Medieval cities and castles, fossil deposits from the Triassic period, high Alpine landscapes, industrial cityscapes, vineyard terraces, wonders of railway engineering, early medieval murals, a unique library in a Baroque abbey and pioneering buildings – so different yet with one thing in common: these sites have all been included on the UNESCO World Heritage List.

This is the first book to present the twelve World Heritage properties in Switzerland: It tells us about, and lets us discover, the many fascinating aspects of these places of outstanding universal value – imprints of history and harbingers of things to come.

Ernst Iten, the author, is a former Ambassador. He was Permanent Delegate of Switzerland to UNESCO from 2004 to 2009. In this capacity, he headed the Swiss delegation at the sessions of the World Heritage Committee, worked closely with the World Heritage Centre and accompanied the candidatures and inscriptions of various cultural and natural properties in Switzerland on the World Heritage List.

WORLD HERITAGE IN SWITZERLAND

United Nations
Educational, Scientific and
Cultural Organization

World Heritage
in Switzerland

WORLD HERITAGE IN SWITZERLAND

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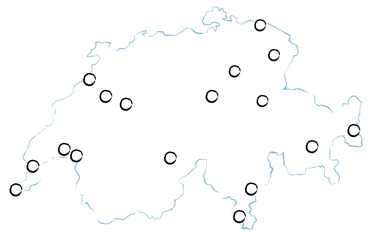

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The World Heritage Convention is a success story: since its adoption in 1972, it has been ratified by 193 states. It is indeed rare that the international community has stood so resolutely behind a shared initiative to protect the cultural and natural heritage of humanity. The World Heritage Convention is a shining example of how by working together sustainable solutions can be found. Each state makes its contribution to the overarching aim of protecting property of outstanding universal value on its own territory for the benefit of humanity.

The World Heritage List currently includes more than 1,000 monuments and cityscapes, natural phenomena and ecosystems deemed worthy of conservation. This list enables us, for example, to become aware of how our planet came about, and of the biological diversity, to which past cultures also bear witness. At the same time it acknowledges the achievements which we owe to the ingenuity of builders and craftspeople of earlier epochs.

The World Heritage therefore also gives us an insight into how human identities and ways of living have developed throughout the centuries. The examination of the past and of our current environments should not only deepen our understanding of the present but also help us to anticipate future developments.

We can congratulate ourselves on Switzerland's contribution to this success story. As a signatory state, Switzerland is appreciated for embracing the objectives of the World Heritage Convention and their credible implementation. This commitment is also reflected in Switzerland's concrete support for international projects, be these in connection with the conservation and listing of sites of World Heritage quality in Africa or with the development of a programme of sustainable tourism for World Heritage Sites. Switzerland also helps to protect cultural and natural property in war zones and in regions hit by natural disasters.

The listing of the architectural works of Le Corbusier in 2016 was a visible demonstration of Switzerland's commitment to international cooperation. The entry includes 17 sites located in seven countries and three continents: Argentina, Belgium, France, Germany, India, Japan and Switzerland. This is the first time in the history of the World Heritage Convention that a listed site extends around the entire world. It is a wonderful symbol of the universal scope and relevance of the Convention for the benefit of future generations.

I wish you much pleasure in discovering Switzerland's 12 World Heritage Sites that are so beautifully presented in this volume.

Federal Councillor Ignazio Cassis,
head of the Federal Department of Foreign Affairs

World Heritage is the result of a revolutionary idea: that the protection and safeguarding of exceptional cultural achievements and outstanding natural phenomena be placed under the responsibility of humankind as a whole. It was first implemented with the rescue of the temple of Abu Simbel, and led to the adoption, in 1972, of UNESCO's Convention concerning the Protection of the World Cultural and Natural Heritage.

This year, we celebrate the Convention's 40th anniversary. During this time almost 1,000 properties have been included in the World Heritage List – a testimony to the wealth and diversity of our planet. This book presents the eleven World Heritage properties in Switzerland: outstanding expressions of a cultural heritage that cover several thousand years; exceptional natural sites which document the most important chapters of the Earth's history and the development of life; and regions of overwhelming natural beauty. These properties are much more than lovely and interesting places. They are also the premises where scientific research is conducted, values are transmitted, and forms of sustainable use of natural and cultural resources are tried and tested.

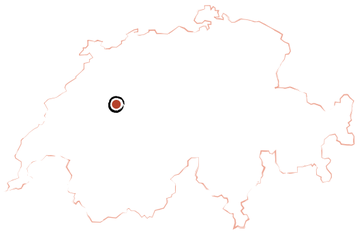
Our task is to inform the general public, and in particular young people, about the universal value of these properties and the need to protect them today so that we can pass them on to future generations, in keeping with the requirements of the World Heritage Convention.

The Swiss Commission for UNESCO actively promotes contacts and exchanges, at national level, between property managers, parties responsible for tourism and for conservation of monuments and sites, and political authorities. We help create synergies within and among the World Heritage properties. We strive to build bridges, to develop understanding between divergent points of view, to bring the widest range of concerns within a single forum and try to work out sustainable solutions. We are committed to fulfilling the task assigned to us all – the protection of the World Heritage properties.

Raising people's awareness is a priority, since only when we grasp the exceptional and unique value of our cultural and natural heritage do we understand the need to treasure and preserve it. World Heritage properties owe their existence and prosperousness not only to those in charge of their conservation and management, but also to the support of the local communities who value them as intrinsic to their identity and environment.

The involvement of each and everyone of us is needed to ensure that the revolutionary idea set in motion 40 years ago lives into the future.

Jean-Bernard Münch
President of the Swiss Commission for UNESCO



What is a city? For Aldo Rossi, a leading 20th-century architect, a city is the site of a collective memory. In Berne, this memory is apparent to any train traveller through the colourful plaques in the underpass of the city's main station close to the former Christopher Tower. They illustrate the city's founding in 1191 by the Zähringens (an old and influential German noble family) and the various stages in its development from Nydegg, the lowest point in the loop of the River Aare, up to today's station plaza.
Yet it is worth digging a little deeper than the few remaining vestiges of the Christopher Tower and the medieval enclosure wall nearby.

The old city cradled in a loop of the River Aare

Arcades and Fountain of Justice

The foundation of the city of Berne was the expression of the Zähringens' economic and political aspirations to build a fiefdom. From this period only a few architectural vestiges remain, such as the Lenbrunnen, a water tower built in 1250 that provided the first public water supply. Adopting the Zähringens' original intentions, the Bernese formed their own territory, making Berne into the most powerful city-state north of the Alps from the 16th century on. This was accompanied by a growing sense of self-confidence, with their worldview apparent in the urban image they conferred upon their city.

Though the streets and rows of houses basically follow the west-easterly direction of the natural headland cradled in a loop of the River Aare, man-made features are apparent within this arrangement. The market stands at the heart of the city, in the central street – formerly known as Märitgasse, now Kramgasse and Gerechtigkeitsgasse. The churches, on the other hand, are relegated to the outlying area. Compared with the small parish church of St Vincent (demolished in the 15th century to make way for the cathedral) the imposing breadth of the Märitgasse might infer that, though devout, the Bernese were mainly concerned with all that was practical and worldly. Also significant is the fact that the judgement seat of the avoyer (chief magistrate of the Bernese authorities) was located at the intersection of the main street running across in a north-south direction (aptly named Kreuzgasse, Cross Lane) and the Märitgasse – approximately at the point where Christ's head would be on a crucifix. Here the avoyer would exercise high jurisdiction on behalf of the German Emperor.

As in the whole of Europe, the penalties meted out were distinctly corporal in nature and, like the trial itself, relied upon explicit images that were deliberately put on show. Criminals were therefore tried and immediately

Cathedral

Central nave of the cathedral | Tympanum of the Last Judgement | Arcades | Town Hall

punished directly before the avoyer's judgement seat. Only executions took place outside the city walls.

Visible from the judgement seat were two timepieces of urban architectural significance: to the west stood the Zytglockenturm (Clock Tower) that has marked the passing of earthly hours since the 14th century, while the bells of the deliberately raised Nydegg church tower to the east chimed the canonical hours. Standing before the judge, the accused awaiting a potential death sentence was therefore quite literally between this life and the next.

Patrician houses lined, and still line, the Kreuzgasse. The Rathaus (Town Hall), the city's actual hub, was situated at the northern end of the street; at the other end, albeit slightly transposed, was the cathedral. Its north entrance was called the Schultheissenpforte (Avoyer's Door), as it was there that these gentlemen would solemnly file into the cathedral from the town hall. It is no coincidence that the town hall and the cathedral stood at either end of the main intersecting street, symbolizing the hands of Christ's two outstretched arms. Even before the Reformation, the self-confident bourgeoisie sought more autonomy from the church.

The Rathaus asserts the powerful position of the authorities. Formerly located roughly on the site of the cathedral's chancel, it was erected between 1406 and 1417. The hipped roof can be seen from afar. A double flight of external stairs leads to the upper floor where both council chambers are located. The ground floor consists of a single impressive room used for various purposes. Adorning the façade itself is a heraldic sequence with Berne's protectorates all oriented towards the escutcheons of Berne and the Imperial realm, which were originally set in the middle. A horizontal porch panel, as may still be seen on farmhouses today, protected the first-floor windows. This roof also allowed stair-users to reach the chambers without getting their feet wet. This is a further indication of the Bernese practical and worldly spirit. The city's elite, which extended back to the lowly landed gentry and the rising artisanal bourgeoisie, retained its conservative agricultural spirit even long after the move away from the countryside. The stalwart roofs of the townhouses also reflect the down-to-earth nature of those who dwell within them.

