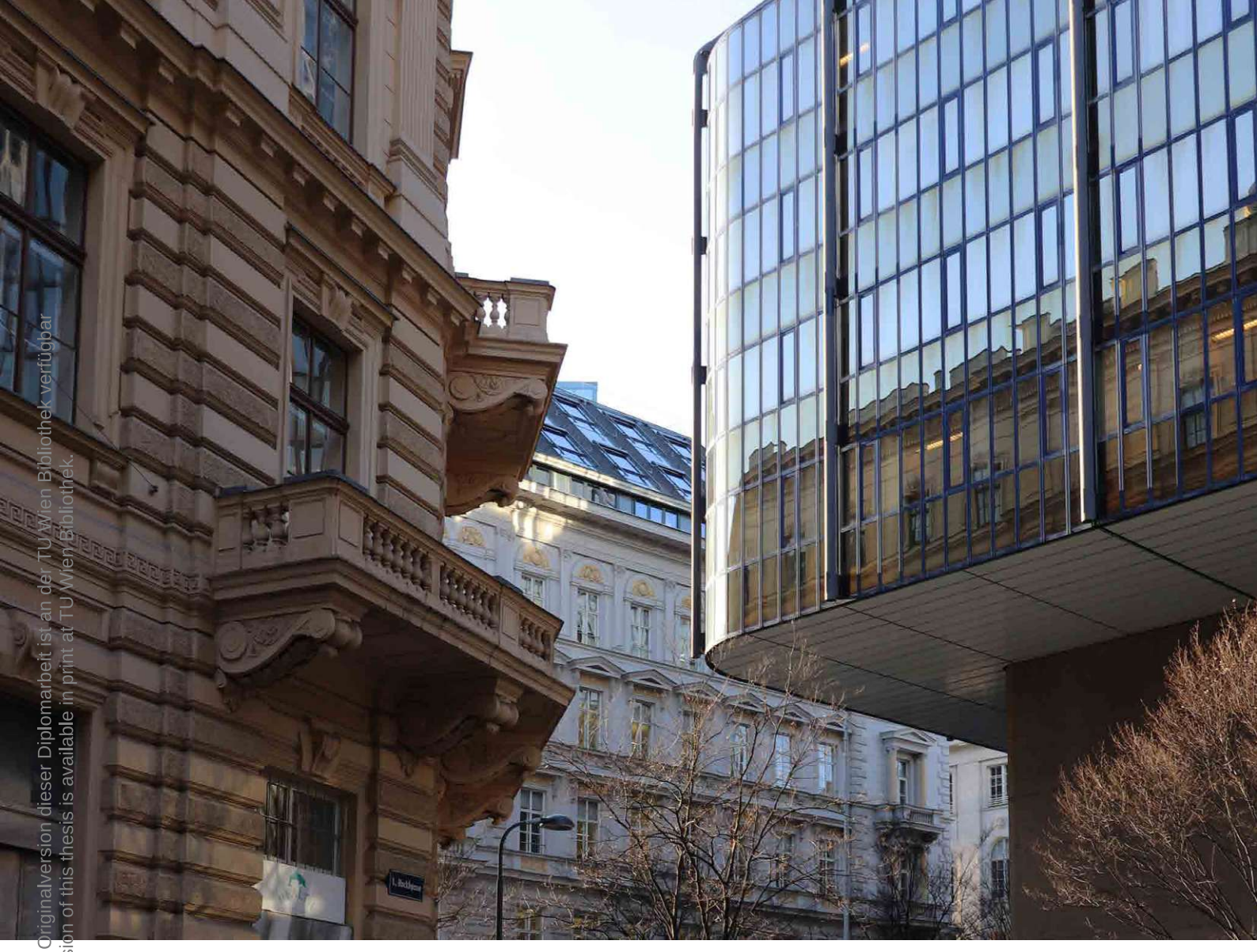


Fig. 119 - Juridicum, 1984 - exterior contrast in the Ringstraße zone

In 1970 Hiesmayr was commissioned by the University of Vienna to design a building, which would become the most recognisable of his career, the Juridicum. Towards the end of the 1960s the University of Vienna was beginning to expand beyond the capacity of its premises. A plot in the Ringstraße zone was acquired and the law faculty decided to use the opportunity to move their many scattered institutes into a single purpose-built headquarters.[15] The existing buildings were demolished and Hiesmayr was given the task of piecing together a vast programmatic puzzle of requirements into a site of such modest size within the dense gridded urban plan that characterises the Ringstraße zone. Conceptually, Hiesmayr wanted to react to the inhumane characteristics of the 19th century Ringstraße buildings. He criticised the monumentality of the high bases that dominated the ground floor environment, as well as the gridded urban plan that forces you to turn corners at a right angle.[16] Therefore there was a will to create public space on the ground floor, and as a contradiction to the neighbours, construct it as transparent as possible.

Fig. 120 - Juridicum, 1984 - interior view top floor

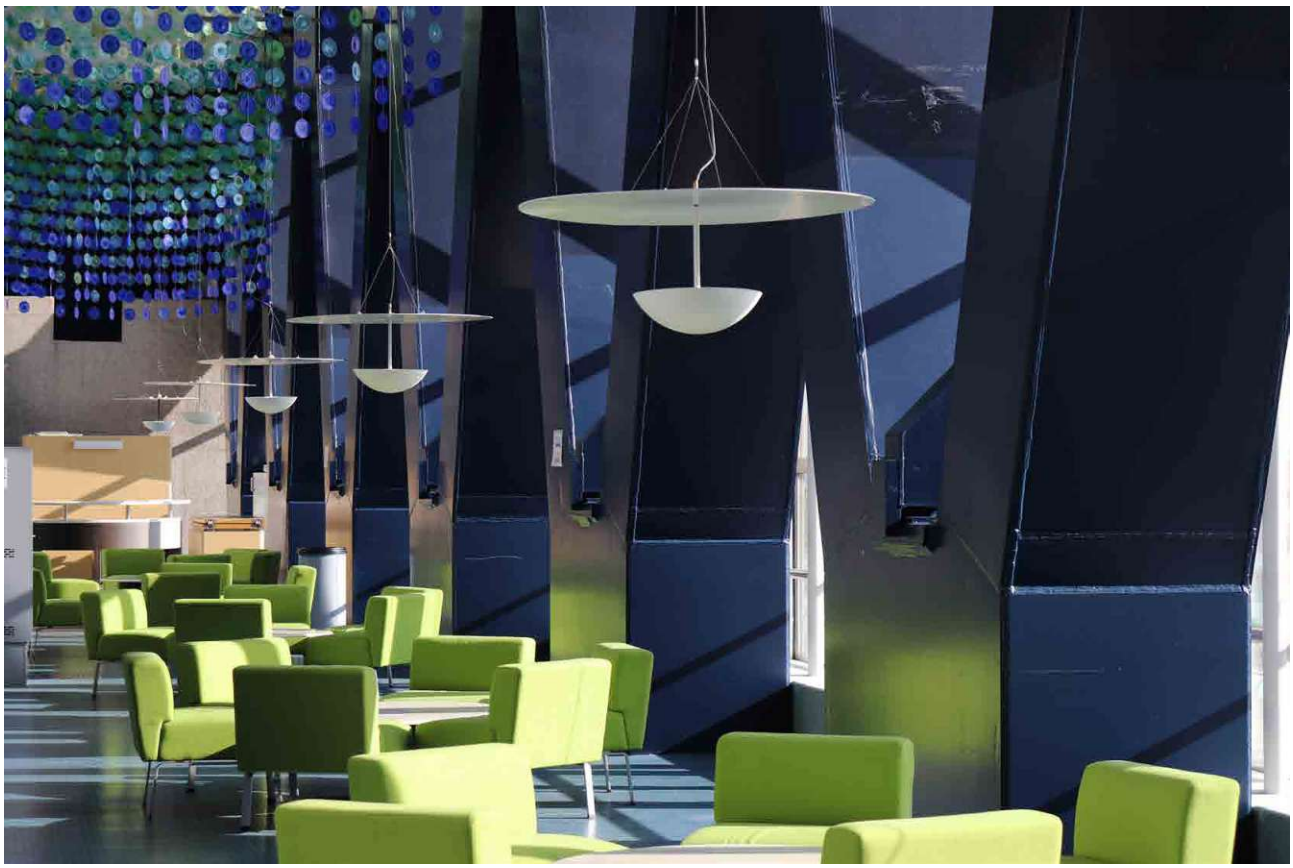


Fig. 121 - Juridicum, 1984 - interior view ground floor incl. floating columns

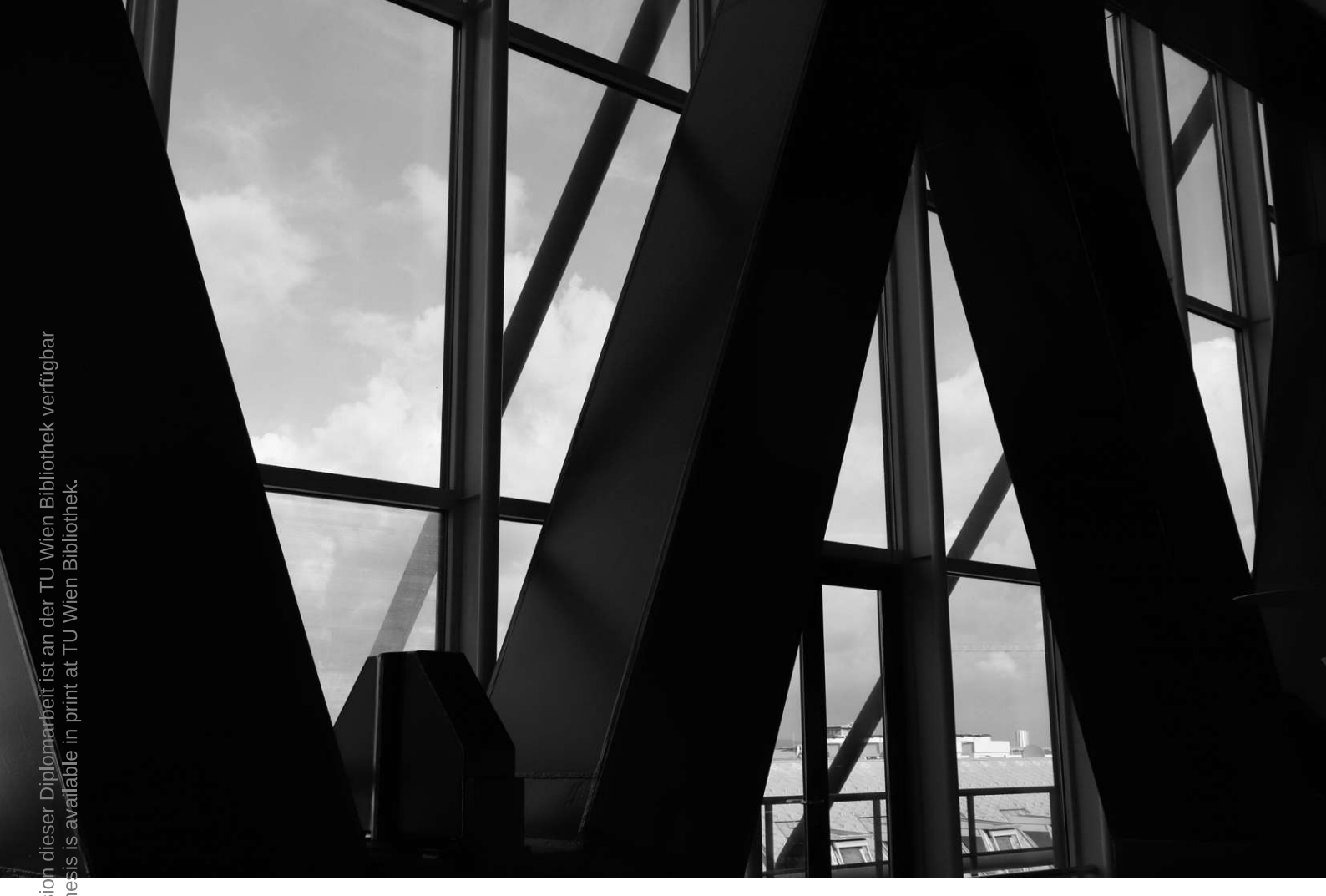


Fig. 122 - Juridicum, 1984 - interior view of steel trusses

Fulfilling these ambitious goals required an innovative structural solution. The resulting solution has more in common with bridges than the rest of the Ringstraße buildings:

"Die konstruktive Konsequenz für den innerstädtischen Bauplatz war ein Hängehaus. Die Obergeschosse hängen an einer Brückenkonstruktion, die zwischen den vier Gebäudekernen gespannt ist. Das Erdgeschoß bleibt frei. Die Untergeschoße stehen auf der Fundamentplatte. Die weitgespannten Decken der Hörsäle tragen nur die Lasten der Halle."[17]

Huge steel trusses (9 m tall, 52,8 m long)[18] span the length between the concrete cores, distributing the weight of all the suspended floors into the ground soil below. The floors were supported by rows of steel trusses, suspended from the bridge structure by steel columns. It was an innovative solution that allowed Hiesmayr to stack the various functions with varying structural needs structurally decoupled from one another. On top of that, it allowed the ground floor area to be reduced, gifting area back to the public realm, free from any columns getting in the way. Hiesmayr credits the structural engineer Kurt Koss as not only providing sound guidance, but also tackling every challenging problem with vigour.[19] After a long period of construction the building began operation in 1984. The Juridicum received the "European Steel Design Award" in 1980 and the project is often referenced as Hiesmayrs highest achievement.

Another defining feature of Hiesmayrs career was his role as a professor at the Technical University of Vienna. In 1967 Hiesmayr completed his doctorate at the TU and soon after he was hired as a professor there. He credited Karl Schwanzer as his most vocal supporter:

"Entweder kommt Hiesmayr an erster Stelle oder überhaupt nicht in die Liste."[20]

From 1975-1977 he was promoted to the role of vice-chancellor at the university. In 1990 he retired from his role as a professor.

"Ernst Hiesmayr, dem Wien das Juridicum im ersten Bezirk verdankt, war ein wunderbarer Professor, weil er der Architektur mit echter Leidenschaft verpflichtet war, weil er die Kunst des Bauens liebte - und weil er seine Studenten wirklich mochte.