Like the old town hall a few decades earlier, the old church of St Vincent became too small. It was replaced by a late Gothic monumental construction – the cathedral. The year 1421 saw the start of the building work. In keeping with the spirit of the age, the cathedral's legal form was selected in order to maintain the council's influence at the highest possible level. The collegiate chapter, instituted in 1485, was the most in keeping with this brief. Indeed, the chronicler Anselm was careful to note that the religious and civil authorities had in this case judiciously secured their respective interests. Was the cathedral's decoration a reference to this course of events? The central portal on the west side reveals scenes of the Last Judgment in its tympanum. The Gate of Heaven – slightly to the left on the far wall – shares some similar features with the Avoyer's Door. Two angels greet the pope; then come the secular and spiritual chiefs, followed by the representatives of the people and three men. The first is probably a town councillor. In his wake are the standard bearer of the Bernese colours and an avoyer wearing his chain of

office. For some, they symbolise the members of the collegial chapter. The ornamentation of the main door has survived the iconoclasts of the Reformation. Only the statue of Mary on a corbel surmounted with a baldachin before the central pillar of the main gate was replaced by a figure of justice. However, in their egalitarian fervour, the Protestants wrecked the statues of any lay figure conceited enough to seek to grace the cathedral's walls for eternity. This was the fate that befell the statue of the archangel Michael. In fact, the avoyer Scharnachtal had seen fit to set his family crest on the fibula holding the archangel's cloak together across his chest, rather than at his feet, as would be allowed for a donor. This attempt to identify with the saint was too much for the Bernese. The smashed remains of the statue were used as filler pieces in the building of the cathedral's platform. They were discovered by chance, along with five hundred other fragments, in 1986 during some building work.

After the great fire of 1405, the buildings were reconstructed on the existing architectural lines, but using fire-resistant materials. The closely-packed new constructions on either side of the street now retraced in stone the phenotype of what was an increasingly dense city. The arcades that stretch for over six kilometres are typical of Berne; allowing ease of movement irrespective of the weather, they combine usefulness with beauty.

Most of the houses to be seen today are a product of the Baroque age. South German and Austrian influence prevailed in the spread of this style in German-speaking Switzerland. However Berne, like the French-speaking part of the country, was subject to the influence of French classicism, which accounts for the more severe aspect of the buildings here. In Berne the uniform colour of the greenish sandstone further accentuates this sense of sobriety. The city's close connections to the French court, added to Protestantism and the traditionally conservative ideas of an agrarian state may explain why it is far removed from the otherwise effusive and theatrical Baroque that can be seen in St Gall or Einsiedeln for instance. Yet it is precisely this understated unity that makes Berne a very special synthesis of the arts. In a quite republican sense, virtually no house seeks

Kreuzgasse

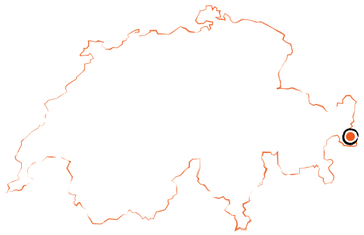
Kramgasse and Clock Tower

to outdo the next. In the few exceptions to this rule, such as the Erlacherhof, which was styled on the French *entre cour et jardin* model, the council prohibited its owner from using his coach to attend council sessions. The water supply had long been part of the city's infrastructure. The first stone fountain, surmounted by a pennant-bearing Bernese bear, came to grace the grand city centre in the Kreuzgasse in 1518/19. Hans Gieng of Freiburg added the world-famous fountain figures only between 1540 and 1548.

Parliament | Closely-packed houses

The new federal state appointed Berne as its capital in 1848. This brought about a wave of renewal within the old town, with a number of buildings being demolished to make way for official constructions. The Federal Parliament Buildings were built between 1852 and 1902. The Parliament itself occupies the central part. It is flanked by two wings, which accommodate the Government. The Federal Parliament Buildings were constructed in a historicist style as a self-portrayal of Swiss identity.

A dome visible from afar, a huge central stairwell and rich artistic fittings to which artists from all over Switzerland contributed, have given it the bearing of a national monument. The inscription over the portico proudly recalls republican Rome, proclaiming in linguistically neutral Latin that here lies the *Curia Confoederationis Helveticae*. Ever since their construction, these buildings have been the centre of Swiss politics par excellence, restoring to Berne some of the splendour that the largest city-state north of the Alps had lost in 1798 at the end of the Ancien Régime.



A journey through the Val Müstair is like a stroll in a different time. It is also the perfect prelude to the visit of a monument from the Early Middle Ages that is unique in the history of art and culture: the Benedictine Convent of St John at Müstair. It was founded in the 8th century and its importance was such that the entire valley was named after it. Müstair derives from the Latin word *monasterium*.

Convent church and Planta tower | Service courtyard | Cloister

The Val Müstair, in the canton of Graubünden, connects the Fuorn Pass and the Vinschgau Valley, in the Italian province of South Tyrol. Today, it is a very quiet place. That was not always so. In the 1st century AD the Via Claudia Augusta passed nearby, linking the Po Valley with the north of the Alps, over the Resia Pass. At the time of Charlemagne (742–814), this road and the nearby passes acquired strategic importance. Charlemagne, already King of the Franks, defeated the Lombards at the siege of Pavia in 774 and became their King. In 788, he further extended his reign by vanquishing the rebellious Tassilo, Duke of Bavaria. The Müstair and Vinschgau valleys, both under the control of the Bishop of Chur, were therefore like a wedge driven between these two territories. No doubt the Benedictine monastery of St John was also built to secure the passage between north and south.

A number of elements indicate the importance of the monastery's founder: the mentioned historical context but also various archaeological finds and dendochronological datings which show the oldest timber to be from the year 775, as well as the sophisticated design and the overall dimensions of the building – the original Carolingian abbey was bigger than today's convent. Thus according to local tradition, the founder was none other than Charlemagne himself. And indeed the King was generous towards the Church of Rome, which he also used as an instrument for the accomplishment of his political objectives. It is also possible however that the actual founder of Müstair was the Bishop of Chur, acting on behalf of Charlemagne and with the latter's financial support.

The monastery was conceived from the start as both a place of worship and a residence for persons of consequence. It was the Bishop's secondary seat, in the southwest of his diocese. The Carolingian monastery had a church with a single hall, three apses and annexes. A cloister and a farmyard garden were adjacent to the church.

The two-storey Chapel of the Cross, near the property entrance, was originally attached to the east wing. This clover shaped building boasts the oldest wooden ceiling in Europe, with timber that has been dated back to the year 788. The lower floor is thought to have contained the tombs of notabilities. The upper floor was richly decorated with marble, stuccos and frescos. This second sacral building of the Carolingian monastery was possibly the Palace Chapel to the Bishop's residence.

Carolingian fresco: Flight into Egypt | The three apses and their frescoes

The outer appearance of the church is deceptive in its simplicity, for it contains the most extensive series of frescos from the age of Charlemagne preserved in situ as well as remarkable Romanesque frescos. These paintings, bathed in subdued light, cover the four walls. Due to alterations carried out at the end of the 15th century, the various cycles are now interrupted by columns, arched windows and a gallery for the nuns.

The Carolingian frescos, which date from the first half of the 9th century, have nowadays a limited range of colours – ochre, red and brown – while the slender and elegant figures of the Romanesque frescos in the lower parts of the apses, from the early 13th century, are more vividly coloured. These were painted on top of Carolingian frescos, with themes that are in some cases similar. The central apse is dedicated to St John the Baptist, patron saint of the church. It depicts his beheading, the feast of Herod and John's interment. The north apse is devoted to the lives of St Peter and St Paul, the south apse to St Stephen.

It would be a mistake to think of these frescos as mere decoration. They are above all a thoughtful evocation of the Christian doctrine of salvation, representing the life and works of Jesus Christ as the saviour and redeemer

Baptism of Christ | The nuns' choir stalls

Last Judgement | Late Gothic style hall-church

of the world. The top row of frescos above the Gothic arch, no longer visible today, evokes the life of King David.

To facilitate understanding the various registers and the instant recognition of familiar biblical stories, the scenes were arranged in grids and framed in borders of leafy design. This configuration enhances the value and impact of each fresco. Here the paintings are not accessory to the architecture, but complement it. Together, they compose a masterpiece of equilibrium and harmony.

Art historians attribute the Carolingian frescos to a master painter inspired by Byzantine art and to an atelier from northern Italy. The reigning Christ (Christus Logos) in the dome of the central apse, surrounded by a host of angels and the symbols of the Four Evangelists, is attributed to the hand of this unknown master. The image is so intense and forceful, with Christ's robe overlapping in places the mandorla, that the Saviour seems to leap from the sky, like a miraculous apparition.

On the opposite wall, complementary to the Christus Logos, is the oldest surviving monumental depiction of the Last Judgement, attributed to the hand of the same master. Christ Triumphant sits in judgement on his throne surrounded by the Twelve Apostles and a host of angels. The Christ figure looms so large as to occupy all three horizontal registers into which the image is included. The scene just above shows two (originally four) angels, rolling up the starry heavens like a parchment to indicate the end of the world and the beginning of the Kingdom of God.

This scene and indeed the whole of the Last Judgement must have been even more impressive when it could be seen together with the upper section now covered by the Gothic arch. This section illustrates the passage in the Old Testament in which Nathan says to David, Christ's lineal ancestor, that his reign will be eternal. The juxtaposition of these two scenes, King David in Jerusalem above Christ sitting in judgement, is a strong affirmation of the principle that only the Lord's anointed can be a legitimate ruler. The political message is even clearer when one considers the next frescos, which recounts the story of Absalom, the son of King David, who rebelled against his father. In a recent research, Matthias Exner establishes a link between the painting and the contemporary rebellion of the sons of King Louis the Pious (778–840) in an attempt to secure their succession.

Charlemagne, the legendary founder of the monastery, remained alive in public memory for several centuries. The stucco statue of the Emperor attached to the narrow wall between the central and southern apse presumably followed his canonisation in 1165. This is the place traditionally reserved for the founder, as can be seen in the church of St Benedict in the nearby village of Mals, built around 785. In addition to the apse frescos in the Romanesque style already mentioned, also worth noting from this period are a stucco relief of the baptism of Christ (10th/11th centuries), the Bishop's residence with its two-storey chapel dedicated to St Ulrich and St Nicholas, and an enthroned Madonna with Child (circa 1250) which is one of the treasures of the convent museum.