Seine Korrekturstunden waren Genuss und lehrreiches Spektakel. Er erschien, schaute mit blauem Bunsenbrennerblick erfreut in die Runde, weil jetzt gleich wieder über die Wunder der Architektur debattiert würde, riss sodann energisch Skizzenpapiere und Pläne an sich, ließ sich Entwürfe geduldig erklären, machte auch die täppischsten von ihnen nie herunter, erklärte vielmehr eindringlich, wie man alles besser machen könne - und warum dieses und jenes effizienter, logischer, eleganter lösbar sei."[21]

This is a quote from one of Hiesmayr's former students that wrote an obituary published in "Der Standard." Judging by the descriptions people close to Hiesmayr give, he was an approachable architect, keen to inspire younger generations, with a total lack of the god complex, a symptom which is prevalent in architects that succeed as much as he did. Hiesmayr died on the 6th of August 2006 in Bregenz.

Philosophy/ Biophilic Tendencies

"Ich lege besonderen Wert auf die Lebensorientierung durch Natur und Landschaft. Unsere Vorfahren haben sich respektvoll und kreativ in ihren Bauten mit Natur und Landschaft auseinandergesetzt, in der Einordnung wie im Kontrast. Die Natur muß als Autorität anerkannt werden, und zwar sowohl lebenserhaltend als auch lebensgestaltend."[22]

This quote clearly demonstrates two of Hiesmayr's main interests that relate to biophilic tendencies. First of all, he expresses environmentalist views, by advising architects to respect and prioritise nature. His second statement expresses his admiration for vernacular architecture and the way it successfully deals with nature.

"Das Bau-Wesen muß ein Leistungstyp in seinem Lebensumfeld sein. Das Innen und Außen beginnt im Dialog Gestalt anzunehmen. Während beide, Innen und Außen, ihr Zusammenwirken beginnen, erfolgt gleichzeitig die Überprüfung, ob dieses Konzept-Wesen dem Standort gerecht wird und dort sein natürliches Selbstverständnis findet. Daraus erwächst der Typus. Dieser muß aber nicht nur lebensfähig, sondern auch mit Lebensfreude am Standort verwurzelt sein. Diese Lebensfreude wird erreicht, indem die Erlebnisqualitäten des Umfeldes in das eigene, vitale Wesen integriert werden. Es bleibt offen, ob sich die Gestalt der Architektur in das Umfeld einordnet oder ob das Umfeld die Idee akzentuiert."[23]

Hiesmayr was passionate about rooting his buildings in their context. He talks of the exterior appearance suiting its setting, but also of the dual relationship with the interior and the influence it will have on our perception of a building. This shows his approach resonates with biophilic design, where the exterior and interior environment are treated as equals. He talks of integrating a building within its setting, but also of the possibilities of using contrasting elements and how this approach can highlight aspects of the context. Hiesmayr believed distilling the qualities of the context and using complimenting and contrasting elements in the design, leads to a joyful outcome. In German he uses the word "Lebensfreude" and this could be translated quite literally into English as the love of life, corresponding with Fromm's original definition of biophilia and certainly representing an approach to design that Fromm would classify as progressive.

"Bauen auf dem Land ist im gesamtkulturellen Zusammenhang zu sehen. Die Stadt-Land-Beziehung ist dualistisch und eine kulturelle Einheit.
(...)
Noch gilt das Recht des Stärkeren, das ist die Stadt! Sie bestimmt am stärksten die Rechtsordnung, Verteilung der Budgetmittel, den Finanzausgleich usw.
Doch städtische Lösungen sind nicht auf dem Land übertragbar. Bauen auf dem Land ist nicht Auseinandersetzung mit einem Haus, sondern deutlicher als in der Stadt mit einem ganzen Kultursystem."[24]

The need to root a building in its context requires a clear understanding of the site and consequently a different approach in a rural context, as opposed to an urban one. Hiesmayr was particularly interested in rural settings, likely due to his upbringing in Innsbruck, a city embedded deep within the Austrian Alps surrounded by towering mountains. He was critical of the urban influence on the countryside and how this influence was beginning to erode the culture and traditions that developed in close connection to the landscapes they emerged from. He believed the spread of detached houses eating their way into the landscape surrounding villages was due to

the urban influence manipulating residents into believing that vernacular typologies are inferior.

"Man distanziert sich vom Boden und von der dörflichen Zeile und demonstriert finanziellen Aufstieg und Emanzipation mit freistehenden Häuser auf hohen Sockeln."[25]

Hiesmayr disliked the trajectory architecture in rural settings was on and he felt it was necessary to truly understand how people built before the urbanites forced their ways upon the countryside. Looking back however, does not mean studying classical architecture and other historical styles. Hiesmayr was much more interested in the anonymous builder, not influenced by decorative rules, but driven by the necessity to provide shelter and cater to the elemental needs.

"Der Individualismus und die damit verbundene Selbstverwirklichung ist der Feind des Stils, weil Stil auch immer Diktat ist. Der substanzlose Pluralismus ist das Spiegelbild der gebrochenen Gesellschaft. Die erreichte Freiheit gibt jedermann die Möglichkeit, die Individualität auszuspielen. Nicht individuelle Gestalt, sondern Uniformität und kulturelle Bewußtlosigkeit treten uns entgegen."[26]

As this quote proves, Hiesmayr supported renouncing historical styles, one of the main doctrines of modernism. However, although he was progressive in this sense and a supporter of modernism, his deep respect for vernacular architecture is undeniable. In the 1990s he produced two books on vernacular architecture. The first was published in 1991 titled "Das Karge als Inspiration/ Castilla elemental." This book portrays a rural sparsely populated area in Spain that Hiesmayr often visited. He was introduced to this area by the Tyrolean painter Rainer Schiestl. He valued the peace and quiet and visited the area to get away from the daily routine of an architect.[27] Nonetheless he couldn't help himself from developing a fascination for the anonymous architecture, preserved in a time capsule as some of these villages were almost entirely abandoned.

"Es stört nicht, eher bestaunen wir die Unbekümmertheit und Freiheit des anonymen Bauens."[28]

In this quote Hiesmayr references a situation, where untreated logs have been used to support the floor in an old farmhouse. Due to the nature of construction fissures appear, but Hiesmayr does not see this as a deficiency. Instead, he has admiration and perhaps a longing to build the way these anonymous builders once did. Unlike past architects that have been trained to design buildings according to the rules of a style, the anonymous builder has the freedom to build as he wishes.

"Die Arkadenuntersicht mit den roh zugehackten Balken läßt noch das Gewachsene erleben. Unsere geschnittenen, prismierten Balken sind ein technischer Fortschritt, aber schwach im Ausdruck. Das Lebendige ist durch die Geometrie vernichtet."[29]

This quote references a similar situation in a different village. He believes this minimal treatment keeps a wooden structure alive and too much technology will sap the life out of it. This aligns with Fromm's description of necrophilia. Fromm warned that transforming the organic inorganic is a necrophilous trait.

The second book was published in 1995 titled "Eine neue Tradition." This book is a documentation of the Bregenzerwald vernacular, resulting from research Hiesmayr conducted together with students when he was asked to do a speech for the artisan guild of Egg-Großdorf.

"Das kulturelle Niveau ist eine Gemeinschaftsleistung von Gesellschaft,

Handwerkern und Entwerfern. Wir Entwerfer sind auf Ihr Können und Ihre Perfektion angewiesen. Sie haben die Ressourcen dieser Welt immer auf das Sparsamste genutzt, sie sind der ökologische Zukunftstyp."[30]

This is an excerpt from Hiesmayr's speech, where he expresses his admiration and respect for artisans. He talks of how an architect depends on the skill of the artisan and interestingly how the absence of an architect allows the anonymous builder to construct more economically- and ecologically friendly. He further justifies the relevance of the artisan by describing the difference between an object that is handmade and one that is manufactured:

"Die reduzierte Sprache eines Industrieproduktes reicht nie an die semantische Beziehung eines handwerklich gefertigten Gegenstandes heran. Denn jeder Gegenstand, auch der Allerpraktischste hat Symbolcharakter.
Ein Beispiel, ein alter handwerklich gefertigter Tisch. Er ist gezeichnet von den Spuren des Lebens.
Das Industrieprodukt hat Make up, ist makellos für den Augenblick und hat nie die Chance in Würde zu altern."[31]

What Hiesmayr describes in this quote, is that the artisans influence results in objects that last and gain character as they age, as opposed to the manufactured object that is predestined to be discarded once the aged appearance is no longer bearable. The book also contains many detailed analyses of old farmhouses in the Bregenzerwald. These farmhouses usually house living quarters, as well as agricultural infrastructure all under one large roof. Hiesmayr was fascinated by the simplistic functionality of the floorplans, and he admired the little to no hall space. There is one specific space prevalent in is this typology that Hiesmayr held in particularly high regard, the "Schopf." The "Schopf" represents a

Fig. 123 - traditional „Schopf"

transitional space between the interior and exterior that provides a sheltered outdoor space often adjoining the entrance or the dining/ living area.

"Es ist unverständlich, wie dieses funktionstüchtige Element - der Schopf - gegen das dekorative Element Balkon (Trocknung von Mais) ausgetauscht werden konnte."[33]

In 1985 Hiesmayr included a modern interpretation of the "Schopf" in a retrofit of a single-family home in Wildschönau, Tyrol. This "Schopf" was fully glazed and accessed via the living room on the southern facing facade. The inhabitants complimented the use of this space on rainy days, as it allowed them to continue to experience such a close connection to nature whilst remaining dry. Further, the "Schopf" had a dual function as a temperature regulator. The inhabitants confessed that it took time to understand how to use the "Schopf." Eventually they

understood the benefit of using it on sunny winter days to heat up parts of the house. However, it is necessary to be vigilant, as once the sun goes down the "Schopf" cools down rapidly, so the door connecting it to the Living room needs to be shut immediately.[34]

Finally, the natural process of evolution inspired Hiesmayr and guided his design process.[35] This is certainly a biophilic trait, as architects and designers are encouraged to source their inspiration from natural processes, as opposed to technological ones. Hiesmayr was interested in the writings of Adolf Portmann, a Swiss zoologist. Portmann wrote about the fundamental difference between humans and other animal life:

"Each one of us is capable of standing, as it were, outside himself, of observing himself from an extra vantage point, so to speak, and thus gaining detachment from himself and judging himself."[36]

Portmann was aware that humans and animals, as well as plant life shared many characteristics in their basic structure, but that our self-awareness is what distinguishes us from the rest of animal and plant life.

"...der Mensch kann gezielt wie die Evolution denken und handeln. Manfred Eigen weist nach, daß auch unsere Welt nicht alle Möglichkeiten der Entwicklung und der damit verbundenen Darstellung genutzt hat. So wandern die überschüssigen Ideen in den Zettelkasten des Schöpfers für eine neue andere Welt – Projekt – zurück."[37]

What Hiesmayr implies with this quote is that we should source our inspiration from natural forms and natural processes and develop them in a similar way to evolution developed life as we know it today. However, due to our ability for self-reflection, we are not restricted by the same constraints as evolution is. We are capable of remembering possible outcomes and implementing them in different situations at later stages, as opposed to losing those possible outcomes before we can take on the next challenge.

Biophilic Construction

Villenhotel Clima (1963-1965)

On a site in the 19th district of Vienna bordering directly onto vineyards to the west, Hiesmayr and his brother created the "Villenhotel Clima." The site was once home to the famous beer garden of the Nußdorfer brewery called "Bockkeller" and below ground was a historic cellar for storage.[38] The site slopes down towards the southeast commanding views over Vienna.

Hiesmayr created a low-lying complex of interlocking cuboids, staggered on top of each other responding to the topographic situation of the site. By staggering the building masses in section and in plan he was able to create intimate outdoor areas for the individual apartments on the ground floor and generous loggias for the apartments above. Concrete was the main construction material, and exposed cast in-situ concrete walls defined the exterior of the buildings. Over the years creepers were consciously allowed to engulf the structures fusing the complex with its natural setting.

"Mein Bruder und ich durchstreiften den Siedlungsrand von Kopenhagen und Zürich und suchten einen Gartenarchitekten. In Zürich wurden wir fündig – Fred Eicher, ein konzeptioneller Gartenarchitekt.

Er entwirft nur mit den Höhenangaben des Geometers genial den Garten, seine Vorstellungskraft ist unübertroffen. Er kauft das Niederwüchsige und findet in der Umgebung die naturwüchsigen Akazien und setzt sie auch. Der Charakter des Baumes hat seine Stellung im Grünassemble entschieden. Die Natur kehrt in die Hausgruppe zurück, sie lebt von Eichers kreativem Garten und seiner gefesselten Phantasie."[39]

Fig. 124 - Villenhotel Clima, 1965 - exterior view of entrance

As the site was located on the edge of Vienna, it represented a setting that was both rural and urban and therefore the landscaping around the apartments was highly prioritised. The brothers commissioned the Swiss landscape architect Fred Eicher. Eicher developed a landscape design that was consciously more urban in the central area of the site, as this area represented a public square situation due to the placement of the building masses. He used concrete slabs for pathways and a mirror pond with aquatic plants as a central feature.[40] The rest of the garden was landscaped in a wild manner.