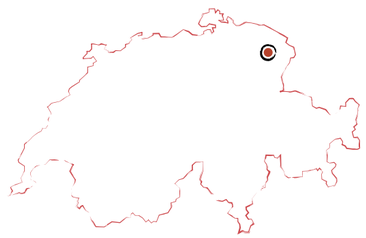
The Alpine passes of the canton of Graubünden regained considerable strategic importance during the reign of the Emperor Otto the Great (912–973), since he reigned over both Germans and Italians, and fostered commercial exchanges between his territories. The monastery's Planta tower, with its swallowtail battlements, dates from this period. It was built as a fortified refuge in the event of an attack by the Saracens, who in the year 940 advanced as far as Chur.

During the Investiture Controversy (1075–1122), which opposed the Popes to the Holy Roman Emperors, monastic life at Müstair almost came to a standstill. The Bishop of Chur decided therefore to turn the monastery into a convent. Ever since, Benedictine Nuns have been keeping the spirit of this very special place alive. In 1492, as Columbus was sailing towards America, the Abbess Angelina Planta began to renovate the church in what is now called Late Gothic style. The ceiling was modified to include heraldic devices testifying to the Abbess's identification with the Bishop and the nobility of Graubünden. In 1496, the Provost of the convent, the future Emperor Maximilian, while attending mass in the company of Ludovico Sforza, Duke of Milan, noticed that his own coat of arms was not among those on the ceiling, an unforgivable heraldic omission for which he was to have his revenge at the beginning of the Swabian War (1499) when his soldiers stormed the convent and destroyed much of it. Abbess Planta subsequently improved the protection of the compound by building the two tower gates, in the form they still have today, thus completing the existing enclosing wall.

Convent Church | Convent

St Ulrich's chapel

Switzerland has a few remarkable sacral buildings from the Baroque period. Their construction implied generally the destruction of previous structures. This was for example the case in St Gall. Due to lack of finances, the convent of St John at Müstair was spared this fate. Thus, despite the fires and depredations that have marked its history, the most recent by the French in 1799, this unique testimony to the architecture and culture of the Middle Ages is still with us today, bearing witness to 1,200 years of Benedictine tradition.



Without its convent, the town of St Gall would not exist. A vulnerable position far away from any major crossroads is not a likely setting to establish a city. But what the Irish monk Gallus was actually looking for in 612 was a secluded place for a hermitage. He found it in the upper Steinach Valley. The Benedictine abbey that developed from this humble retreat was to become not only one of the most renowned centres of art and learning in Europe, but also a very influential religious state. In fact, a visit to the convent of St Gall is a must for anyone interested in the early Middle Ages since its archive has the largest collection of Carolingian documents and its library the probably richest collection of manuscripts, incunabula and books from that period. The remarkable architectural complex we see today – a masterpiece of baroque art in its own right – shelters the heritage of more than 1,200 years of religious and cultural history.

The abbey and school founded by Saint Otmar around 720, where Saint Gall had lived as a hermit, were modest. It soon grew however to become a place of highest importance thanks to properties bequeathed for the salvation of souls but also as a result of strong political links with the Carolingian and Ottonian courts. Emperors and kings were regular guests in St Gall. Entirely in line with the usual policy of Charlemagne and his successors, the monastery received lavish treatment but was in return used by the Empire for governmental and educational purposes. Abbot Grimald (841–872), for example, was Chancellor, a key position in the Empire's administration, while Abbot Salomon (890–919) was one of the most influential statesmen in the Kingdom of the East Franks for more than three decades.

Church | St Gall monastery plan

The convent's golden age began with Abbot Gozbert (816–837) who was close to Emperor Ludwig the Pious, son of Charlemagne. He built an impressive church with three naves. It was bigger than the churches in Reichenau and Basel and as wide as the cathedral today! These building activities were strongly influenced by the famous St Gall Monastery Plan, the earliest-known architectural plan drawn on parchment. Some capitals from this older church are on display in the convent's Lapidarium.

Three outstanding men are emblematic of that golden age: Ratpert, Notker the Stammerer, and Tuotilo. According to the Chronicle penned in the 11th century by Ekkehard IV, the biographer of the monks of St Gall, these three were *one heart and one soul*. Ratbert was a historian, poet and musician. He was among the first to write Latin hymns with neumatic notations. Notker was probably the most influential poet of his time. He created numerous sequences (alleluias), including the famous Easter sequence *Laudes Salvatori*. As for Tuotilo, a *uomo universale* ahead of his time, he invented the trope (a form of embellishment to Gregorian plainchant) and excelled in poetry, painting and playing music. He was also a master of relief art and carved the two ivory plaques framed in hand-wrought gold for the binding of the *Evangelium longum*.

Carved ivory panel | Abbey library

Folchart Psalter | Nibelungen-Handschrift

The golden age came to an abrupt end when the convent was looted in the Magyar Raid (926) and, shortly after, burnt down. However, it continued to exist and prospered again during its silver age (976–1072). One particularly noteworthy name from this time is Notker the German, a master of the Old High German language. This period ended on account of St Gall's political embroilment in the Investiture Controversy, a conflict that opposed ecclesiastical and secular power from 1075 to 1122. The abbey then slumped into its iron age which lasted four centuries until the energetic Abbot Ulrich Rösch (1463–1491) created the modernised city-state St Gall, which lasted until 1798.

Books were central in mediaeval culture. The St Gall Monastery Plan clearly emphasised the importance of both the scriptorium and the library. On the northern side of the choir, they occupy the position corresponding to the two-floor vestry on the southern side. St Gall's culture of the written word gave rise to such supreme masterpieces that no standard work on early mediaeval art history can get by without mentioning them. To recall just two of these: the *Golden Psalter*, with the frontispiece portraying King David as a musician, and the *Folchart Psalter*, which contains the most extraordinary illuminated page of that time: the gold filigreed initial Q of Psalm 51 with a greenish-blue diaphanous cross shining through from the background. Such precious items were, of course, much coveted, and the abbots took measures to safeguard them. The Folchart Psalter, for instance, was chained to the lectern. Furthermore, the margin of the double page with the initial Q carries a curse on thieves. The documents in the library are so varied that they also give insights into the life of the monks and even the concerns of the scribes. One of them, Eadberct, complains that he was unable to complete the book without bodily torment, writing: "Those unable to write cannot appreciate the work it entails. It is true that only three fingers do the writing, but work is done by the whole body."

The modernisation which began under Abbot Rösch made it possible to reorganise the princely abbey in the 18th century. The church, which had become a patchwork of individual parts, gave way to a new unified structure, a monumental work of art fulfilling the baroque ideal. Here, architecture has pre-eminence over fittings and furnishings. To get the best impression of the masterly achievement of the planners and builders, one has to enter the abbey from the east, walking through the small, dark archway under the New Palace. Then it is

View of the church from the western apse

Choir stalls

like a theatre curtain being suddenly raised and revealing the dazzling courtyard flooded in light and surrounded by an impressive architectural ensemble. The cathedral, with its 68-metre-high double spires and richly decorated gable relief, is bound to command attention. Its long northern side, with the main entrance in the middle next to the rotunda, has been kept sober. After the calmness of this façade, the impact of the inside of the church is all the more impressive. Baroque theatrical effects dumbfound the visitor. Although the choir and the nave are of equal lengths, the nave seems longer. Above the snowy-white structural elements, stucco work in malachite green provides the transition to the dark-coloured ceiling paintings. They present a coherent theological concept but incorporate several optical illusions, for instance in the cupola. Splendid altars, masterly crafted choir stalls and confessionals as well as a slender wrought iron choir screen accentuate the interior of the church. Mediaeval remains are to be found at the two ends of the edifice in the form of the crypts of Saint Gall (from 837) and Saint Otmar (from 980). The shape of the latter has remained unchanged up to the present.

The convent's other jewel is the library. You enter it though a magnificent columned doorway bearing a Greek inscription announcing the *sanatorium of the soul*. Whereas architecture dominates the cathedral, the preeminent features of this five-bayed, two-storeyed pilastered Baroque hall are the natural-timber panelling, the curvilinear gallery, the plasterwork in the vaults, the ceiling paintings with their cyclical concept and some 170,000 books arranged in disciplined rows. All these elements enhance each other to create a work of art of exquisite beauty.

Abbey library

Plan of the city with the abbey | Terrestrial and celestial globe

The library possesses a world-famous collection of manuscripts and palimpsests, first-rate illuminated manuscripts and ornate book bindings. This remarkably uniform and complete collection allows scholars to reconstruct the spiritual and cultural life of the abbey from the Early Middle Ages until 1805 (dissolution of the abbey). Along with the works from the golden age already mentioned, it is worth singling out the pages from Vergil's *Aeneid* written around 400, i.e. while still under the Roman Empire, fragments of Vetus Latina bibles, some hundred pages of the oldest Vulgate by Hieronymus, the *Codex Abrogans* manuscript of 790, which is the oldest book in the German language, and the *Cantatorium* of St Gall (922 – 925), the earliest complete musical manuscript in the world with neumatic notation. As a particularly precious work, it is bound in a wooden box adorned with a carved ivory panel dating about 500, once owned by Charlemagne in person.

The library and archive were always considered to be extremely valuable. That explains Saint Wiborada's premonition of the Magyar Raid and her timely call for the collection of books to be hidden in a safe place. Six hundred years later, the mayor of St Gall, Joachim Vadian, a humanist and reformer, campaigned for the preservation of the archive and library during the iconoclastic action of 1529. Abbot Beda Angehrn (1767 – 1796) was the last big collector and patron of the library. He acquired the literary estate of the famous chronicler Aegidius Tschudi. It included the *Nibelungen-Handschrift* B written around 1250 – one of the three most important and complete manuscripts of the *Song of the Nibelungs*, the major epic poem in Middle High German literature, which were inscribed in UNESCO's *Memory of the World* Register in 2009.