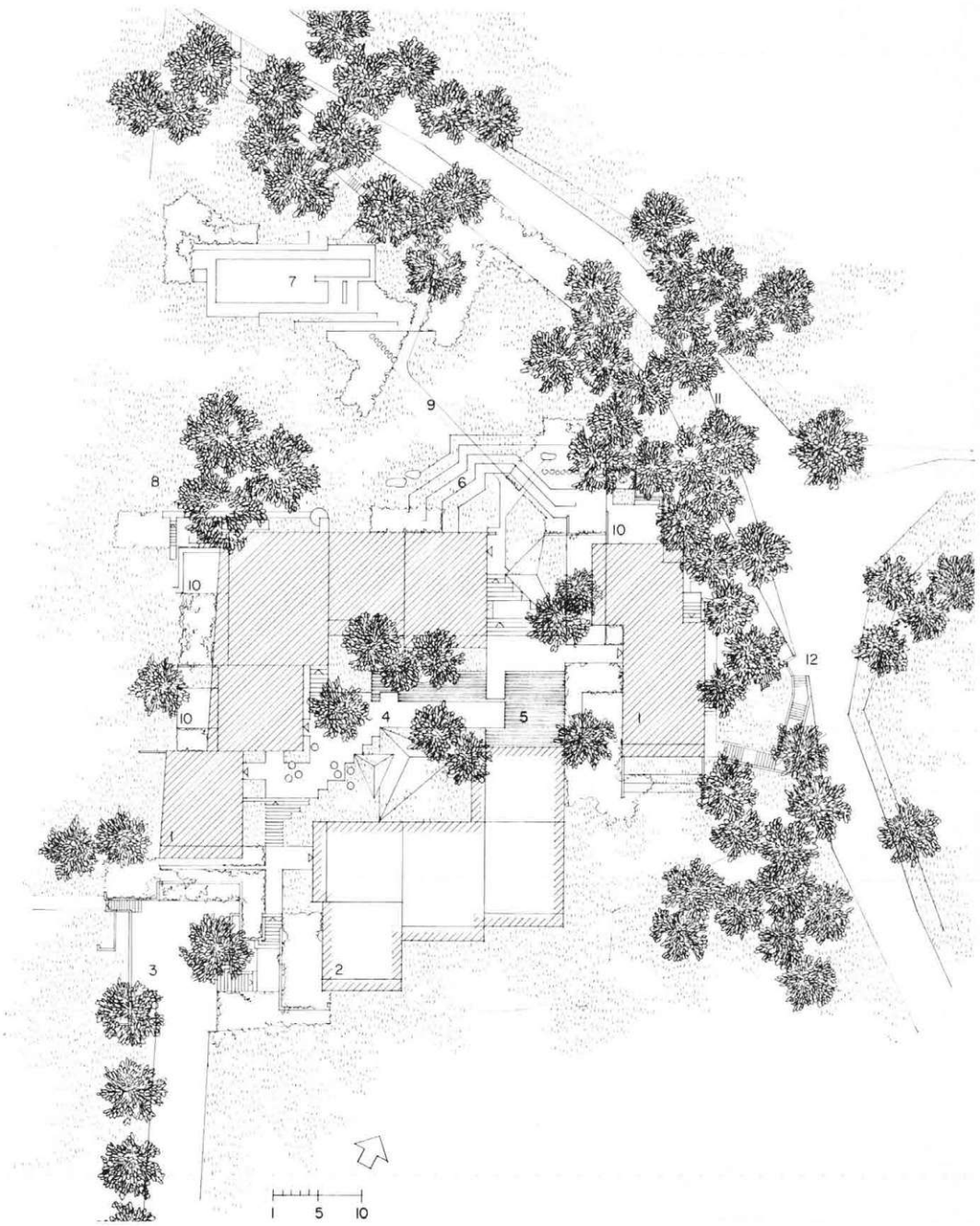


Fig. 125 - Villenhotel Clima, 1965 - landscaping design, Fred Eicher

The northern part of the site was slightly higher and free from buildings. Small grass terraces create a subtle transition from the urban area to the garden above, where on the northwestern edge there was an outdoor swimming pool. The “Villenhotel Clima” was the first project Hiesmayr and Eicher collaborated on, and it was the beginning of a successful long-lasting partnership.

In 1998, the Hiesmayr family sold the hotel and after lying dormant for many years it was redeveloped into luxury apartments. Although the urban plan is similar to Hiesmayr’s original design, more storeys have been added to maximise the profitability of the site. Mere fragments of Eicher’s landscaped garden remain. The mirror pond has disappeared and a retaining wall of concrete hollow blocks slices through the original green terraces.

Fig. 126 - Nußberggasse 2c, 2006 - Hans Peter Petri

Fig. 127 - Villenhotel Clima, 1965 - exterior view with walls covered in creepers

Atelierhaus Eroicagasse 30 (1975-1978)

Not far from the site of the "Villenhotel Clima" Hiesmayr designed and built his atelier, completing it in 1978. The site lies on the corner of an urban block with an area of 300 m², and it used to contain a summerhouse. Once again, the site lies on the edge of the built environment as to the north, a road separates it from vineyards and a cemetery. The owner of the summerhouse granted Hiesmayr permission to develop the site on the condition that she was able to continue living there. The solution was to integrate an apartment into the building on top of Hiesmayr's atelier.[41]

The house has an unusual shape that stands out amongst the rest of its neighbours. It is a cylinder cut in half with the straight side facing towards the residential area in the south and the curved side facing the vineyards and the cemetery to the north. There are rounded edges throughout, so the shape of the floorplan reminds you of a cell, where the spiral staircase represents the nucleus.

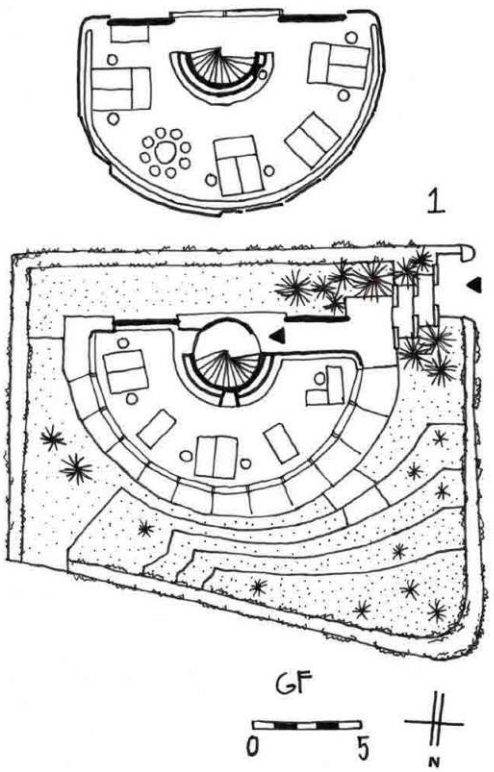


Fig. 128 - Atelierhaus, 1978 - floorplans

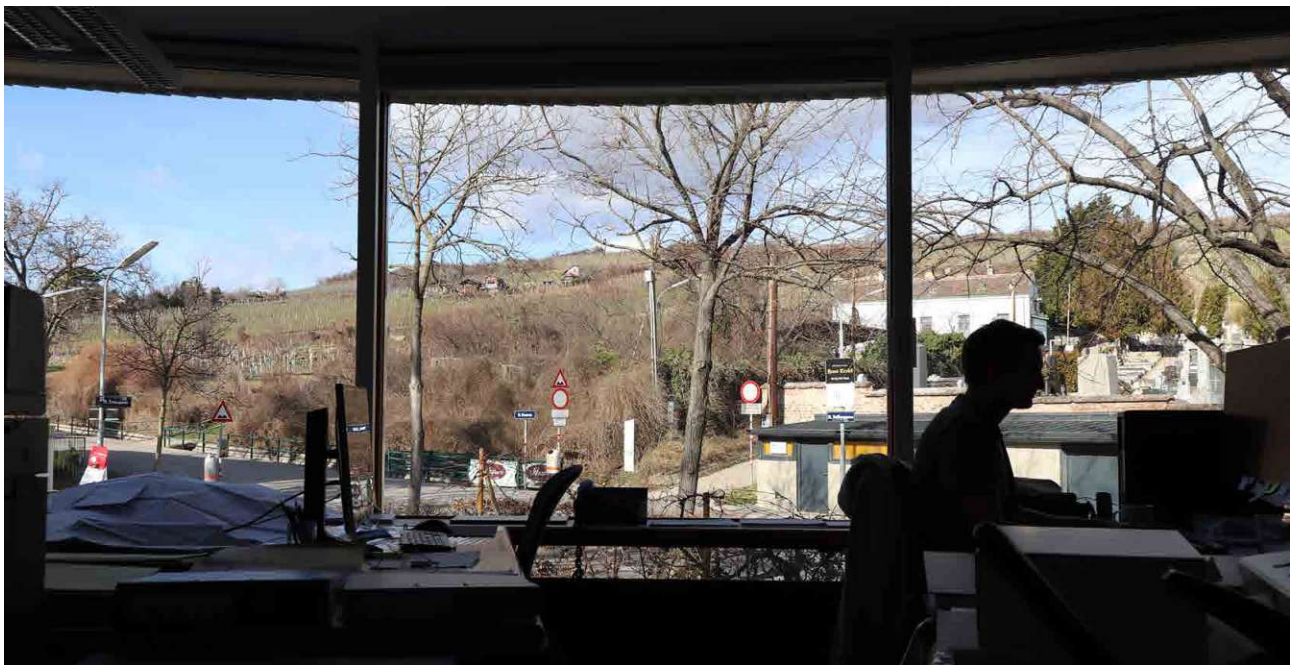


Fig. 129 - Atelierhaus, 1978 - view out onto vineyards

Fig. 130 - Atelierhaus, 1978 - exterior view from northwest

Overall, there are four floors, one of which is underground. The first two floors function as an atelier space and the top floor space was reserved for the apartment.

The concrete core is made up of a concrete semi-circular wall housing the spiral staircase, as well as two concrete walls on the edges of the straight side of the house. The floor slabs are reinforced concrete supported by the concrete core and slender steel columns close to the edge of the curved side of the floor slabs. Wood is the second dominant material in this project and most visible. The façade is clad with Nordic-pine panels vertically oriented overlapping each other. All the window frames were constructed with Oregon-pine and all the floors apart from the cellar had wooden floorboards.[42] Even the

Fig. 131 - Atelierhaus, 1978 - curved north facing façade

Fig. 132 - Atelierhaus, 1978 - Karl Prantl sculptural stone entrance from garden

garden pathways are constructed with wooden blocks.

The curved shape of the north-facing façade offers panoramic views onto the bordering vineyards. The walls on the second floor are glazed from floor to ceiling to maximise these views. Only the view onto the cemetery has been partially obscured. This creates an intimate connection with the greenspace outside, represented by the vineyards. Although the curved façade is in essence north facing, due to the nature of the curve it provides an east and west facing façade and consequently more access to daylight.

"Der Übergang vom öffentlichen Raum zum intimen Raum, die Schwellen, sind besonders kommunikativ auszubilden. Zäune und Mauern sollten fallen und die Grenze durch grün markiert werden. Eine naturnahe Einbettung ist das Ziel."[43]

As this quote demonstrates, Hiesmayr was critical of creating harsh boundaries. Therefore, bushes are planted along the edge of the site and the former acute angle on the corner of the site bordered by roads was rounded off.

The entrance situation is a particularly artistic example of Hiesmayr's approach to dealing with such a threshold. There is no gate, but six parallel facing stones by the sculptor Karl Prantl. They are placed in three rows shifting slightly with each row in a diagonal direction. It creates an entrance that is unobstructive, but still offers a certain level of privacy. Once again, Eicher was commissioned to design the garden. As a reaction to the form of the house he created semi-circular terraces fanning out from the edge of the curved side. Here, he planted evergreen plants that prefer shade. By the south facing façade he planted bamboos.

Fig. 133 - Atelierhaus, 1978 - Karl Prantl sculptural stone entrance from Eroicagasse

Zweithaus Parisini

Neusiedl am Steinfeld 1964-1965

Fig. 134 - view of southwest facing façade

Client/ Brief/ Location

As early as 1962 Hiesmayr began designing a second home for the aristocratic couple, with the surname Parisini, on a site in Neusiedl am Steinfeld, Lower Austria. Jowa Parisini was a successful fashion photographer and possibly more engaged during the design process due to her work in a creative sector. Most drawings were titled "Atelierhaus J. Parisini" and earlier designs were titled "Atelier Jowa Parisini." The earliest complete proposal dating back to 1963 features a 250m² hall with skylights adjacent to a living space encompassing an area of approximately 150 m². As the title "Atelier Jowa Parisini" suggests, perhaps the original intention was to construct a building that functioned as a photography studio, as well as a holiday home.

Neusiedl am Steinfeld is a village on the edge of the Alps close to Wiener Neustadt. The site was a typical example of a historic Austrian "Streckhof." Bordering onto the road was the tip of a long L-shaped building mass and the interior courtyard. A barn separated the interior courtyard from the field behind and at a distance of 40 m from the barn, the field width enlarges to approximately 28 m.

"Die Einsicht in das innere Gefüge von Dorf- und Hausgliederungen wird nicht mehr weitervererbt und weitervermittelt. Kein Wunder daher, wenn Neubauten wie Fremdkörper beziehungslos in den Dörfern herumstehen und immer mehr die Verschmelzung der verbleibenden Dorfreste zu einem harmonischen Ganzen erschweren.

Unsere Aufgabe müßte es sein, eine Verbindung zwischen Alt und Neu dergestalt zu verwirklichen, daß die alte historische Bausubstanz auf dem Wege einer echten Wiederbelebung (Revitalisierung) mit der neuen Gesellschaftsstruktur übereingestimmt und zusammengefügt wird."[44]

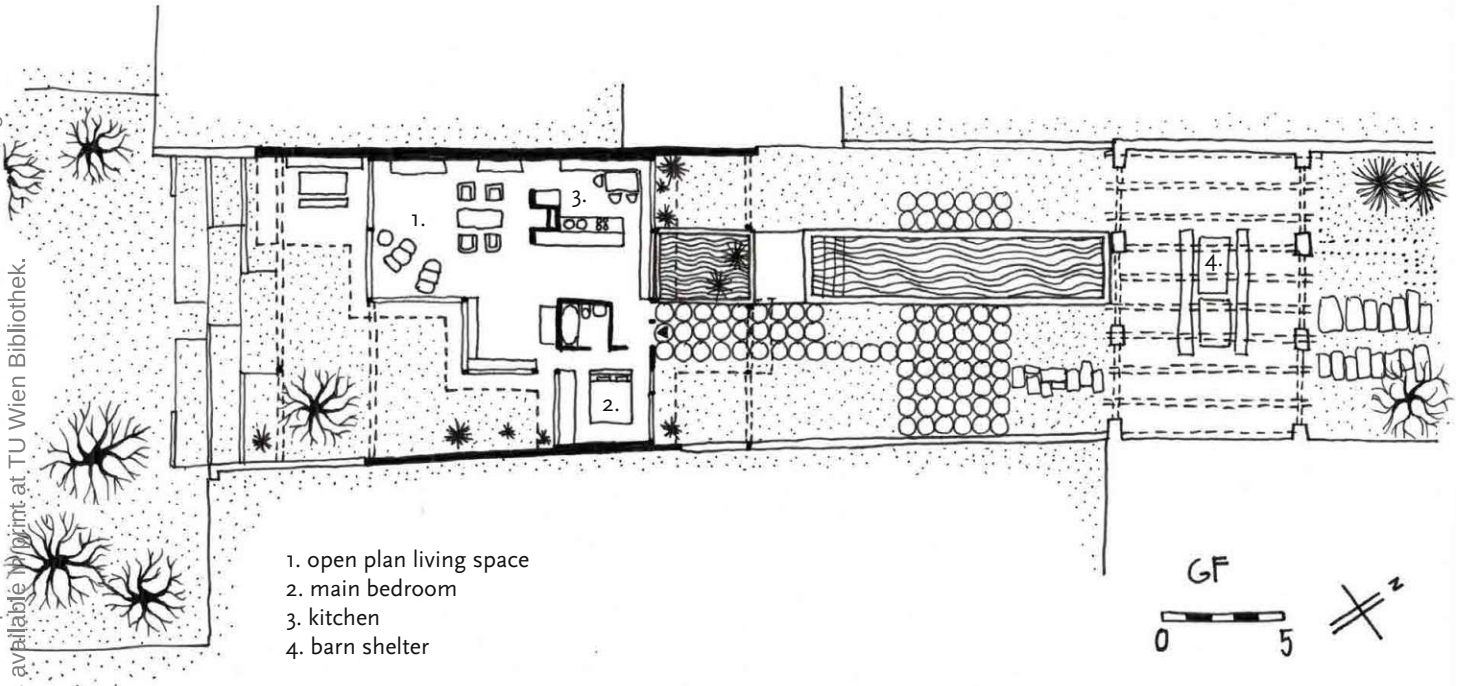
The „Zweithaus Parisini" is the next example of Hiesmayrs approach to dealing with a historical building following the retrofit of the "Nikolauszeche." In the previous quote he describes the problem of suburban sprawl occurring in small villages in the Austrian countryside. The historic Austrian "Streckhof" was abandoned, and the single-family home was popping up beside it without any connection to the historic urban plan. Hiesmayr saw the opportunity to counter this phenomenon with the revitalisation of a historic "Streckhof." It was an opportunity to breathe new life into an otherwise abandoned building, as well as creating a best practice example for how to deal with historical substance using his revitalisation approach.