The monastic state was disbanded in 1798 and the convent secularised in 1805. Ironically, the modern canton of St Gall, which emerged out of the ruins of the Ancien Régime, is still governed from the abbey. Where the prince abbot used to reside and receive his guests is today the seat of the bishop and of the cantonal government. Moreover, the cantonal parliament, elected by universal suffrage, holds its debates in the former throne room. The city, finally, whose old winding alleyways cling tightly to the convent, keeps alive Tuotilo's artistic heritage through the world famous embroidery of St Gall.

To the Swiss, the site of present day Bellinzona has long been both a barrier and a gateway to Italy: barrier, because the Dukes of Milan built fortresses and high walls blocking the entire valley; gateway, because once the obstacle was overcome, it opened a clear road to the north of Italy. The three castles together with the defensive wall and ramparts bear witness to Bellinzona's strategic value in the 15th century as a position of defence against Swiss incursions. Today, the fortified ensemble of Bellinzona is inscribed on the World Heritage List as an outstanding example of a late medieval defensive structure guarding a key strategic Alpine pass.

Castelgrande

Murata | Castelgrande, the White tower

The location does offer a number of natural strategic advantages. It lies where several mountain passes intersect: the southerly passes of the Gotthard, San Bernardino, Lukmanier, Greina and Nufenen, and on an east-west axis, the San Jorio linking the Centovalli region with the Valtellina. Control of these thoroughfares required possession of the promontory that rises from the valley floor, offering a natural defensive position. These heights have been occupied throughout recorded time, the earliest traces going back to the Neolithic period (5000 BC).

The fluctuating importance of Bellinzona depended on the prevailing interests of the political powers. When the Romans under the Emperor Augustus were attempting to extend their hegemony beyond the Alps, Bellinzona served as a point of departure. By the 4th century AD, when the Empire was in retreat, the site was further fortified to protect Italy from the invading German hordes. According to the remnants uncovered on the Castelgrande hill, the defensive works would have been sufficient to hold a Roman cohort of a thousand men. With the collapse of the Roman Empire, Bellinzona was at first seized by the Ostrogoths, then fell to the Eastern Empire (Byzantium) and finally to the Lombards. Fire destroyed the fortifications in the year 800. In the 10th century, possession passed to the Holy Roman Emperor Otto the Great. The earliest fortifications still standing today date from this period. The first urban structures that eventually became the modern city of Bellinzona rose on the eastern side of the fortified hill in the 12th century. The conflict in Italy between partisans of the Holy Roman Emperors (Ghibellines) and the partisans of the Pope (Guelfs) was mirrored in Bellinzona. The second of the three castles, Montebello, was added to the defensive system by the Ghibelline Rusca family near the end of the 13th century. Bellinzona fell to the Visconti, Dukes of Milan, in 1340. The strategic importance of Bellinzona increased further in the 15th and 16th centuries when the opposing powers fought to expand their respective territorial dominance. The suzerainty of Milan, under its new overlords the Sforza, was resisted by the rest of Italy, forcing the city to strengthen its defences. As its stronghold in the north, Bellinzona also had to be fortified anew, at great expense, with the building of the wall (Murata) and a third castle at Sasso Corbaro. Following the defeat of the Dukes of Milan, Bellinzona sought the protection of the Swiss Confederation in the year 1500. King Louis XII of France, who had ended the Milanese suzerainty, reluctantly ceded Bellinzona in 1503 to the three cantons

Uri, Schwyz and Unterwald, founders of the Swiss Confederation. In an effort to check Switzerland's southwards expansion, the French decided to build new ramparts – the Rivellino – to strengthen the castle of Locarno, the next city to the south, with state-of-the-art military building techniques. Marino Viganò, a Milanese researcher, attributes this work to Leonardo da Vinci.

Whereas elsewhere in Europe medieval strongholds have been transformed or demolished, the castles and fortifications of Bellinzona have survived more or less intact right up to the present day. Since its occupation by the Swiss, Bellinzona has become a remote relic of a bygone age, of no strategic importance in the modern world.

However, having lost its role as a barrier, Bellinzona acquired new importance as a crossroads. With the building of the railway in the 19th century, the Gotthard line became the most important north-south rail link in Europe, requiring the piercing of a tunnel through the rockface on the town's east side.

The overlords of the canton of Uri had once planned on demolishing the Castelgrande because of its costly maintenance. Luckily, the citizens of Bellinzona didn't see it that way. The castle remained, serving the new canton of Ticino first as a prison, then as an arsenal. As the city expanded, however, several of the old city gates and a third of the defensive wall were sacrificed.

Sasso Corbaro | Montebello | Tunnel at the bottom of the wall

Castelgrande, the White tower and the Black tower

Montebello

The biggest and most important of the three castles, the Castelgrande, is also known as Uri Castle. It stands today as it was under the Sforza. The castle structures are enclosed by thick walls partly built on Roman hilltop foundations. Its defences include two towers, the *white* and the *black*. The massive black tower is the cornerstone of the castle walls, which enclose three distinct open spaces big enough to accommodate additional troops and to facilitate manoeuvres. The buildings the wall once supported were demolished by the Visconti to liberate additional space. The more gracile white tower on the eastern wing has its own fortifications. At the far end of the most southerly courtyard is an archaeological museum in which the various stages of the Castelgrande's construction are illustrated, and various artefacts are displayed.

The wall (Murata) begins on the western flank of the Castelgrande, a barrier that once sealed off the entire valley. A stone bridge led on the western side of the river Ticino to a fortified watchtower, la Torretta, protecting the narrow path between the river and the steep mountain cliff. Until 1869, the Murata had a gate, the Portone. This has since been replaced by a footbridge overlooking the street. The purpose of the Portone was to prevent the narrow city streets from being used by horses and other livestock, the export of which was the most important source of revenue for the merchants of Uri, Schwyz, Unterwalden, Lucerne, and Zug. These cantons also had an interest in territorial expansion towards northern Italy. In the 1512–1515 period, the Duchy of Milan briefly became a Swiss protectorate.

When the Swiss Confederates succeeded in breaching the Bellinzona wall in the course of the battle of Giornico (1478, in which 600 Swiss defeated 10,000 Milanese), the Sforza decided to better protect the valley by strengthening the wall, raising it to a second level and creating a tunnel at the bottom where the defenders would be able to move at will without being visible to the enemy.

To be able to withstand a siege, a town must above all have an open supply line. According to a number of authors, Bellinzona was fortunate here too, up to the 15th century, thanks to a small river port enabling the defenders to access the Magadino plain to the south to seek supplies. Attackers from the north had to deal with steep valleys and mountain passes, difficult or impossible to pass at certain times of the year for their supply lines.

Bellinzona's historic city centre, the Borgo, was integrated into the defensive system at an early stage, protected to the north and south by walls stretching from the Castelgrande to the Montebello Castle, also known

The three castles: Sasso Corbaro, Montebello, Castelgrande

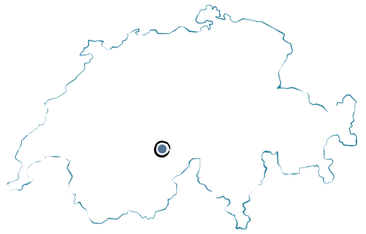
Ancient map of Bellinzona

as Schwyz Castle, which is itself a splendid example of what many expect a medieval castle to look like. The tower built in the 13th century by the Rusca, a powerful Como family, was augmented by the Milanese with trapezoid shaped walls and a protective moat on the eastern side, more accessible to attackers. The castle was entered by a drawbridge, which has since been rebuilt. The castle walls were later given the additional protection of a three-sided bailey (the Rivellino).

The most recent of the three castles is Sasso Corbaro with its distinctive swallow-tail Ghibelline merlons, 600 metres east of Bellinzona and once known as Unterwald Castle. It was built with unprecedented haste in just six months following the terrible defeat at Giornico, which brought the Milanese court's fear of the Swiss to a high pitch. Sasso Corbaro is not directly linked to the other fortifications of Bellinzona, its primary purpose having been to prevent the enemy from outflanking the defenders from above. The castle is square in shape, each wall roughly 25 metres long. The living quarters are in the northeast corner overlooking the walls, with a watchtower in the southwest corner.

Thanks to various restorations and constant maintenance, all three castles are in fine condition. One of the most significant restorations was undertaken in the 1982–1992 period, when the renowned local architect Aurelio Galfetti renovated the Castelgrande adding some modern conveniences. The International Council on Monuments and Sites (ICOMOS) was impressed by the high quality of the improvements, in particular a lift that takes visitors from the town below up to the castle.

In contrast to a time when Bellinzona was an instrument of war, the three castles today have a peaceful, educational role. Instead of repelling invaders, they attract visitors from all over the world.



The Alps are such an intrinsic part of the image of Switzerland that the country is often referred to as the Alpine Republic. Hardly surprising therefore that Switzerland is home to the first natural World Heritage property in the Alps. The Jungfrau–Aletsch region is a spectacular high Alpine landscape offering such classic views as the celebrated triad Eiger, Mönch and Jungfrau. The Aletsch Glacier is 23 kilometres long and Europe's largest ice mass, covering 82 square kilometres. At Concordia (Konkordiaplatz), three glaciers converge to build a slightly inclined sheet of ice measuring six square kilometres. Here, you stand on some 900 metres of ice – the polar icecaps are the only other places in the world where ice as thick as this can be found. The estimated weight of the glacier is 27 billion tonnes, a mass of ice that could supply all the inhabitants of the Earth with a litre of water a day for a period of six years.