Building Description

Parts of the historic "Streckhof" were demolished as restoring the entire structure to accommodate the new programme would have been too costly.[45] The former living quarters were retained, and the rest of the agricultural infrastructure, excluding the barn separating the courtyard from the field was demolished. The remaining living quarters were restored and functioned as a guest house. The structure of the barn was retained, whilst parts of the roof and wooden cladding between the columns were removed. Behind the barn, a long narrow swimming pool was constructed, followed by a new build, which functioned as the private living space for the Parisini couple. The completed building complex in 1965 featured no more construction from the point where the site's width increases.

The new build comprises a total living area of approximately 100 m² covering the entire width of the "Streckhof." The floorplan consists of one bedroom with an ensuite bathroom, and the remaining area is open plan living space. There is a fireplace in a central position adjoined by a kitchen island. There is a dining lounge next to the kitchen and a lounge area in a niche on the southern side of the house. The ceiling height was 2,2 m from the floor to the underside of the ceiling joist and the terrain in the field was 60 cm lower than the rest of the site. The height of the new build excluding the chimney stack is 2,9 m.

Fig. 135 - „Zweithaus Parisini“ floorplan



1. open plan living space
2. main bedroom
3. kitchen
4. barn shelter

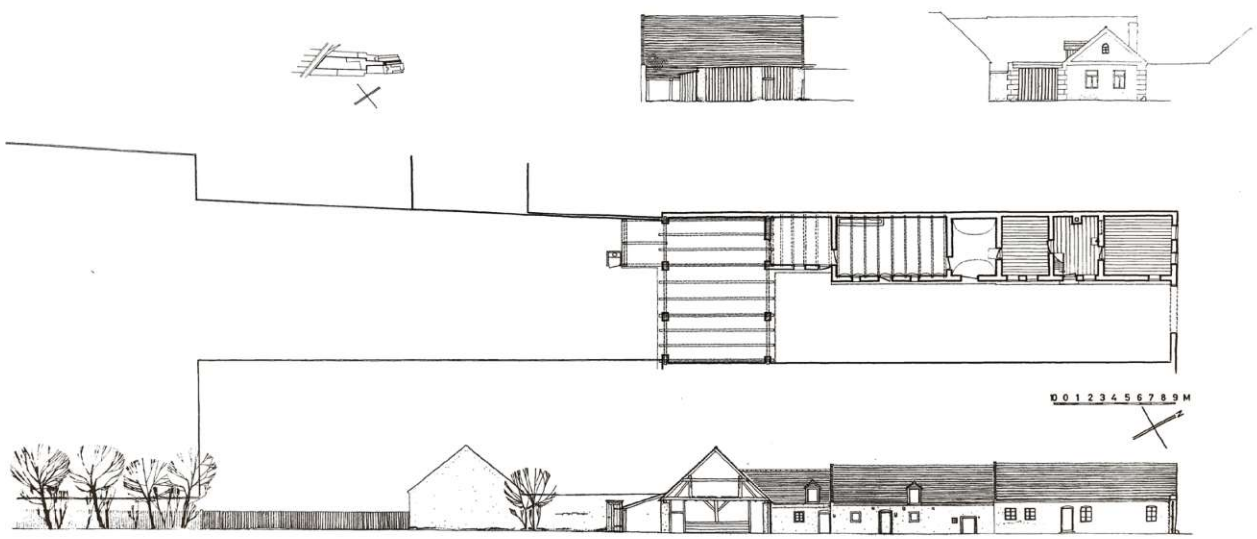


Fig. 136 - existing historic Austrian „Streckhof“

Biophilic Criteria Evaluation

Environmental Features

„Die Einheit in der Vielheit wird durch wenige, einfache Materialien gewonnen.
Fritz Zotter, mein Lehrer, hat beim Entwurf die angewandten Materealien abgezählt. Mehr als drei ließ er nicht zu.“[46]

The “Zweithaus Parisini” has a reduced material palette with concrete and wood being the dominant materials. Industrial prefabricated concrete elements were used for exterior walls and garden pathways. The exterior walls of the original “Streckhof” were extended using a hollow concrete blockwork construction, which remained untreated. The garden pathways were constructed using cylindrical precast concrete elements with a diameter of 80 cm. Although concrete is not a natural building material, it was locally sourced, most likely from the Weissenböck concrete factory in Neunkirchen, a ten-minute drive from the site.[47] This helps to justify the use of concrete on this project, as prefabricated elements were used, and the embodied carbon associated with transport was kept so low. The rest of the new build is predominantly constructed with wood and large areas of glazing. Wooden joists span the width of the house, supported on top of the hollow concrete blockwork walls on either side, as well as wooden columns positioned on a grid of approximately 4/ 4 m. The floor consists of larch panels and there were wooden panels on the ceiling. The ceiling panels were laid out parallel to the ceiling joists to show they were non-load bearing.[48] Otherwise, artificial materials were used to create a vapour seal, for insulation and concrete was also used for the foundations.

The initial proposal from 1963 would have had a much more detrimental impact on biodiversity and the environment, as opposed to the final outcome due to the enlarged area it would have sealed. By reducing the programme and keeping the floorplan compact, the entire field behind the house was free from construction and therefore nature was given more space to flourish, whilst the house remained within the confines of the historic urban plan. Once again Eicher was commissioned to plan the garden.
One can criticise the use of concrete in the landscaping, but the form that was chosen results in a surface that remains permeable. By placing the cylindrical elements next to each other in rows, gaps emerge between the concrete elements, allowing rainwater to permeate into the soil below and grass to grow in between the concrete elements. Rainwater runoff from the roof was directed through spouts directly into the garden. The long narrow swimming pool introduces the element of water as a form of recreation.

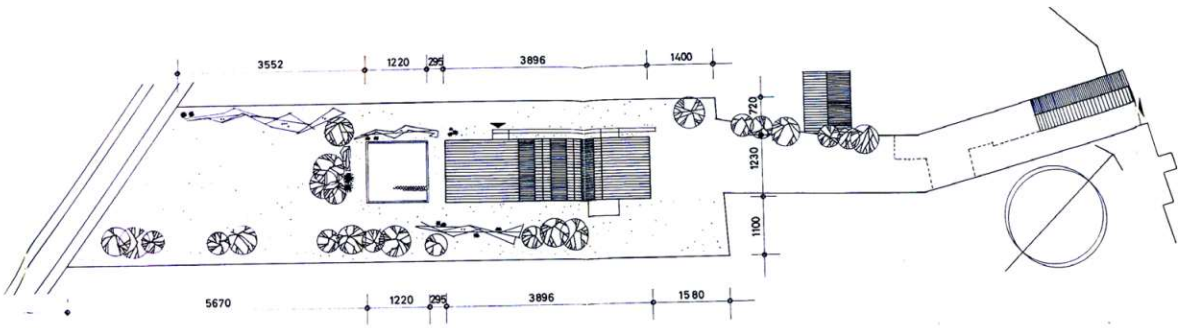


Fig. 137 - floorplan initial proposal

Fig. 138 - view towards barn shelter

Daylight enters the building from the northeast- and southwest facing façade. On the southern side, Hiesmayr broke up the floorplan to create a stepped façade, with access to daylight from the southwest and southeast. Most of the southern facing façade in the open plan living space was glazed. Hiesmayr positioned the windowsill height at approximately 50 cm with the top of the window adjoining the underside of the ceiling joist. On the final façade, providing access to the garden, there were floor to the underside of the ceiling joist windows. As the corners of the stepped façade point towards the south, it provides the opportunity for the winter sun to consistently illuminate the interior space throughout the day. The wooden joists supporting the roof continue into the outdoor

Fig. 139 - view from south

environment where the floorplan steps away from the exterior walls. This creates lines of shade that make their way across the exterior and interior of the building, creating varied scenes of light and shadow.

The dining area on the northeast facing façade received windows with a windowsill height of approximately 50 cm and the top of the window also adjoined the underside of the ceiling joist. As the entire living space was open plan it benefitted from multiple sources of daylight. The bedroom received clerestory windows on the northeast- and southwest facing façade. There is a minimum roof overhang of 1,1 m throughout to provide protection from the weather for the wooden structural elements, with the added benefit of providing the necessary shade during summer months. Further, in front of the southern facing façade a tree was planted on the inside of the final ceiling joist. This natural element is perfectly positioned to provide extra shelter from the sun in the open plan living space. The glazing on the final façade leading out onto the garden is divided in the middle, so that one half can slide across providing access to the garden, as well as ventilation into the living space. Wooden ventilation shutters were integrated into the façade of the bedroom to facilitate cooling airflow.

Exterior

On the southern facing façade representing the end of the built ensemble, Hiesmayr's aim was to break down the boundary separating architecture from nature. The ceiling joists that continue into the exterior environment and the floorplan area that gradually reduces as the building approaches the field at the back of the site blurs this boundary. It is a subtle transition from solid to transparent that makes it harder to define where the edges of the building really lie. As a tree has been planted between two ceiling joists in the exterior environment, nature has been welcomed into an area, that shares a physical connection with the house. Looking out from the interior, the ceiling joists and columns frame views of the exterior environment. The framed view along the main axis of the site looks directly onto the natural setting of a field. As mentioned previously, there was a height difference between the "Streckhof" and the field at the back of the site. To deal with this situation Hiesmayr took inspiration from Alvar Aaltos grass steps that bridge the boundary between architecture and nature. It is a successful way of using nature to

Fig. 140 - interior view incl. framed views in the exterior

soften the geometric rationality of modernist architecture. This allows architects to provide a transitional area on the ground plane, as such terraces are defined by modern architectural forms, but they house nature.

"Die Vergangenheit selbst herzustellen wäre die Restauration, bei der die Frage des Originalzustandes auftritt und das Leben sich den historischen Räumen anpassen muß, während bei der Revitalisierung die historischen Räume unserem modernen Leben angepaßt werden müßen."[49]

The way Hiesmayr dealt with the existing barn is a prime example of his revitalisation approach. In a past life, this barn was used for agricultural purposes, such as the storage of hay. Hiesmayr argues that if the barn was restored to cater to its former need, this would have provided no benefit to the Parisini couple. Besides the barn was built in a different time and its scale would struggle to even accommodate modern machines to provide the agricultural purpose it once did. Nonetheless, Hiesmayr saw the potential in this structure, and he adapted it to a modern way of life, by converting it into a sheltered outdoor space. This conversion was a simple case of reduction. By clearing the wooden partitions and exposing the columns, as well as demolishing the small extension of the roof on the southern side, he created a pure architectural form, which served the purpose of enabling the residents to shelter from the sun and rain, whilst maintaining full contact with the exterior environment.

Further outdoor sheltered space was provided for by the roof overhangs in the new build. On the southern façade this overhang extends by a length of 4,6 m into the garden. This creates an area sheltered from the sun and rain and it was used as an outdoor seating area.

Fig. 141 - view from field to new build

Fig. 142 - existing barn

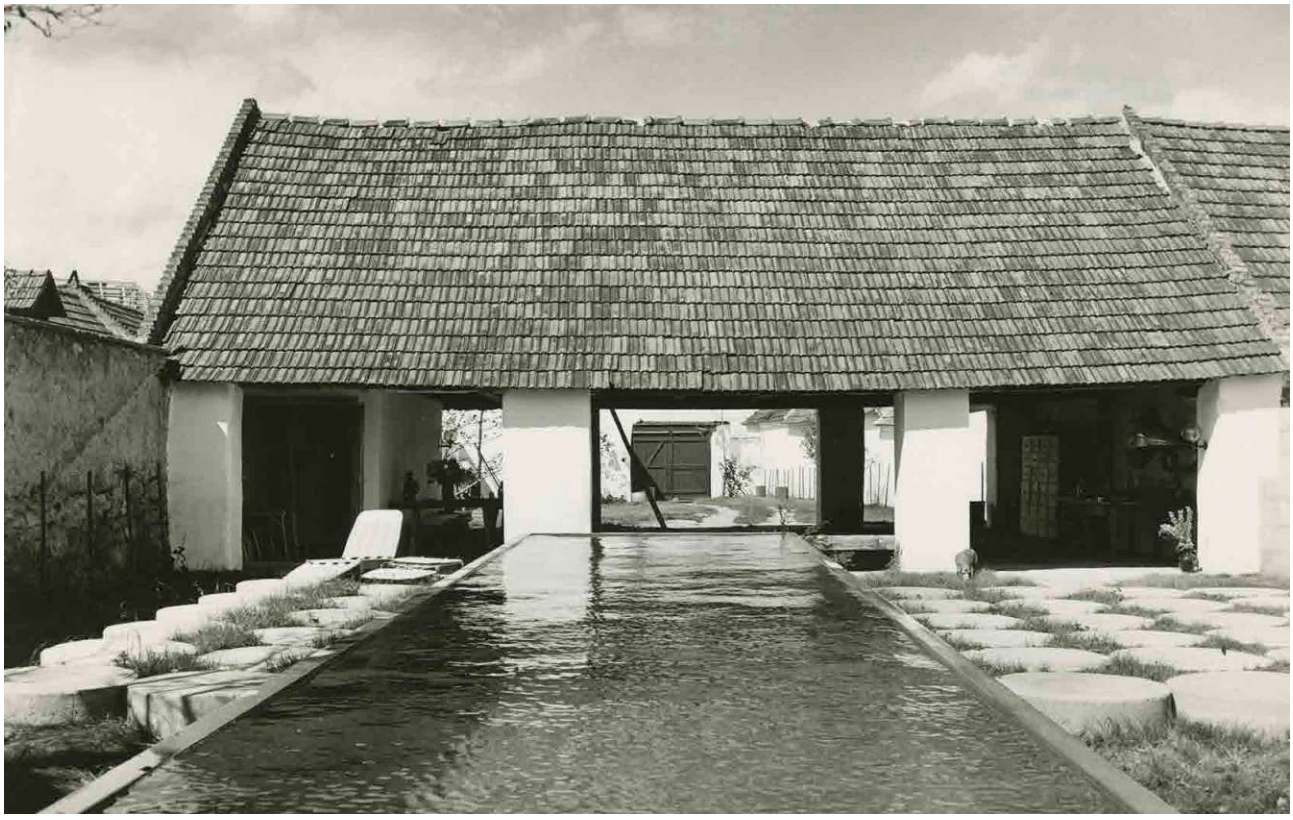


Fig. 143 - revitalised barn

Symbolic Design

As is the case with most modernist icons, the "Zweithaus Parisini" had a rational floorplan defined by right angles and a total lack of ornamental features. There was no plaster concealing the hollow concrete blockwork construction, nor was there paint concealing the grain of the wooden elements, interior walls were whitewashed. However, there is an important element that introduces colour, contrasting with the otherwise neutral environment. A splash of bright and vibrant colour is introduced by the curtains. It is a neutral backdrop of architecture that has been uplifted with textiles (furniture, carpets & curtains) that provide colourful accents.

The historic "Streckhof" is a building typology defined by functionality. On the long and very narrow sites, there was always a similar linear progression of functions. Bordering directly onto the road were the living quarters, followed by a stable for livestock, then the barn and finally the field at the back of the site.[50] Hiesmayr adapted the linear progression to create an enticing sequence of spaces. As you enter the site you are aware of the new build behind the barn, as it is visible through the columns underneath the roof structure. Transitioning through the barn you walk through a space that dims the light, then once you emerge back into the light the new build fully reveals itself. Upon entering the building your gaze is consciously directed to the field at the back. The linear progression culminates in the final view of the field, framed by the wooden joists and exterior walls. The outdoor seating area looking out onto the field is a perfect refuge situation. The prospect is the field and as there are trees along the perimeter of the site the rest of the field has good visibility. The extension of the exterior wall provides a sense of security, as well as shelter from wind.

Fig. 144 - view of southwest facing façade incl. red curtains

Fig. 145 - view towards field from new build

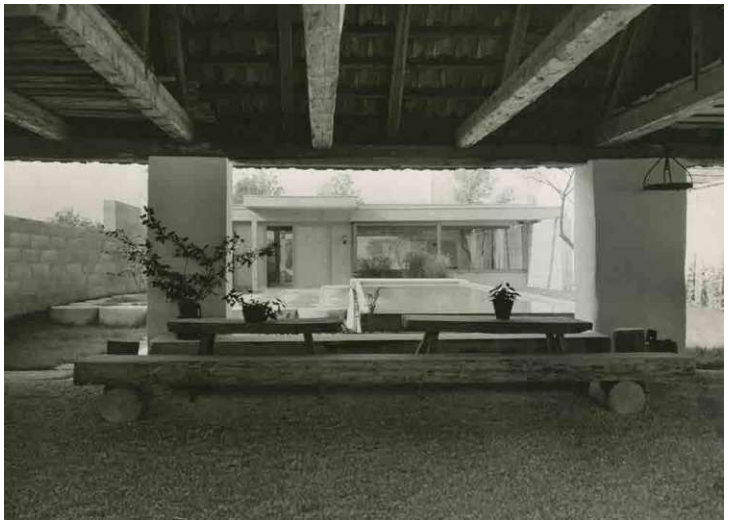


Fig. 146 - view towards new build from barn structure

Fig. 147 - view towards barn structure from entrance

Fig. 148 - view towards enclosed barn structure

Post-Occupancy Evaluation

In the early 1970s Hiesmayr's atelier planned an extension for the new build. The extension was slotted next to the southern facing façade into the wider part of the site. It extended the new build beyond the confines of the historic urban plan, yet to retain the framed view of the field, it was positioned in the northern corner of the wider part of the site. The tree positioned between the two ceiling joists is now fully grown, but it does not appear to have caused any structural damage to the new build or the exterior walls. The current resident is a ceramic artist and they decided to convert the barn structure into an enclosed workshop space. In terms of biophilic design this is an unfavourable intervention, as a large area of outdoor sheltered space, as well as the sightline leading up to the new build is now lost.

Fig. 149 - view from field to new build incl. fully grown trees

Wohnhaus Siemer

Goßam in der Wachau 1967-1969

Fig. 150 - view from east

Client/ Brief/ Location

The Siemer couple approached Hiesmayr in 1967 to design a weekend home that could be occupied throughout the year on a site in the Wachau. They visited and acquired the site prior to Hiesmayr's involvement, and they were introduced to him by a family acquaintance. Their first visit to the site was the first time they were introduced to the beautiful landscape of the Wachau.[51]

The brief called for a modest-sized home to accommodate the Siemer couple and their son. Although Dr. Siemer was a lawyer by profession, his family explains that in essence he would have preferred the life of a farmer, which is why they chose to build a second home in the country. Consequently, the Siemer family kept animals, including cows on their property. Hiesmayr was granted artistic freedom, the only restriction was the budget, which was set from the beginning.[52]

"Die Behörden arbeiten immer noch mit der inhaltlich nicht definierten Formel des landschaftsgebundenen Bauens. Ein Vorläufer des Regionalismus. Die historischen Bauten auf dem Lande sind Funktionstypen, die vom Städter, der keine Funktion im landwirtschaftlichen Nutzgebiet hat, nicht als sinnentleerte Attrappen nachgeahmt werden sollten."[53]

The process of receiving planning application was complicated, as the planning authority encouraged homes with pitched roofs, to fit in with the traditional village aesthetic. Hiesmayr proposed low-lying flat roofed homes, so three attempts at gaining planning approval

were necessary, until finally the local planning officer conceded, remarking:

"Dann baut's halt euren neurotischen Bunker!"[54]

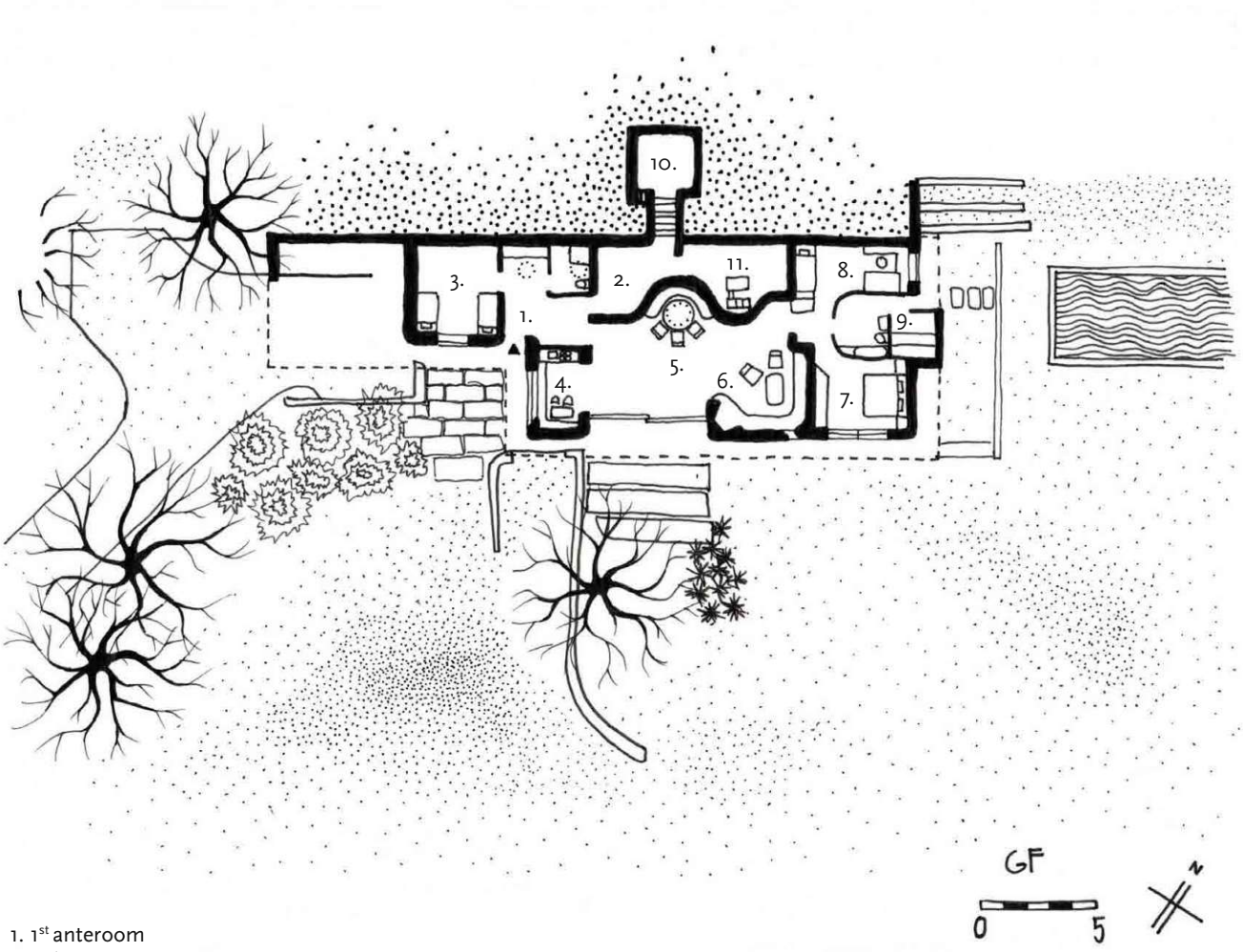
The site is situated in Goßam, a village bordering the Danube opposite Melk in the heart of the Wachau. The site lies on relatively high terrain, commanding views to the opposite side of the Danube, including "Schloß Schönbühel." There is an inclination from south to north, as the terrain gradually descends towards the Danube valley below. Since 2000, the Wachau cultural landscape is a UNESCO world heritage site. The Wachau gained world heritage status because of its "high visual and landscape qualities."[55] The cultural landscape is defined by the many vineyards and apricot tree orchards bordering onto the Danube, whilst the forests on the hilltops dominate the horizon.

Building Description

The "Wohnhaus Siemer" is a two-storey detached single-family home comprising a total floor area of approximately 160 m². It is a large site, with the longer sides parallel to the topographic contour lines of the terrain. Hiesmayr positioned the home close to the northern border in a central position, with the longer sides parallel to the topographic contour lines oriented towards the southeast. A curved driveway leads through planted plane trees providing access to the home from the west. Next to the northeast-facing façade there is a swimming pool. The northern part of the home is submerged within the hill. There is a retaining wall structure bordering the home to the south. The eastern side of this retaining wall structure curves around the plane tree that was planted closest to the southeast facing façade.

A roof overhang on the western end of the home provides shelter for a parking space. The main entrance lies on the western corner of the house, where its width enlarges. The first anteroom is entered from the main entrance, providing access to the guest bedroom, a bathroom, the open-plan living space and a second anteroom that provides access to the wine cellar and the boiler room. A kitchen, dining area and lounge with a fireplace is included within the open-plan living space. On the eastern end of the home lies the main bedroom and a children's room, separated by a bathroom and a sauna that is accessed from the garden.

Fig. 151 - „Wohnhaus Siemer“ floorplan



1. 1st anteroom
2. 2nd anteroom
3. guest bedroom
4. kitchen
5. dining area
6. lounge area
7. main bedroom
8. children‘s room
9. sauna
10. wine cellar
11. boiler room

Biophilic Criteria Evaluation

Environmental Features

Due to parts of the house being submerged within the terrain, one of the main construction materials is concrete. All the walls separating the interior from the soil to the north are constructed with waterproof concrete. The rest of the walls are a brick work construction. Concrete was used in the foundations and the roof structure was a reinforced concrete slab supported on top of the walls.[56] The roof construction was a green roof, soil was distributed from the hill behind across the final layer of gravel creating a seamless connection between the landscape and the green roof. Interestingly, Hiesmayr included a layer of ribbed "durisol" or wood-concrete panels in the roof structure, which is a composite material predominantly consisting of the natural building material, wood. Further, wood was used for all the window and door frames, as well as the shading elements on the exterior façades. Most of the furniture in the interior was also custom designed by Hiesmayr and they are constructed with a combination of wood and textiles. The most dominant natural building material on the interior are the stone floor slabs. "Wachauer Marmor," a regional natural building material was used as a border around the swimming pool in the garden. Finally, the interior walls were lime washed.

As Hiesmayr was dealing with such a generous site, he turned to Fred Eicher to help him design a garden that could do the beautiful surrounding landscape justice. Eicher used simple features to generate a complex plan. Rolling man-made hills, likely consisting of excavated soil from construction, were distributed around the garden defining individual zones. The groups of plane trees on the western end of the site form a gateway, confronting visitors with majestic natural elements before they enter the house. The planting Eicher determined for the site promoted minimal management. Lavender is a recurring plant throughout the garden and next to the swimming pool, there is a large area of Chinese silver grass. Both these plants require pruning once a year, but otherwise a minimal effort to control.[57] Later, the Siemer family introduced grape vines by the exterior façades. Their growth was directed along the

Fig. 152 - roof construction before soil distribution

Fig. 153 - distribution of soil from top of the hill

Fig. 154 - view of southeast facing façade

parapet of the roof structure creating a link to the green roof and a homage to the main crop that is cultivated in the Wachau.

The green roof is an effective feature that slows stormwater runoff. Due to the roof overhang running the entire length of the west, east and south facing façade most of the sealed area of the site is covered by this green roof. Rainwater runoff from the roof is then directed through waterspouts into the garden, allowing it to percolate into the ground soil below. The element of water as a recreational feature is introduced with the swimming pool. The border of "Wachauer Marmor" naturally integrates it into the surrounding lawn.