Despite its celebrity status, this World Heritage property is fairly isolated. There are only four means of transport that bring visitors into it: the Jungfrau Railway, which boasts Europe's highest railway station at an altitude of 3,454 metres; the tunnel lift giving access to the spectacular Trümmelbach Falls; the "Lötschberger" mountain excursion train; and the Lötschberg Base Tunnel which is part of the New Railway Link through the Alps. The other connections go only as far as the property's perimeter. The railway that runs along the rocky steppe in the canton of Valais marks the southern perimeter. There are however a number of possibilities on foot, with an impressive network of trails and a variety of Alpine tours. Within the property, 39 mountain cabins offer overnight accommodation.

Research station Jungfraujoch

This relative isolation has its positive side: 95 per cent of the property – 823 square kilometres, of which 57 per cent lies in the canton of Valais and the remainder in the canton of Berne – is still in a natural condition.

The power of attraction of these mountains has made tourism the most important sector of the local economy. This was not always the case. Up until the 18th century the high reaches of the Alps with their glaciers were seen as inhospitable, frightening, to be avoided. The Enlightenment changed this. The ideas of Jean-Jacques Rousseau and a poem by the scholar Albrecht von Haller, *Die Alpen*, helped to bring about this change, ushering in a new age of discovery and Alpine research. The mountain dwellers were romanticised as healthy freedom-loving shepherds and herders, in contrast to *lowland farmers* still under the feudal yoke. These free shepherds symbolized an ideal society of which Schiller's play *Wilhelm Tell* provides a dramatic illustration. The spell the mountains exerted on artists can be seen in the paintings of Caspar Wolf, Alexandre Calame and Ferdinand Hodler. Visiting the Staubbach Falls, Goethe was inspired to write his poem *Gesang der Geister über den Wassern* (Song of the Spirits over the Waters). Artists of today still find inspiration in the Alps, but their focus is different. Uppermost in the minds of many is the idea that these landscapes may be destroyed by humankind.

Bietschhorn

Exploration of the Alps began in the 18th century with various scientific expeditions. Among the pioneers were Joseph Hugi and Louis Agassiz, one of the founding fathers of the ice age theory. Recent research traces the history of the Aletsch Glacier back 3,500 years. It has also provided new information on the phenomenon of climate change which in the past 30 years alone has caused the glaciers to lose a quarter of their mass and whose impact can also be seen in the permafrost region. These once stable zones are now subject to landslides, as can be seen at Stieregg in the Jungfrau region. Scientific research in this World Heritage property not only provides information about the Alps themselves but also adds to our knowledge of ecological processes on a global scale. The research station on the Jungfraujoch is of international importance.

For 500 million years the Jungfrau-Aletsch region has been the scene of a constant geological and geographical evolution. The Alps are still rising approximately 0.5 to 0.7 millimetres per year, faster than the rate of erosion. This is due to the northward drift of the African tectonic plate, pushing against the stable Eurasian plate at a rate of 5 centimetres per year. The formation of the Alps, between 20 and 40 million years ago, is a consequence of the collision of these two plates. The resulting overthrusts and upward thrusts have led to complex formations. The chronology of the geological layers is often surprising since the oldest layers are not always at the lowest levels, where they normally are, but lie on top of more recent ones. Thus the peaks of the Mönch and Jungfrau consist of a crystalline rock which is older than the limestone below, whereas the summit of the Eiger is almost exclusively limestone. This complexity can also be deduced from the physiography of the region: The north is distinguished by precipitous walls of rock including the renowned North Face of the Eiger with its 1,800 metre sheer drop and steep valleys. In the South the slopes fall more gently towards the Rhone Valley. This tells us that, considering the history of the Earth, the Alps as we know them are among the more recent mountain formations, since they are only 2 million years old.

The Alps have a major impact on climate, acting as a barrier to humid winds from the Atlantic and generating clouds that bring rain and snow. North of the Alps the climate is sub-oceanic and rainfall high. The south has a relatively dry, subcontinental climate. This determines the rainfall pattern, with twice as much rain falling in Grindelwald at the foot of the North Face of the Eiger as in the town of Brig in Upper Valais. The Aletsch Glacier's main accumulation zone is thus in the north.

At the margin of the Unteraar Glacier | Gasterntal

Chamois | Edelweiss | Marmots

Bisse Gorperi | Typical farm buildings in the village of Bellwald

Due to its various climate zones, the Jungfrau-Aletsch region is host to a large diversity of flora and fauna. The World Heritage property is home to over 3,000 plant and animal species, an amount that is all the more impressive when one thinks that 90 per cent of the area, high in the mountains, is entirely lacking in vegetation. The fauna consists of classical Alpine species, and the altitudinal zonation of plant species is readily discernible. On the Bernese side, where the timberline is at 1,800 metres, the succession is of oak, beech and spruce while on the Valais side, where the timberline is 400–600 metres higher, it changes to pine, spruce, Swiss stone pine and larch. In the Aletsch Forest, which is one of the most interesting places of the property, stone pines (Pinus Cembra) are especially prevalent. They are long-lived and the oldest-known specimen is thought to be 1,000 years. The zone extending from the foot of the glacier is famous for its entire succession of vegetation, from the earliest mosses and lichens at the edge of the glacier to the forest itself. As the glacier has been retreating since about 1850, revegetation of land liberated from the ice is a promising new field of study.

One of the great assets of the property is the rocky steppe in the canton of Valais. So exotic did it appear to Albrecht von Haller that he called it the *Spain of Switzerland*, and the poet Rainer Maria Rilke asked to be buried in the neighbouring village of Raron. The mountains protect this segment of the valley from bad weather. The flora and fauna that developed in this microclimate is therefore more akin to that of the Mediterranean, or to the steppes of Eastern Europe or Central Asia. The only saffron that grows in Switzerland is found here, in the village of Mund.

To overcome the dryness of the climate the people of Valais built the famous watercourses that bring water from the glaciers to the valleys, known as *Suonen* in German or *bisses* in French. This centuries-old system is the work of daring builders. Its maintenance as well as the distribution and utilisation of this *holy water* are a living tradition.

The dynamic symbiosis between high mountain landscapes and inhabited areas in such close proximity is also unique. The last village on the northern side, Stechelberg, is just five kilometres as the crow flies from the peak of the Jungfrau, 3,000 metres higher. Relatively speaking, this beats the altitude differences in the Himalayas: from the village of Dingboche to the peak of Mount Everest, the distance is 14 kilometres for a difference of 4,500 metres. As a result of this topography,

Great Aletsch Glacier

the people of the Jungfrau-Aletsch region did not settle on the high mountains but around them. This did however not prevent them from exploiting it, and not only for tourism. The water from the mountains provides Switzerland with a wealth of hydropower. The region of the Grimsel Pass was known for its crystals, some of which were sent to Milan for cutting already in the 18th century. During this same century, the furniture maker Matthäus Funk had marble quarried from the foot of the Grindelwald Glacier to top his much sought after chests of drawers. And in the 20th century, molybdenite for hardening steel was mined at an altitude of between 2,600 and 2,950 metres in the Baldschiedertal.

Agricultural settlements can be divided into two categories: scattered farmsteads in the north, and in the south small self-sufficient villages. In both regions, living conditions were extremely hard and many of their inhabitants emigrated. Since painstakingly earned reserves of food had to be protected from rodents, the traditional stilt structures used in Valais for storage had a wide circular stone plate built into each leg to prevent mice from climbing up.

The development of tourism since the 19th century hastened structural change, transforming farmers into service providers. Here the tourist is spoiled for choice. In addition to unique natural landscapes for winter and summer sports, they can visit the surrounding cultural landscapes. The interaction between humankind and the environment in this unique setting is worth studying, made all the more poignant by the impact of climate change.

We tend to think of stones as lifeless: a person turned to stone is motionless, while if we have an expressionless demeanour we are said to be stony-faced. So you might well be tempted to conclude that stones cannot show any spark of life. But Monte San Giorgio tells us otherwise. This pyramid-shaped mountain rising up between the southern arms of Lake Lugano is one of the world's most significant sites for fossils of marine and land-based animals and plants from the Triassic Period. Originally Monte San Giorgio was not a mountain rising to over 1,000 metres at all, but actually formed part of the seabed. To understand its origins, we must go back some 245 – 235 million years, when it was part of a sheltered lagoon protected by an offshore reef of sandbanks and islands, located at the western extremity of the Tethys Ocean.

Monte San Giorgio and the village of Brusino

The marine reptile *Ceresiosaurus calcagnii* – symbol of Monte San Giorgio

The most important fossilised remains found at Monte San Giorgio cover a period of some 10 million years. During this relatively long era, at least five fossiliferous strata were laid down, giving us an insight not only into the organisms themselves, but also allowing us to study how they evolved over time. In this respect Monte San Giorgio differs from other Triassic sites, which, generally only have a single fossil-bearing layer and consequently only provide a "snapshot" of life at one moment in history.

The finds at Monte San Giorgio provide clues about the origin of these organisms. Tracing their development back, we reach their primal forms, which can be compared with fossils from other areas. The latest research puts the origins of the Triassic marine fauna in the Guizhou Province of southern China, where rich layers of sediments holding vertebrates were found. By comparing these life forms with Triassic marine fossils found in other places, such as Tibet, Iran or Turkey, we can hypothesise that ocean currents carried these organisms westwards from what is now China to the sea area that would much later on become Monte San Giorgio. Unlike deposits found in Guizhou, however, which to date have revealed only a relatively limited diversity of fish and reptiles, the strata at Monte San Giorgio show a real explosion of life forms. This was probably due to the relatively warm and nutrition-rich waters of the lagoon. Along with the excellent state of preservation of the fossils, thanks to the lagoon being sheltered, and other favourable conditions such as oxygen-poor water and a muddy seabed, this diversity makes Monte San Giorgio one of the six most important fossil repositories in the world. In addition, the many studies made since the 19th century – some 800 publications are dedicated to it – make this mountain the single best documented paleontological site of the Triassic Period.