The building is clearly oriented to the southeast with the open-plan living space benefiting from large areas of glazing. The continuous roof overhang provides protection from the summer midday sun. If more protection is required, residents can slide two wooden louvre elements on the exterior façade across the glazed area of the open plan living space. The guest bedroom and the main bedroom also received glazing on the south-east facing façade. Wooden louvre elements on the exterior façade can rotate like doors to provide additional shading if necessary.

The plane tree planted closest to the home by the southwest facing façade is a natural element that provides effective shading, and the canopy now extends well above the height of the home. Plane trees are deciduous trees, so the prominent large leaves effectively mitigate the sun's intense glare in summer months, whereas the empty branches in winter allow the sunlight to pass.

Fig. 155 - interior view of dining area incl. light pool

Fig. 156 - interior view of dining area incl. light pool

As the north facing façade has no access to daylight due to its submergence within the hill, Hiesmayr included skylights in the deeper areas of the floorplan. By the dining area in the open plan living space, Hiesmayr turned the necessity of including a skylight into a unique design feature. A circular wooden dining table is elegantly positioned within the concave surface of the interior wall. Centrally positioned above the dining table is a circular skylight with a diameter of 1 m. The edges of the ceiling bordering onto the skylight are rounded of, allowing more daylight to reflect of the curved surface into the dining area. Further, for parts of the day a light pool emerges on the concave surface of the interior wall. This pool of light slowly makes its way across this surface, constantly changing its shape and effectively helping residents tell the time, based on where this light pool shines.

Finally, due to the green roof and large parts of the home submerged within the hill, thermal gain is kept to a minimum, as the interior temperature is regulated by the thermal mass of the surrounding ground soil. This effectively eliminates the need for artificial cooling in the hotter summer months.[58]

Exterior

Hiesmayr's design, along with Eicher's garden design successfully merges "Wohnhaus Siemer" with the surrounding landscape in a charming and poetic manner. The house is so successfully concealed by the green roof, the man-made hills, and the plane trees, that when it is viewed from the opposite side of Danube, it merely reveals itself as thin white strip in the landscape and the neighbouring homes are much easier to identify. Further, Hiesmayr and Eicher even managed to fool technology, as the house doesn't show up on google maps. In section, the inclination of the hill, as well as the soil of which it is composed, is extended over the roof, and continued along the retaining wall structure that almost touches the south facing façade, creating a harmonious bridge from the upper part of the site to the lower part.

As mentioned previously, Hiesmayr was interested in creating green communicative boundaries, as opposed to harsh barriers, such as the garden walls that Roland Rainer propagated. The rolling man-made hills distributed around the garden are a prime

example of such green communicative boundaries. They provide a level of privacy, whilst simply appearing to be a part of the landscape and we don't perceive these elements as fulfilling the function of a barrier. The first man-made hill visually conceals the part of the garden bordering the open-plan living space from the approach along the driveway. The second smaller hill provides a subtle barrier between the swimming pool and the aforementioned part of the garden. These man-made hills integrate themselves harmoniously into the garden landscape, as well as mirroring the surrounding hills of the Wachau on a smaller scale. Further, the man-made hills frame views into the surrounding landscape with natural elements, so the resident's perception of the exterior environment is a pure natural setting devoid of any human intervention.

The main bedroom and the open plan living space share the closest connection to the exterior environment. In the open plan living space, there are two floor-to-ceiling window segments and a long narrow window by the lounge area. The floor-to-ceiling window segments have the same width, and one half can slide across to provide access into the garden. The dining area is positioned on the same axis as one of the floor-to-ceiling window segments, granting residents a view all the

Fig. 157 - view from opposite side of the Danube

way across to the other side of the Danube. The main bedroom received a fully glazed door, which also grants direct access into the garden, as well as the same view as the open plan living space. In the deeper parts of the floorplan, it is harder to establish a direct connection with the exterior environment. However, the skylights allow residents to look up into the sky above and as the green roof surrounds these skylights, grass and other small bushes pop up into view.

The continuous roof overhang along the west, east and south facing façade provides shelter from the rain, allowing residents to move around the exterior of the building during rainy weather without getting wet. The roof overhang sheltering the parking space generates the largest covered outdoor area. This space is now used as an outdoor seating area, instead of parking. The changing function of this space is an indication that Hiesmayr failed to include sufficient covered outdoor space that shelters residents from the rain in his original design.

Symbolic Design

A defining aspect of "Wohnhaus Siemer" is the unusually small number of right angles. Many interior walls are curved, and most corners are rounded off. This is a feature that recurs in many of Hiesmayr's buildings, and it makes him stand out amongst other modernist architects that religiously adhered to rational grids and the standardised right angle. If we observe the earlier attempts to gain planning permission, it becomes clear the final design is the most conservative option. In the first attempt, not a single right angle was included in any of the structural walls. The second attempt is more reduced, but still included an oval-shaped recess in the open plan living space. In the final outcome, the remnants of this freeform treatment of walls are distilled and most pronounced in the dining area in the open plan living space.

Fig. 158 - interior view of dining area incl. skylight

As mentioned previously, the dining area is inserted within the concave surface of an interior wall. The edges around the centrally positioned skylight curve up to the sky, and a spherical lamp is delicately suspended from the middle of the skylight. These are all forms that have more in common with nature than the right angle or the rational grid. In a sense though, these forms transcend this world, as the lamp looks like a planet on the brink of being sucked up into a blackhole.

"Wohnhaus Siemer" is a particularly suitable example, that exemplifies the prospect and refuge theory. First of all, the building lies on high terrain and the view out over the Danube allows residents to survey a large prospect. The home functions brilliantly as the refuge, as it is partly submerged within the terrain. It perfectly represents a modern interpretation of our preferred prehistoric typology, the cave. The impenetrable mass of ground soil to the north means residents can be rest assured that no threat could ever surprise them from behind. The most comforting refuge situation in the interior occurs when we are seated in the middle of the curved bench within the dining area. From this spot we can survey

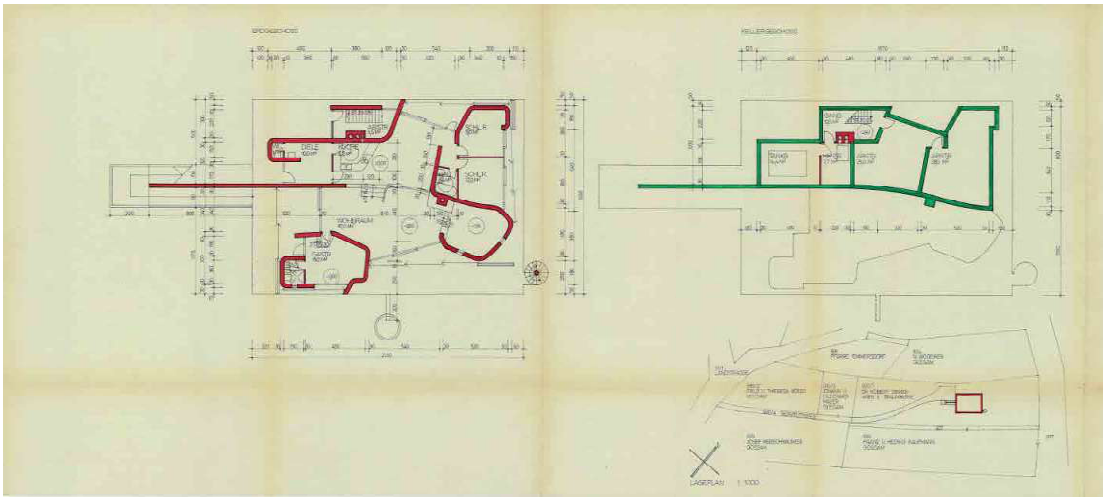


Fig. 159 - floorplan - 1st planning application

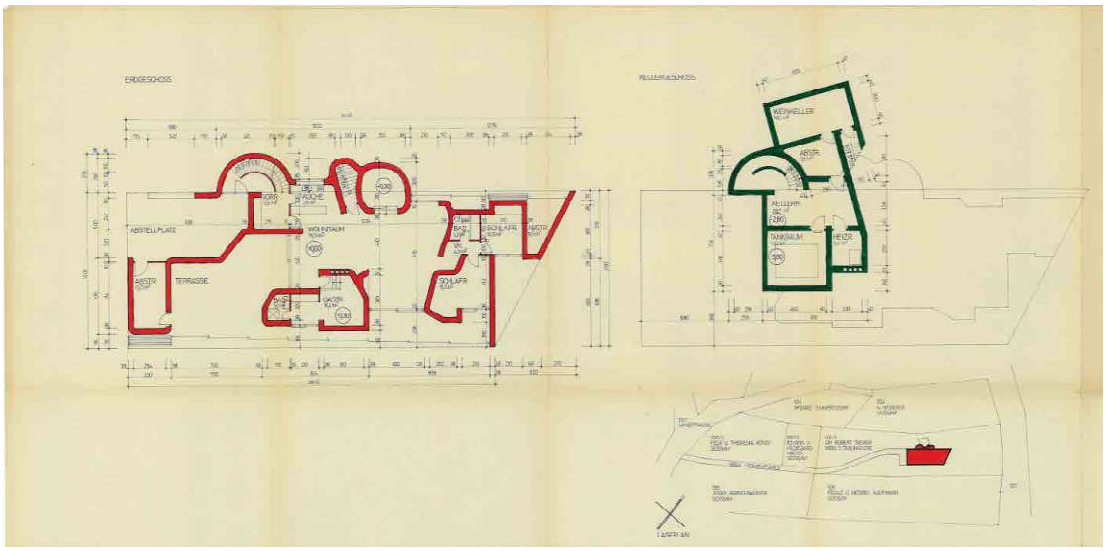


Fig. 160 - floorplan - 2nd planning application

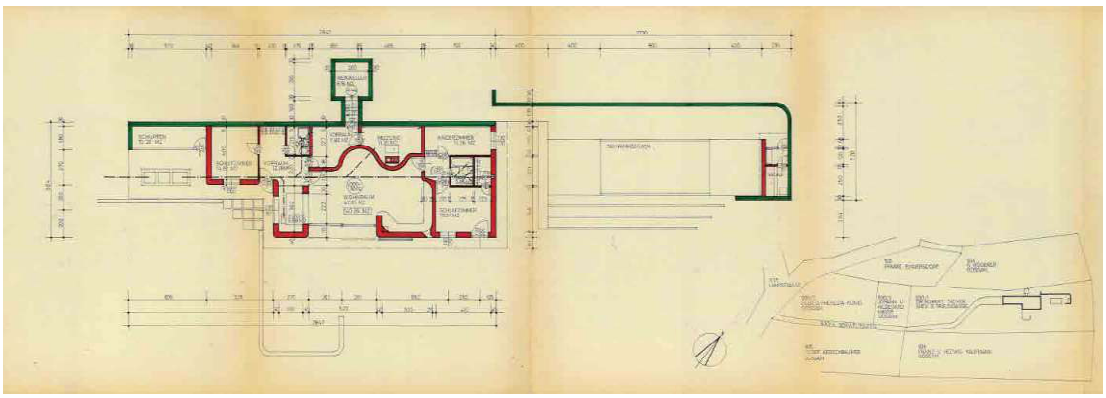


Fig. 161 - final planning application

the prospect of the Danube valley through the floor-to ceiling windows on the southeast facing façade. The curved walls on either side of the seating area embrace the resident providing an additional sense of security. The stone floor in the interior further emphasizes the cave-like atmosphere.

Finally, the approach towards the home along the driveway is a pleasantly enticing experience. Firstly, the driveway is a double bend, as opposed to a straight line, which allows visitors to gain multiple perspectives of the house along their approach. The house lies on slightly higher terrain, so only the southwest-facing façades and the curved chimney stacks are decipherable. The man-made hills effectively conceal the rest of the house from view. As many of the design elements harmoniously bridge the boundary between nature and architecture, a visitor may wonder: "Is there even a home...? Is this the right address...?" As we get closer to the house, we pass beneath the majestic plane trees that dim the light and the tree trunks consecutively obscure our view. Finally, once we have passed through the trees into the light, the architectural features such as doors and windows fall into place, and we understand we have arrived.

Post-Occupancy Evaluation

Since its completion, the Siemer family has consistently occupied the "Wohnhaus Siemer." There have been no extensions added to the exterior of the home and the original floorplan structure largely remains, apart from the wine cellar, which has been enlarger further into the ground soil. As mentioned previously, there was a programmatic change in the use of the parking space on the western end of the home. On the interior, the former children's room has been converted into a larger bathroom with an integrated sauna. The former bathroom and sauna originally separating the two bedrooms, has been converted into a walk-in closet. In 2023, the green roof required renovation work, as rainwater began to seep through the skylights. This was the first time the green roof had to be renewed equating to a lifespan of approximately 50+ years, which is above the industry standard. A looming renovation issue is rusting rebar in the roof structure, as the rebar in the reinforced concrete slab was placed particularly close to the exterior surface. The roots of the plane tree planted closest to the house have caused damage to concrete paving stones in the garden. Nonetheless, the distance to the foundations appears to be sufficient, as there has been no structural damage to the house due to root growth.

When Mrs. Siemer was asked whether the house with its close connection to nature fosters peace of mind, she agreed. She mentions how the home represents the antithesis to her apartment in Vienna, a welcome contradiction to the urban environment. However, she added that this ultimate connection to nature can also foster the feeling of loneliness.[59] This answer puts things into perspective. Although we may have spent most of our evolutionary phase immersed in a natural setting, we are still social animals. Using biophilic design to distance ourselves further away from the built environment can also distance ourselves further away from society and each other.