Reconstruction from the fossil, using the example of the ammonoid *Ticinites*

Monte San Giorgio's riches stem from the above-mentioned succession of five fossiliferous layers containing a wide range of specimens from a period approximately 245 to 235 million years ago. As commonly the case with deposits, the earliest layer is also the deepest. This is the Besano Formation. This stratum is the best studied and has yielded the most finds. The next four layers belong to the so-called Meride Limestone formation, comprising the Cava Inferiore, the Cava Superiore, the Cassina Beds and the Upper Meride Limestone. These four deposits also hold a wide variety of fish and reptiles, which prompted the Universities of Zurich and Milan as well as the Cantonal Museum of Natural History in Lugano to undertake extensive excavations during the 1990s. The success of this research provided the spur for submitting the candidature of the area for inclusion in the UNESCO World Heritage List. Today, Monte San Giorgio is a transnational World Heritage property. The Swiss part was inscribed in 2003 ; the Italian part was added in 2010.

Altogether the layers from the Middle Triassic are 600 metres thick and over 21,000 fossils have been recovered. As mentioned, the most important rock sequence is the Besano Formation, which is only 16 metres thick. Documenting and cataloguing the fossils yielded around 30 reptile species, 80 fish species, over 100 species of invertebrates and a variety of plants, namely several species of conifers. The scientific names of animals discovered for the very first time indicate where they were found, for example *Ceresiosaurus*, *Ticinosuchus*, *Serpianosaurus*, *Meridensia* and *Besanosaurus*, to name but a few.

Many species were recovered at different stages of their life cycle. In some cases it was even possible to determine their sex. The finds that always attract the most attention are the reptiles. These include Monte San Giorgio's very own paleontological emblem: the *Ceresiosaurus*. With its oar-like limbs, this reptile could reach three metres in length and was well adapted to life in water. Another remarkable animal is the *Tanystropheus* which could measure up to five metres. It had a very long giraffe-like neck that was longer than the rest of its body. Other reptiles such as the *Paraplacodus* specialised in cracking open mussels and crustaceans. Their teeth were not sharp, but flat and oval. The largest reptile was a marine reptile, the *Besanosaurus*. A specimen discovered in 1992, in the Italian part of the site, is almost six metres long and it took around 15,000 hours of work to separate the fossil from the stone! It even contained remains of the spines of much smaller saurians, probably embryos.

A beautifully preserved ganoid fish 16 cm long

The Cantonal Museum of Natural History owns an exceptional specimen of *Saurichthys* whose innards contained 16 embryos. This means that this species bore live offspring and did not propagate by laying eggs, as is more usual for fish.

The invertebrate ammonites (molluscs) are usually only found in the shape of cavities in stones. Researchers fill the *negative* impression they leave with silicone to reveal the *positive* shape of the animal, which can then be studied.

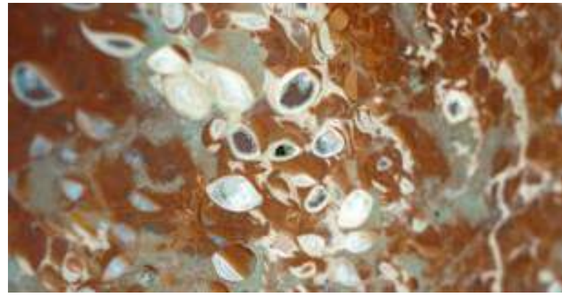
In 1998, the University of Milan succeeded in recovering the first fossil insect in the site, a one-day fly. This specific Ephemeroptera was named *Tintorina meridensis*. In the same year, the University of Zurich discovered other insects.

In 2007, the Cantonal Museum of Natural History discovered in Cassina the fossil of a so far unknown conifer. It was named *Elatocladus cassinae*. The research revealed other fossil plants, in particular a fern that produced seeds, which is very unusual.

In 2010, the same Museum found three fossil insects in the Upper Meride Limestone stratum. These wingless insects were named *Dasyleptus triassicus*. They belong to an extinct subclass of Archaeognatha, the Monura. Until this discovery, they were believed to have died out much earlier, during the largest mass extinction in Earth's history, at the end of the Permian, 252 million years ago. Comparing them to the bristletails, their modern relatives, it is assumed that they lived on the ground, near the seashore.

Interestingly, however, the first fossil finds were not the result of academic research, but of commercial endeavours, namely the search for fuels which began with bituminous shale in the 18th century. Shortly after 1900, these layers were used for medical purposes, to manufacture the black cream marketed – with a clear nod to the reptiles – under the name of Saurolo. The old factory near Meride still stands there.

Brachiopod fossils in Broccatello (Jurassic) from Arzo



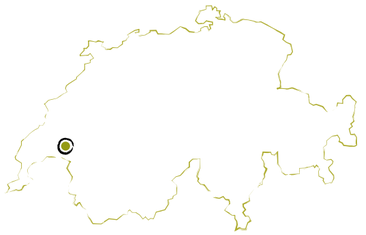
Macchia Vecchia in the Arzo quarry | Church Santa Croce in Riva San Vitale

Red Jurassic marl in the Arzo quarry | Pulpit of *Marmo di Arzo*, parish church of Arzo

Another commercial use of Monte San Giorgio's rock is quarrying. Limestone from Arzo, Saltrio and Viggiù (often inaccurately called marble) has been greatly sought after from the 15th century onwards. The quality and colours of this stone were held in high esteem across Europe and beyond. Columns made of stone from Monte San Giorgio help to hold up the roofs of well-known churches such as the Einsiedeln Abbey Church, St Peter's in Rome and the baptistery in Milan Cathedral. Incidentally, impressive examples of the variety of colours in this stone can be seen very near the World Heritage property, on the main altars in the parish church in Arzo and the Chiesa della Madonna della Croce, in Viggiù.

This commercial exploitation of Monte San Giorgio stone also helped scientists examine strata younger than those of the Triassic Period. Research projects investigated, for instance, crevasse filling in Arzo limestone, or deposits from the Jurassic Period which are around 30 million years younger. In 1996, the remains of a new, carnivorous dinosaur at least eight metres long were discovered in this layer. It was named *Saltriosaurus* after the village where it was unearthed.

The fact that Monte San Giorgio is now a mountain is due to the formation of the Alps. Around 100 million years ago the African landmass began to move northwards and push against the Eurasian tectonic plate. A crumple zone was formed at the point where the two continents collided, with the peaks in this zone becoming the Alps. The area of Monte San Giorgio was located at the southernmost edge of the collision area. The resistance created by the crumple zone and the increasing northward drift of the African plate resulted not only in the stratifications found at Monte San Giorgio, but also in their characteristic southward inclination. So the huge variety of flora and fauna that once flourished in a tropical lagoon can now be found in the petrified sediments of a European mountain.



Lavaux is one of those places that are enchanting at first sight. Many catch their first glimpse on the train from Berne as it exits the Puidoux Tunnel and the vast panorama of Lake Geneva (lac Léman) and the Lavaux terraces suddenly opens up in front of them. Others discover this magnificent scenery on a visit to the terraced vineyards around Grandvaux or from the *Balcon du Léman*, as the village of Chexbres calls itself.

View from Rueyres, above Epesses

From this balcony the artists Ferdinand Hodler and Félix Valloton captured the breathtaking view on canvas. Other visitors admire the vineyards from the lake, their thoughts dancing to the gentle music of the waves. When rising mist engulfs the shores of France opposite Lavaux, the Léman resembles the sea itself. In the words of the local poet Charles Ferdinand Ramuz it is "our own Mediterranean, our small inner sea before the big one". To the expressionist painter Oskar Kokoschka this place was nothing less than a "legendary paradise". Hardly surprising that artists of all kinds are drawn to this spot and either spend the rest of their days here or after even a brief visit are inspired to create memorable works. They have included the great comic actor and director Charlie Chaplin, painters William Turner and Gustave Courbet, writers Graham Greene and Jean Anouilh, chansonnier and local poet Jean Villard Gilles, and Lord Byron who was inspired to write the poetic narrative "The Prisoner of Chillon". Born in Geneva, Jean-Jacques Rousseau chose Lavaux as the site of his emblematic novel "Julie, or the New Heloise". The celebrated architect Le Corbusier, born in La Chaux-de-Fonds, built a cosy villa for his parents in Corseaux.

What is it that makes ordinary mortals wax as lyrical as any advertising copywriter at the sight of this 20-kilometre strip with its 898 hectares of vineyards, 10 villages and 5,600 inhabitants? Lavaux is a tribute to continuous, successful human endeavour interacting with nature: the natural beauty of the landscape is enhanced by the clear pattern of vineyards across the slope, distinguishing it entirely from the built-up areas to the east and west. When registering Lavaux as a World Heritage property in 2007, UNESCO noted that "the vineyard landscape demonstrates in a highly visible way its evolution and development over almost a millennium through the well preserved landscape and buildings that demonstrate a continuation and evolution of longstanding cultural traditions". To Ramuz this interaction was pure poetry: "The Good Lord began it, then we came along and completed it... The Good Lord created the slope, but we ensured that it served a purpose, that it holds together, that it lasts".

On a more scientific note, the Lavaux slope was carved-out by the Rhone glacier, which at its peak some 25,000 years ago, stretched as far as Lyons. As it retreated, it left behind not only one of the biggest lakes in Europe but also moraines which produced the fertile soil of the hilly contours of Lake Geneva. The terrain left by a re-

treating glacier is usually colonised gradually by plant life. About 2,000 years ago the Lavaux landscape consisted of shrubs and forests through which passed streams feeding into the lake. The remaining outcrops of forest at the top of the hill, which hide the watershed between the North Sea and the Mediterranean, are a reminder of this earlier landscape. At the beginning of the expansion of the Roman Empire, the area not only served as a direct link between Italy, Gaul and Western Germany but, thanks to its mild climate, as an ideal place to cultivate the vine. The first vineyard terraces – today they number more than 10,000 – were created much later, in the 12th century, by Benedictine and Cistercian monks, whose legendary perseverance was probably decisive for this complex and painstaking job. The delicious fruit of their labour was not reserved only for the serving of mass: so prized was the wine of Lavaux that it contributed greatly to the coffers of the Lord Bishop of Lausanne. In the year 1397 a full quarter of the Bishop's revenues derived from Lavaux. No wonder that the Lausanne cathedral rosette celebrates September as the month of harvesting the grapes.

The conquest of Vaud by the Bernese in 1536 and the introduction of the Protestant Reformation brought new owners, but the vineyards prospered even more and continued to do so after the rout of the Bernese and the creation of the canton of Vaud in 1803. As political regimes came and went, the winegrowers remained true to their ancestral duties. This is not to say that changes do not also occur in the vineyard. Lavaux is not a place where time stands still: over the centuries, the technology of cultivation of the vine has constantly evolved. With a profound respect for tradition, innovation enriches the knowledge and experience transmitted from generation to generation.

Vineyard of Epesses | Wine cellar

Wine growing stamped its mark on the villages, where so close together are the houses with their cellars and wine presses that they resemble medieval towns. One of the most typical is Saint-Saphorin, with traces that date back to Roman times. The historic village's compact nature left as much land as possible free for growing grapes, the Gold of Lavaux. Land suitable for wine growing cost much more than any other type of agricultural land. The high price bore with it the risk that the land would be asked to produce too much, and the quality of the wine would suffer. To prevent this, quality control was introduced at an early stage. Indeed the earliest record goes back to the year 1368. A federal decree of 1992 limits production and introduced the principle of quality-based payment.

The 19th century brought major changes to the area. Industrialisation and urbanisation of the two poles on either side, Lausanne and Vevey, put pressure on wine growing as a way of making a living. The two cities drew the workforce away from Lavaux. Then the sale of land in smaller parcels for home building brought the threat of creeping urban sprawl. In 1861–1862, the construction of the railway running along the lakeside further accelerated the process but had also its good side: making it easier to export wine.

However, the biggest change of all was brought by a miniscule pest, the phylloxera, grape vine louse. Originating in North America, this plague reached Lavaux in 1886 and had devastating consequences, which called for radical responses. Traditional methods had to be altered to an extent that wine growing now required accomplished professionals. More resistant types of

Harvest | St Saphorin

Vineyards near Rivaz, with Lake Geneva

Vineyards near Chexbres

grapevine had to be grafted onto the rootstocks, with close monitoring of the results and the use of chemical sprays. After 1945, this increasing specialisation sounded the death knell of the wine growing and cattle raising polyculture, giving way to the present monoculture. Against this background, the traditional transfer of know-how from father to son, although preserved by some families, passed mainly to agricultural colleges. Today's growers are all highly qualified and know that a good wine results from the right blend of technology and tradition.

In 1970, the wine growers of Lavaux adopted an integrated production model to guarantee a sustainable and environment-friendly business. Row cultivation is no longer down the slope but parallel to the coast to reduce erosion of the soil by rain. The new methods also require less pesticide. Even with these innovations wine growing in Lavaux remains labour intensive and costly. Whereas flat vineyards, which allow the use of a tractors, require 400–500 man hours per hectare, in Lavaux it takes twice that many. Only wine of the highest quality can make such an investment profitable.

Lavaux is a registered brand, an *Appellation d'origine controlée* (controlled designation of origin) with eight recognised production areas – Lutry, Villette, Epesses, Calamin, Dézaley, Saint-Saphorin, Chardonne and Vevey-Montreux. The grape variety most commonly found in Lavaux is Chasselas with 78 per cent. The average annual production is about 63,400 hectolitres; some 81 per cent of it is white wine. The wine of Lavaux is distinguished by a strong fruity character and a harmony of aromas delightful to the palate. The people of Lavaux like to say that three suns are responsible for this divine beverage. The most important is direct sunlight. The second is reflected sunlight (albedo) from the lake, which also ensures temperate winters. The third sun is man-made: the retaining walls of the vineyards that radiate warmth through the night. To these advantages must be added a hillside location which protects the grapes from the cold north winds. Altitude also plays a role: closer to the lake the vines produce buds two weeks earlier than higher up in the vineyards, so that the grapes towards the bottom of the slope generally have more sugar. The climate change that has taken place since the 1970s has on the whole been beneficial for Lavaux. Thanks to the increase in temperature it is possible to grow other kinds of grape such as Merlot. There are also negative consequences including short periods of intense rainfall, periods of drought and hail storms.

As long as Lavaux can produce quality wines that justify higher prices, the wine growing tradition will continue to prosper. The growers no longer struggle alone, for in 1977 the Vaud electorate approved an amendment to the canton's constitution guaranteeing the protection of Lavaux and calling a halt to creeping urban sprawl.

The vineyard terraces are the very essence of Lavaux. Wine growers have created this exceptional mosaic and keep it alive. Thanks to their hard work, to their commitment to both their craft and their land, this legendary paradise lives on and we all have the privilege to enjoy it.

Mountains often harbour more secrets than it seems. This holds particularly true of the fascinating landscape extending over more than 300 square kilometres where the borders of the cantons of Glarus, Graubünden and St Gall meet, and where seven peaks rise above 3,000 metres, including the Piz Sardona. The Swiss Tectonic Arena Sardona presents an exceptional and dramatic display of mountain-building through continental collision. It is distinguished by the clear three-dimensional exposure of the structures and processes that characterise this phenomenon and its ongoing contribution to geological sciences.

Tschingelhörner with Martin's hole

Just beneath the ridge of the Tschingelhörner, at an altitude of 2,600 metres, the famous Martin's hole opens up. This strange, almost triangular opening, with a diameter of around 18 metres, was formed by the accelerated erosion of a more fragile part of the rock. It is very special since it is a kind of natural calendar. Twice a year, roughly a week before the spring equinox and a week after the autumn equinox, the rising sun shines through the hole and lights up the church tower of the village of Elm, for 2 minutes. Then it disappears behind the wall of rock before emerging above the ridge some 15 minutes later. This occurrence has fascinated people for centuries. Sometimes, mountains also bring death.

In 1881, a massive rockslide buried half of the village of Elm, killing 114 of its inhabitants. The other mysterious characteristic of the Tschingelhörner and of the surrounding peaks is a grey-yellowish line, wedged between two layers of Alpine rock. This distinct line has intrigued the scientific world for a long time and prompted a considerable number of arguments amongst geologists, since it overturned (in the literal sense of the word) the prevailing theories regarding the development of the Earth's crust. This "magic line", as it is often called, ultimately provided a key to our understanding of the tectonic processes that gave rise to the Alps and to other similar mountain ranges.

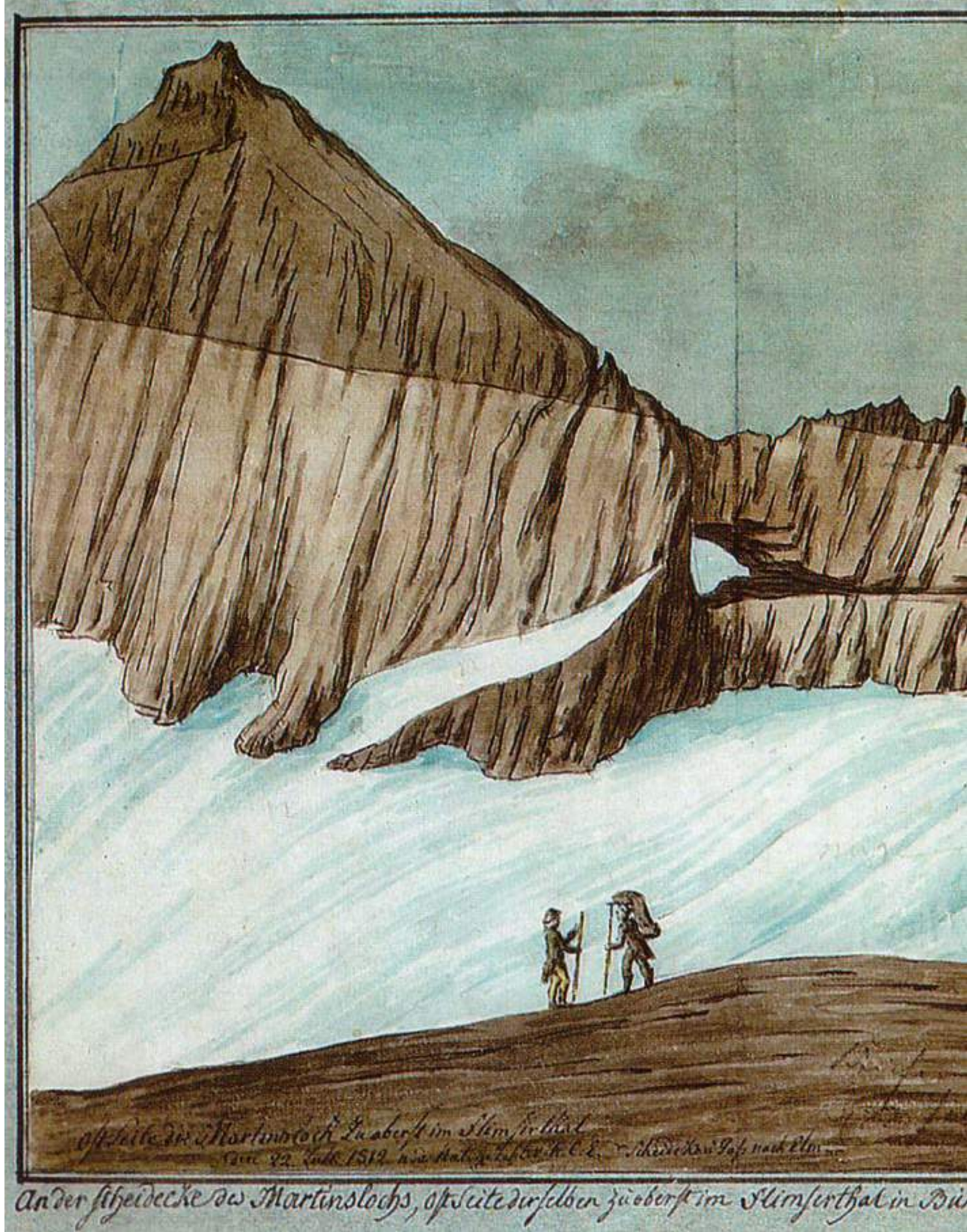
Two centuries ago, some scholars put forward the idea that the Earth had cooled down, causing it to shrink and, in the process, to form mountains – a bit like an old, wrinkled apple. The experts had established that the more recent layers of rock were always on top of the older ones. Always? The first to point out that there might be an exception to the prevailing scientific orthodoxy was Hans Conrad Escher. He is familiar to the general public through his correction of the course of the river Linth which made the region between the Walensee lake and Lake Zurich into fertile land. The Swiss authorities expressed posthumously their gratitude for this major undertaking by allowing Escher's family to add "von der Linth" to their name. As a keen observer and meticulous draughtsman, Escher showed in 1807 that in the Glarus Alps the younger layer of rock, in this case Alpine limestone, which ought logically to have been on top of the older layer, was, in fact, located beneath it. This older rock, which was known as greywacke at the time, is now called verrucano. Escher consulted the