Fig. 162 - exterior view incl. retaining wall structure

Fig. 163 - view from driveway

Fig. 164 - view from site entrance

References

1.Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 7

2. https://www.architektenlexikon.at/de/721.htm *(last visited 01.02.2024)*

3. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 8

4. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 8

5. https://www.hiesmayr.at/html/unternehmen/chronik.php *(last visited 01.02.2024)*

6. http://www.kunstransfer.at/archiv/semiotik/07/_web_semiotik/03_nostalgia_interview%20elisabeth%20hiesmayr.html *(last visited 01.02.2024)*

7. https://www.architektenlexikon.at/de/721.htm *(last visited 01.02.2024)*

8. http://www.kunstransfer.at/archiv/semiotik/07/_web_semiotik/03_nostalgia_interview%20elisabeth%20hiesmayr.html *(last visited 01.02.2024)*

9. https://www.nikolauszeche.at/

10. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 120

11. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 122

12. Ernst HIESMAYR, Einfache Häuser, Vienna (Löcker Verlag) 1991, pp. 6-9

13. Lois WELZENBACHER, Haus in der Landschaft, Moderne Bauformen, (May) 1937, p. 240

14. http://www.ernst-hiesmayr.at/gebautes/wifi-linz/ *(last visited 01.02.2024)*

15. https://geschichte.univie.ac.at/de/artikel/juridicum *(last visited 01.02.2024)*

16. Ernst HIESMAYR, Ernst Hiesmayr: Juridicum: Universität Wien, Vienna (Löcker Verlag) 1996, p. 15

17. Ernst HIESMAYR, Ernst Hiesmayr: Juridicum: Universität Wien, Vienna (Löcker Verlag) 1996, p. 19

18. Ernst HIESMAYR, Ernst Hiesmayr: Juridicum: Universität Wien, Vienna (Löcker Verlag) 1996, p. 46

19. Ernst HIESMAYR, Ernst Hiesmayr: Juridicum: Universität Wien, Vienna (Löcker Verlag) 1996, p. 46

20. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 142

21. Ute WOLTRON, Ernst Hiesmayr 1920 – 2006, Der Standard, 13.8.2006

22. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 136

23. Ernst HIESMAYR, Einfache Häuser, Vienna (Löcker Verlag) 1991, p. 4

24. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 140

25. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 134

26. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 21

27. Ernst HIESMAYR, Das Karge als Inspiration: Castilla elemental, Vienna (Löcker Verlag) 1995, p. 7

28. Ernst HIESMAYR, Das Karge als Inspiration: Castilla elemental, Vienna (Löcker Verlag) 1995, p. 60

29. Ernst HIESMAYR, Das Karge als Inspiration: Castilla elemental, Vienna (Löcker Verlag) 1995, p. 116

30. Ernst HIESMAYR, Eine neue Tradition, Dornbirn (Vorarlberger Verlagsanstalt AG) 1995, p. 98

31. Ernst HIESMAYR, Eine neue Tradition, Dornbirn (Vorarlberger Verlagsanstalt AG) 1995, p. 84

32. Ernst HIESMAYR, Eine neue Tradition, Dornbirn (Vorarlberger Verlagsanstalt AG) 1995, p. 160

33. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 137

34. Ernst HIESMAYR, Einfache Häuser, Vienna (Löcker Verlag) 1991, p. 152

35. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 24

36. https://www.commentary.org/articles/adolf-portmann/beyond-darwinism-the-special-position-of-man/ *(last visited 01.02.2024)*

37. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 24

38. https://www.geschichtewiki.wien.gv.at/Nu%C3%9Fdorfer_Brauerei *(last visited 01.02.2024)*

39. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 74

40. Fred EICHER, Siedlung Nussdorf Wien, Band 7, Heft 3, anthos, p. 36

41. Ernst HIESMAYR, Einfache Häuser, Vienna (Löcker Verlag) 1991, p. 108

42. Ernst HIESMAYR, Einfache Häuser, Vienna (Löcker Verlag) 1991, p. 112

43. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 136

44. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 120

45. http://www.ernst-hiesmayr.at/gebautes/haus-in-neusiedl/ *(last visited 01.02.2024)*

46. Ernst HIESMAYR, Das Karge als Inspiration: Castilla elemental, Vienna (Löcker Verlag) 1995, p. 50

47. Ernst HIESMAYR, Einfache Häuser, Vienna (Löcker Verlag) 1991, p. 54

48. Ernst HIESMAYR, Einfache Häuser, Vienna (Löcker Verlag) 1991, p. 56

49. Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999, p. 120

50. Roland RAINER, Anonymes Bauen: Nordburgenland, Vienna (Böhlau Verlag) 1995, p. 91

51. Dialogue with Mrs. Siemer 08.09.2023

52. Dialogue with Mrs. Siemer 08.09.2023

53. Karin RAITH, Einfache Häuser, Vienna (Löcker Verlag) 1991, p. 68

54. Dialogue with Mrs. Siemer 08.09.2023

55. https://whc.unesco.org/en/list/970/ *(last visited 01.02.2024)*

56. Ernst HIESMAYR, Einfache Häuser, Vienna (Löcker Verlag) 1991, p. 71

57. Dialogue with Mrs. Siemer 08.09.2023

58. Dialogue with Mrs. Siemer 08.09.2023

59. Dialogue with Mrs. Siemer 08.09.2023

Conclusion

The analysis of the objects of interest demonstrates that environmental features and exterior biophilic criteria were successfully embraced by all the pioneers of Austrian biophilic design. The symbolic design criteria perhaps less so, as these elements are most likely to clash with modernist principles. On the other hand, the intimate connection between the interior and exterior was particularly pronounced in all objects of interest, as this is a shared characteristic of both modernism and biophilic design.

Plischke's role in promoting a biophilic approach to architecture is significant compared to the other pioneers, as he was the eldest and therefore most involved in the early development of modernism, especially as one of his most influential mentors was Josef Frank. His marriage to Anna Plischke, a landscape architect, and close cooperation with her throughout his professional career increased the quality of the gardens in his many residential commissions. The extent of Wörle's work demonstrates his alignment with the biophilic approach. He was involved in the planning of garden cities, the "Gänsehäufel" is a prime example of architecture that is subservient to nature, and his residential projects express a clear desire to allow residents comfortable access to the exterior environment. Rainer is certainly the most vocal environmentalist, and his substantial oeuvre demonstrates that he put his theories into practice. His involvement in Plischke's return to Vienna is a clear indication that he believed their philosophies aligned. Hiesmayr, the youngest of these pioneers, exhibited a biophilic approach that was more poetic and less rational than the other pioneers and his close cooperation with the Swiss landscape architect Fred Eicher improved the biophilic credentials of his projects significantly.

Wörle was the only pioneer, who did not take on a role as a professor, so his influence on the following generation is harder to determine. The collective influence of Rainer, Plischke and Hiesmayr is perhaps most pronounced in the "Neue Vorarlberger Bauschule." Many of the leading figures of this architectural movement, which promoted sustainable architecture and wood as a dominant construction material, studied under one of these pioneers. Hans Purin and Rudolf Wäger both studied under Rainer at the Academy of Fine Arts in Vienna, whilst Roland Gnaiger studied under both Plischke and Rainer at the academy. Helmut Dietrich and Much Untertrifaller studied under Hiesmayr at the Technical University of Vienna.

Two homes stand out as representing the biophilic approach most successfully. The "Sommerhaus St. Margarethen" designed by Rainer, demonstrates an effective use of natural building materials and the stone used in its construction firmly roots the building to its context. Further, the primitive nature of construction and the absence of all things technological facilitates an intimate connection with nature. The "Wohnhaus Siemer" designed by Hiesmayr, awakens instinctual memories of our primal habitat and with the help of environmental features the house all but disappears in the surrounding landscape.

A recurring feature in most of the objects of interest that has been heavily criticised is the oil heating system. Otherwise, the range of passive solutions exhibited in these homes remain as relevant today as when they were first completed. Today, it would be advisable to embrace the new technology at hand and include heating systems that rely on renewable sources, such as solar panels. However, in keeping with Frank Lloyd Wright's concept of "organic architecture," solar panels should be integrated within the building structure as a feature, so that it doesn't appear to be a technological tumour emerging out of the architecture, instead it should blend in with the overall composition.

Bibliography

Henry George LIDDELL & Robert SCOTT, A Greek-English Lexicon. revised and augmented throughout by. Sir Henry Stuart Jones. with the assistance of. Roderick McKenzie. Oxford (Clarendon Press) 1940

Erich FROMM, The Heart of Man: Its Genius for Good and Evil, New York (Harper & Row) 1964

Edward O. WILSON, biophilia, Cambridge (Harvard University Press) 1984

Stephen R. KELLERT, Judith H. HEERWAGEN, Martin L. MADOR, Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life, Hoboken (John Wiley & Sons, Inc.) 2008

Friedrich EULER, Planen und Bauen für das Wochenende, Vienna (Steyrermühl-Verlag) 1928

G. BROADBENT & C. A. BREBBIA, Eco-Architecture: Harmonisation between Architecture and Nature/ Cultural responses to primitive needs, Nick BAKER, Southampton (WIT Press) 2006, pp. 3-13

Bernard RUDOFSKY, Architecture Without Architects: A Short Introduction to Non-Pedigreed Architecture, Alburquerque (University of New Mexico Press) 1987

Manuel GUEDES, Thermal Comfort and Passive Cooling in Southern European Offices. PhD Thesis, Univ. Cambridge 2000

Mackay H. BAILLIE-SCOTT, Houses and Gardens, London (George Newnes Ltd.) 1906

Stephen KAPLAN, 1979. Perception and landscape: conceptions and misconceptions. In: Elsner, Gary H., and Richard C. Smardon, technical coordinators. 1979. Proceedings of our national landscape: a conference on applied techniques for analysis and management of the visual resource Incline Village, Nev., April 23-25, 1979. Gen. Tech. Rep. PSW-GTR-35. Berkeley, CA. Pacific Southwest Forest and Range Exp. Stn., Forest Service, U.S. Department of Agriculture: pp. 241-248

George FINK, Stress: Concepts, Cognition, Emotion, and Behaviour/ Ch. 11 Evolutionary Origins and Functions of Stress Response System, R.M. NESSE, S. BHATNAGAR & B. ELLIS, Cambridge (Academic Press) 2016

Adolf LOOS, Ornament and Crime: Thoughts on Design and Materials, Translated by Shaun Whiteside, London (Penguin Random House) 2019

Roger S. ULRICH, View through a Window May Influence Recovery from Surgery, Science, New Series, Vol. 224, Issue 4647, 27.04.1984, pp. 420-421

Stephen KAPLAN, The Restorative Benefits of Nature: Toward an Integrative Framework, Journal of Environmental Psychology, Vol. 15, Cambridge (Academic Press Limited) 1995, pp. 169-176

Masashi SOGA & Kevin J. GASTON, Extinction of experience: the loss of human-nature interactions, Frontiers in Ecology and the Environment, Vol.14, Issue 2, Washington DC (Ecological Society of America) March 2016, pp. 94-99

William J. RIPPLE, Christopher WOLF, Thomas M. NEWSOME, Phoebe BARNARD, William R. MOOMAW, & 11,258 Scientist Signatories from 153 Countries, World Scientists' Warning of a Climate Emergency, BioScience, Vol. 70, No. 1, Oxford (Oxford University Press) January 2020, pp. 8-11

United Nations Environment Programme, 2022 Global Status Report for Buildings and Construction: Towards a Zero-emission, Efficient and Resilient Buildings and Construction Sector, Nairobi 2022

Stefano BOERI, a vertical forest/ un bosco vertical, Mantova (Corraini Edizioni) 2015

Daniel A. BARBER & Erin PUTALIK, Forest, Tower, City: Rethinking the Green Machine Aesthetic, 45: Into the Woods, Cambridge (Harvard University Graduate School of Design) 2018

Pro Landscaper, Litlehampton (ELJAYS44) January 2020 pp. 8-9

Niranjika WIJESOORIYA & Arianna BRAMBILLA, Bridging biophilic design and environmentally sustainable design: A critical review, Journal of Cleaner Production 283, Amsterdam (Elsevier Ltd.) February 2021

Fei XUE, Stephen SiuYu LAU, Zhonghua GOU, Yifan SONG & Boya JIANG, Incorporating biophilia into green building rating tools for promoting health and wellbeing, Environmental Assessment Review 76, Amsterdam (Elsevier Ltd.) May 2019

Josef FRANK, Architektur als Symbol: Elemente des Neuen Deutschen Bauens, Vienna (Löcker Verlag) 2005

Alvar AALTO, Zwischen Humanismus und Materialismus, Der Aufbau, (July/ August) 1955, pp. 174-176

Eduard F. SEKLER, Europäische Architektur seit 1945, Der Aufbau, (June) 1952, pp. 213-234

Edgar KAUFMANN & Ben RAEBURN, Frank Lloyd Wright: Writings and Buildings, Cleveland (The World Publishing Company) 1960

Alfred H. BARR JR., Henry-Russell HITCHCOCK JR. & Philip JOHNSON, Modern architecture: international exhibition, New York (The Museum of Modern Art) 1932

Arthur DREXLER & Thomas S. HINES, The architecture of Richard Neutra: from International Style to California modern, New York (The Museum of Modern Art) 1984

Richard NEUTRA, Survival Through Design, New York (Oxford University Press) 1954

Roland RAINER, Ebenerdige Wohnhäuser, Wien (Berglandverlag) 1948

Tetsuro YOSHIDA, Japanische Architektur, Tübingen (Wasmuth) 1952

Tetsuro YOSHIDA, Das japanische Wohnhaus, Tübingen (Wasmuth) 1954

Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989

Ernst A. PLISCHKE, Vom Menschlichen im Neuen Bauen = On the human aspect in modern architecture, Vienna (Wedl) 1969

Ernst A. PLISCHKE, Design and Living, Wellington (Department of Internal Affairs) 1947

Christina RAUTER, Haus Frey: Nutzungsstrategien für ein Einfamilienhaus der Nachkriegsmoderne, Diploma Thesis (TU Wien) 2019

Friedrich ACHLEITNER, Das Haus als Lebens- und Erlebnisraum, bauforum, 7. Jg., (May - June) 1974, pp. 37-41

Herbert HOFFMANN, Eine Dreizimmerwohnung von Eugen und Paul Wörle, Wien, Moderne Bauformen, (December) 1936, pp. 708-711

Eugen WÖRLE, 1967, Max Fellerer, ÖGFA, 29 April – 24 May. [Exhibition Catalogue]

Eugen WÖRLE, Bau, 20. Jg. Heft I, (March) 1965, p. 1

Hans HOLLEIN, 100 Jahre ZV 40 Jahre Bauherrenpreis, Vienna (Zentralvereinigung der Architekten Österreichs) 2007

Baujahre, österreichische Architektur 1967-1991, Vienna (Zentralvereinigung der Architekten Österreichs) 1992

Eugen WÖRLE, Ist Architektur Kunst?, Der Bau, 16. Jg. Heft 3, (March) 1961, pp. 123-127

Eugen WÖRLE, Zum Publikum Geredet, Der Bau, 14. Jg. Heft 4, (April) 1959, pp. 176-192

Karl JOST, Das Strandbad „Gänsehäufel" Gestern und Heute, Der Aufbau, 6. Jg. Nr. 8, (August) 1951, pp. 282-283

Max FELLERER & Eugen WÖRLE, Der Neubau des „Gänsehäufels", DER AUFBAU, 6. Jg. Nr. 8, (August) 1951, pp. 286-288

Neue Städtische Wohnformen, 1967, ÖGFA [Exhibition Catalogue]

Eugen WÖRLE, Zwischen Wald und Stadt, Der Bau, 14. Jg. Heft 6, (June) 1959, p. 295

Eugen WÖRLE, Project Description, Vienna (21.09.1959), Architekturzentrum Wien, Sammlung

Theresa KNOSP, Sinnbild unserer Stadt in dieser unserer Zeit. Roland Rainer und die Wiener Stadthalle, 1952-1958, Diploma Thesis (TU Wien) September 2020

Das Franz-Domes-Lehrlingsheim, Der Aufbau, (November) 1952, p. 441

Roland RAINER, Wandlung des Bebauungsplanes, Der Bau, 14. Jg. Heft 3, (March) 1959, p. 125

Roland RAINER, Planungskonzept Wien, Vienna (Jugend und Volk GmbH) 1962

Roland RAINER, Gärten: Lebensräume, Sinnbilder, Kunstwerke, Graz (Akademische Druck- und Verlagsanstalt) 1982

Roland RAINER, Lebensgerechte Außenräume = Livable environments = Les extérieurs vivants, Zurich (Artemis Verlag) 1972

Roland RAINER, Rudolf KÖNIGSEDER, Nikolaus AMIRAS & NEUE HEIMAT, Forschungsarbeit: Gartenstadt Puchenau II, Vienna (Architektur- und Baufachverlag) 1984

Roland RAINER, Roland Rainer: Arbeiten aus 65 Jahren, Salzburg (Residenz-Verlag) 1990

Franz HAAS & Ernst SMETANA, Die Geschichte der Lokalbahn Ödenburg – Preßburg, Vienna (Railway-Media-
Group) 2020

Eva MATTES, Roland Rainers Ruhe, Wohnen, 3/ 1996, p. 70

Roland RAINER, Roland Rainer: Arbeiten aus 65 Jahren, Salzburg (Residenz-Verlag) 1990

Albert KIRCHENGAST & Norbert LEHNER, Archaische Moderne: Elf Bauten im Burgenland 1960-2010, Zurich (Park Books) 2015

Roland RAINER, An den Rand geschrieben: Wohnkultur – Stadtkultur, Vienna (Böhlau) 2000

Sokratis DIMITRIOU, Haus Dr. Bösch, bauforum, 7. Jg., (May - June) 1974, p. 33

Brigite GROIHOFER, Der Bau des Architekten: Roland Rainer, Diners Club, Heft 1, 1997

Ernst HIESMAYR, Analytische Bausteine, Vienna (Löcker Verlag) 1999

Ernst HIESMAYR, Einfache Häuser, Vienna (Löcker Verlag) 1991

Lois WELZENBACHER, Haus in der Landschaft, Moderne Bauformen, (May) 1937, p. 240

Ernst HIESMAYR, Juridicum: Universität Wien, Vienna (Löcker Verlag) 1996

Ute WOLTRON, Ernst Hiesmayr 1920 – 2006, Der Standard, 13.8.2006

Ernst HIESMAYR, Das Karge als Inspiration: Castilla elemental, Vienna (Löcker Verlag) 1995

Ernst HIESMAYR, Eine neue Tradition, Dornbirn (Vorarlberger Verlagsanstalt AG) 1995

Fred EICHER, Siedlung Nussdorf Wien, Band 7, Heft 3, anthos, pp. 33-36

Roland RAINER, Anonymes Bauen: Nordburgenland, Vienna (Böhlau Verlag) 1995

Karin RAITH, Einfache Häuser, Vienna (Löcker Verlag) 1991

Internet Sources

https://www.hsph.harvard.edu/nutritionsource/vitamin-d/ *(last visited 01.02.2024)*

https://www.archdaily.com/623966/unified-architectural-theory-chapter-10 *(last visited 01.02.2024)*

https://www.friendsoffriends.com/profiles/florian-kaps/ *(last visited 01.02.2024)*

https://unfccc.int/process-and-meetings/the-paris-agreement *(last visited 01.02.2024)*

https://commonslibrary.parliament.uk/the-rise-of-climate-change-activism/ *(last visited 01.02.2024)*

https://www.stefanoboeriarchitetti.net/en/project/vertical-forest/ *(last visited 01.02.2024)*

https://www.sheppardrobson.com/journal/our-connection-to-nature-is-a-powerful-force-and-not-to-be-underestimated *(last visited 01.02.2024)*

https://www.architectsjournal.co.uk/news/is-the-boom-in-green-roofs-and-living-walls-good-for-sustainability *(last visited 01.02.2024)*

https://www.targetingzero.co.uk/expertise *(last visited 01.02.2024)*

https://www.cbc.ca/news/world/green-housing-bosco-milan-trudo-netherlands-1.6228709 *(last visited 01.02.2024)*

https://www.latimes.com/opinion/op-ed/la-oe-graham-folly-of-green-buildings-20160306-story.html *(last visited 01.02.2024)*

https://www.dezeen.com/2019/10/31/celine-baumann-landscape-architecture/ *(last visited 01.02.2024)*

https://www.studio2a.co/corbusier-manifesto-five-points-of-new-architecture/ *(last visited 01.02.2024)*

https://www.thonet.de/en/magazine/history-brand/detail/thonet-and-tubular-steel *(last visited 01.02.2024)*

https://franklloydwright.org/site/fallingwater/ *(last visited 01.02.2024)*

https://education.nationalgeographic.org/resource/plate-tectonics-ring-fire/ *(last visited 01.02.2024)*

http://wandervogel.at/lib/exe/fetch.php?media=djwv:kefermarkter_erklaerung.pdf *(last visited 01.02.2024)*

https://www.architektenlexikon.at/de/468.htm *(last visited 01.02.2024)*

https://www.knaufinsulation.co.uk/wood-wool-insulation *(last visited 01.02.2024)*

https://www.dieschwalbe.at/ *(last visited 01.02.2024)*

https://www.dieschwalbe.at/eine-krise-als-chance-meine-gruendungsgeschichte-der-schwalbe/ *(last visited 01.02.2024)*

https://www.azw.at/de/artikel/sammlung/die-goldene-stiege-von-eugen-woerle/ *(last visited 01.02.2024)*

https://www.derstandard.at/story/2000090521472/roland-rainer-unumstriten-ideen-und-ideologien *(last visited 01.02.2024)*

https://www.derstandard.at/story/1630203/roland-rainer-1910-2004 *(last visited 01.02.2024)*

https://www.durisol.uk/ *(last visited 01.02.2024)*

https://www.hummel-stein.at/der-steinbruch *(last visited 01.02.2024)*

https://www.wien.gv.at/stadtentwicklung/grundlagen/stadtforschung/stadtklimaanalyse-messdaten.html *(last visited 01.02.2024)*

https://www.architektenlexikon.at/de/721.htm *(last visited 01.02.2024)*

https://www.hiesmayr.at/html/unternehmen/chronik.php *(last visited 01.02.2024)*

http://www.kunstransfer.at/archiv/semiotik/07/_web_semiotik/03_nostalgia_interview%20elisabeth%20hiesmayr.html *(last visited 01.02.2024)*

https://www.nikolauszeche.at/ *(last visited 01.02.2024)*

http://www.ernst-hiesmayr.at/gebautes/wifi-linz/
(last visited 01.02.2024)

https://geschichte.univie.ac.at/de/artikel/juridicum
(last visited 01.02.2024)

https://www.commentary.org/articles/adolf-portmann/beyond-darwinism-the-special-position-of-man/ *(last visited 01.02.2024)*

https://www.geschichtewiki.wien.gv.at/Nu%C3%9Fdorfer_Brauerei *(last visited 01.02.2024)*

http://www.ernst-hiesmayr.at/gebautes/haus-in-neusiedl/ *(last visited 01.02.2024)*

htps://whc.unesco.org/en/list/970/
(last visited 01.02.2024)

Figure Sources

1. diagram produced by author

2. Hugh Mothersole

3. Kunsthistorisches Museum Wien, Gemäldegalerie

4. table produced by author

5. https://fridaysforfuture.org/take-action/resources-and-materials/ *(last visited 01.02.2024)*

6. - 7. Paolo Rosselli

8. https://www.archdaily.com/84524/ad-classics-villa-savoye-le-corbusier *(last visited 01.02.2024)*

9. https://architectuul.com/architecture/plan-voisin *(last visited 01.02.2024)*

10. https://www.thonet.de/en/magazine/history-brand/detail/thonet-and-tubular-steel *(last visited 01.02.2024)*

11. - 12. Julius Scherb

13. Stephan Huger

14. - 16. Patrick Gläßner

17. Carol M. Highsmith

18. https://www.marmol-radziner.com/kaufmann-house-architecture/ *(last visited 01.02.2024)*

19. Tom Blachford

20. http://www.seyseysha.com/en/works/2/index.html *(last visited 01.02.2024)*

21. Mariell Lind Hansen

22. Roland RAINER, Anonymes Bauen: Nordburgenland, Vienna (Böhlau Verlag) 1995, p. 91

23. Roland RAINER, Anonymes Bauen: Nordburgenland, Vienna (Böhlau Verlag) 1995, p. 95

24. - 27. photograph produced by author

28. Paul McCredie

29. Ernst A. PLISCHKE, Ein Leben mit Architektur, Vienna (Löcker Verlag) 1989, p. 481

30. Ernst A. PLISCHKE, Design and Living, Wellington (Department of Internal Affairs) 1947, p. 83

31. Ernst A. PLISCHKE, Design and Living, Wellington (Department of Internal Affairs) 1947, p. 81

32. diagram produced by Taras Shandalovych, Benjamin Holtz and author

33. - 44. Kupferstichkabinett, Akademie der bildenden Künste Wien

45. drawing produced by author

46. - 57. Kupferstichkabinett, Akademie der bildenden Künste Wien

58. Verein „Die Schwalbe“

59. https://www.tulbingerkogel.at/portfolio-items/restaurant/#iLightbox[gallery_image_1]/9 *(last visited 01.02.2024)*

60. Margherita Spiluttini, Architekturzentrum Wien, Sammlung

61. - 63. Elena Ruppitsch

64. Der Bau, (Heft 6) 1969, p. 64

65. photograph produced by author, Architekturzentrum Wien, Sammlung

66. drawing produced by author

67. Eugen Wörle, Architekturzentrum Wien, Sammlung

68. photograph produced by author, Architekturzentrum Wien, Sammlung

69. Eugen Wörle, Architekturzentrum Wien, Sammlung

70. - 73. photograph produced by author, Architekturzentrum Wien, Sammlung

74. Roland RAINER, Arbeiten aus 65 Jahren, Salzburg (Residenz Verlag) 1990, p. 26

75. Margherita Spiluttini, Architekturzentrum Wien, Sammlung

76. photograph produced by author

77. https://www.donauinsel-wien.com/ *(last visited 01.02.2024)*

78. https://www.countrylife.co.uk/property/muswell-hill-the-london-spot-whose-views-are-unrivalled-for-beauty-with-a-snapshot-of-the-whole-of-london-in-front-of-you-238593 *(last visited 01.02.2024)*

79. https://italian.cri.cn/2024/01/25/ARTIa9qw6qrQcmvhMsBlLqsM240125.shtml *(last visited 01.02.2024)*

80. Roland RAINER, Arbeiten aus 65 Jahren, Salzburg (Residenz Verlag) 1990, p. 66

81. - 83. photograph produced by author

84. Roland RAINER, Arbeiten aus 65 Jahren, Salzburg (Residenz Verlag) 1990, p. 68

85. Roland RAINER, Arbeiten aus 65 Jahren, Salzburg (Residenz Verlag) 1990, p. 66

86. Roland RAINER, Vitale Urbanität, Wien (Böhlau Verlag) 1995, p. 84

87. Roland RAINER, Vitale Urbanität, Wien (Böhlau Verlag) 1995, p. 109

88. Roland RAINER, Arbeiten aus 65 Jahren, Salzburg (Residenz Verlag) 1990, p. 231

89. Roland RAINER, Vitale Urbanität, Wien (Böhlau Verlag) 1995, p. 119

90. Roland RAINER, Vitale Urbanität, Wien (Böhlau Verlag) 1995, p. 111

91. Roland Rainer, Architekturzentrum Wien, Sammlung

92. - 93. ÖNB

94. Roland RAINER, Arbeiten aus 65 Jahren, Salzburg (Residenz Verlag) 1990, p. 126

95. Hertha Hurnaus

96. ÖNB

97. drawing produced by author

98. - 104. Roland Rainer, Architekturzentrum Wien, Sammlung

105. Margherita Spiluttini, Architekturzentrum Wien, Sammlung

106. drawing produced by author

107. - 112. Roland Rainer, Architekturzentrum Wien, Sammlung

113. AT TUWA 14-075-10-Foto-01v

114. http://www.ernst-hiesmayr.at/gedachtes/alt-und-neu/ *(last visited 01.02.2024)*

115. http://www.ernst-hiesmayr.at/ *(last visited 01.02.2024)*

116. Forschungsinstitut Archiv für Baukunst

117. - 118. http://www.ernst-hiesmayr.at/gebautes/wifi-linz/ *(last visited 01.02.2024)*

119. - 122. photograph produced by author

123. Friedrich Boehringer

124. Margherita Spiluttini, Architekturzentrum Wien, Sammlung

125. Anthos, (Band 7) 1968, p. 35

126. Gerald Zugmann

127. Margherita Spiluttini, Architekturzentrum Wien, Sammlung

128. drawing produced by author

129. - 133. photograph produced by author

134. AT TUWA NL-075-20-Fotos-C04

135. drawing produced by author

136. Ernst Hiesmayr, AT TUWA

137. Ernst Hiesmayr, AT TUWA

138. Ernst Hiesmayr

139. AT TUWA NL-075-20-Fotos-C01

140. AT TUWA NL-075-20-Fotos-C02

141. AT TUWA NL-075-20-Fotos-D05

142. AT TUWA NL-075-20-Fotos-D01

143. AT TUWA NL-075-20-Fotos-D03

144. AT TUWA NL-075-20-Fotos-A01

145. AT TUWA NL-075-20-Fotos-C03

146. AT TUWA NL-075-20-Fotos-D04

147. AT TUWA NL-075-20-Fotos-D02

148. - 150. Michael Hiesmayr

151. drawing produced by author

152. - 153. Ernst Hiesmayr

154. Michael Hiesmayr

155. - 156. Ernst Hiesmayr

157. Michael Hiesmayr

158. Ernst Hiesmayr

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162. - 164. Michael Hiesmayr