The sun shining through Martin's hole | Church of Elm

German expert Leopold von Buch, who came to study the phenomenon on location. Escher had hoped to have his theory confirmed – von Buch rejected it, saying that it was impossible to make an exception to the rule for the Glarus Alps! In that same year of 1807, Escher's son, Arnold, was born. During his adult life, Arnold continued his father's work and, in 1845, came to the conclusion that these strata, which go against nature, could be explained by a "colossal overthrust". But, in the same way as his father, he was rather hesitant. He considered his discovery to be so daring that he confided in his diary: "No one would believe it; I would be considered a fool". He found a way out by explaining that it was a double fold: a fold from the north and a fold from the south, which had met at the Foopass and enclosed the younger limestone in what could be compared to a tobacco-pouch... But, as Friedrich Durrenmatt said, once an idea has been expressed, it is impossible to fully forget it, and Arnold Escher's discovery marked the start of several decades of at times fierce controversy amongst scientists. The region, which is now a World Heritage property, even developed into a geologists' Mecca. But leaving aside the disputes, one thing is certain: the theory of the colossal overthrust put forward by Arnold Escher opened the way to our current understanding of large-scale Alpine overthrusts.

200 million years ago, the Tethys Ocean separated the continental plates which would later form Africa and Europe. Approximately 100 million years later, the southern plate started to move towards the northern plate, causing the Tethys to shrink. The crusts of the two continents finally met up and formed a fold. The front sections of the African plate moved over the European plate, rose up and bent over. In the Sardona region, the overthrusts occurred about 30 to 20 million years ago, deep in the interior of the Earth. The distance between the north and the south as the crow flies was greatly reduced by this collision of the two continents – making the journey between Lugano and Basel some 600 kilometres shorter, for instance. A solace for all those who dream of making Switzerland bigger... if we could just manage to flatten the Alps again!

Watercolours by Hans Conrad Escher, Piz Sardona (around 1810)
Tschingelhörner with Martin's hole (1812)



Panorama Piz Sardona, Piz Segnas, Tschingelhörner

Overthrust at Piz Segnas | Close-up view of the „kneading-structure" in the Lochsiten limestone

In the Piz Sardona region, an extraordinary phenomenon occurred: A bulk of rock (50 kilometres long and more than 100 kilometres wide) was pushed somehow like a blanket towards the north on top of another, younger body of rock. The overthrust extended at least 35 kilometres. Thanks to the upheaval of the rock mass and the simultaneous erosion over millions of years, these two layers of rock, as well as a third one in between, are now clearly visible on the surface of the earth. In this World Heritage property, it is possible to follow its course over a total distance of more than 50 kilometres. It would seem normal that a layer of rock of this size should break under the frictional forces and earthquakes triggered by the sudden and violent movements of the continental plates. Scientists are still asking why there have not been any fractures of this kind in this overthrust.

Taking a close up look at the mountain, we see two masses of rock: the lower one, the flysch, is a *mere* 35 to 50 million years; on top of it, the verrucano, which dates back 250 to 300 million years. And in between, there is thin layer, light-grey weathering to yellow. This layer is known to geologists worldwide as Lochsiten limestone. It is the famous magic line which is particularly visible on the Tschingelhörner, in the Weisstannental (in the canton of St Gall) and on the Piz Sardona. Even if it is mostly only 30 to 40 centimetres thick, it acted as a kind of lubricant and thus enabled the verrucano to slide over the flysch despite the enormous frictional forces at work.

The best spot for not only seeing the overthrust but also for actually touching it is near Sool/Schwanden, in the canton of Glarus. Here, visitors can see the phenomenon at chest height. The verrucano is on top, then comes the thin grey-yellowish layer of Lochsiten limestone and, finally, beneath it, the flysch. The fact that the phenomenon is actually visible is so impressive that the American Museum of Natural History in New York had a life-size reconstruction of it on display even before the area became a World Heritage property.

Even though scientists have accepted for more than a century that this is a tectonic overthrust – a process in which older and deeper layers of rock rise up and pass over younger, less deep layers – intensive research is still being conducted into the mechanisms by which this happened. The Lochsiten limestone often has a marble-

Overthrust at Ringelspitz and at Pizol

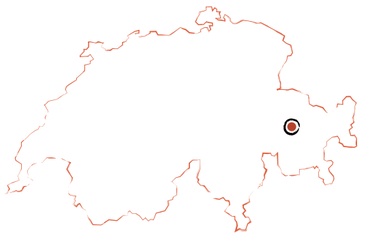
The fold structure at the Mürtschenstock shows the overwhelming forces involved in the formation of mountains

like appearance. It is folded and deformed, which means that it has been subjected to high pressures and temperatures. Laboratory analyses have shown that this appearance is due to a temperature of 320°Celsius and a pressure of 5 kilobars. Conditions of this type prevailed 16 kilometres beneath what was at that time the Earth's surface. This overthrust must thus have taken place at this depth. Recent research has focused on fluids that reduce the friction between the rock masses.

This geologists' Eldorado has not yet yielded up all its secrets. A key site for geologists ever since the 18th century, it stands out from among similar sites through its clear three-dimensional exposure and its substantial contributions to the understanding of mountain building tectonics. It also has excellent accessibility, allowing visitors (both geologists and tourists) to readily observe the phenomenon. These are the main reasons which prompted the World Heritage Committee to recognise its exceptional universal value and to include it on the World Heritage List under the name of Swiss Tectonic Arena Sardona.

This name sums up the special features of the property. The term tectonic, from the Greek *tektonikos*, means relating to carpentry and refers to the construction of mountain chains. Arena illustrates the scale and majestic nature of this site that depicts and recounts millions of years of history. The geographical designation Sardona comes from the name of the peak, which rises up to 3,056 metres and is located at the point where the three cantons of Glarus, Graubünden and St Gall meet.

As for the magic line, visible from all sides, it reminds us that even though we already know a lot, there is still a great deal to be discovered and explained.



Switzerland is a land of railways. Of its almost 5,000-kilometre network, the Albula and Bernina lines stand out for their extraordinary beauty. Even at the time the railway was built, care was taken to present the landscape to the traveller in all its magnificence from the comfort of the train. Nonetheless, the reasons for the choice of route were not just aesthetic. By the mid-19th century, the railways had reached as far as the foot of the Alps. From there those who wanted to explore the mountain valleys had to proceed either on foot or take the mail coach. Once the way to Davos was opened up by a narrow-gauge railway in 1890, followed by Zermatt a year later, other resorts such as St Moritz were eager to follow.

Several options were considered for the route through the Engadine. To provide better access to the central regions of the canton of Graubünden, the stretch from Thusis to St Moritz, via Tiefencastel, Filisur, Bergün, Samedan was chosen for the Albula line. Construction lasted from 1898 to 1904, and the line was electrified in 1919.

Although it was not intended as a through line, great effort was made to ensure it was built according to the specific principles required to provide the most efficient railway possible. This explains why still today, despite increased rail traffic, on large stretches trains still run along the original route. The desire to create an efficient railway also led to the same approach being adopted for the Bernina line.

Albula pass

Following the model of the Landquart-Davos Railway, a narrow gauge was chosen for both the Albula and Bernina lines. However, the radius of curvature for the Albula line was increased to 120 metres in order to reduce wear and tear on tracks and wheels. The inclines have been planned in such a way that it is only the final climb from Filisur that requires increased, and therefore more expensive, traction power. To ensure the otherwise usual maximum 25 per mille incline along the line from Thusis to Filisur, a balanced longitudinal profile had to be found. As a result, it could happen that, for topographical reasons, the line had to be laid at some distance from a village, as is the case with Filisur. The Albula Tunnel was bored at a "mere" 1,823 metres above sea level to keep down the cost of winter operations. Access routes were laid on the sunny side of the valley slopes for the same reason. Avalanche barriers, reforestation and protective galleries were additional, deliberately employed means of maintaining winter services. The Albula line is 67 kilometres long and has 144 viaducts and bridges, and 42 tunnels and covered galleries. Although an efficient and modern rail system, the line is exemplary in the way it harmonises with the mountain landscape, an aspect that was reinforced by ensuring that the right materials were chosen.

Bernina pass

Here, a few outstanding examples have been chosen to highlight the quality of the route, and to point out monuments worth visiting and the spectacular views.

The Schin Gorge begins shortly after Thusis, the northern starting point for the Albula line at 697 metres above sea level. Here, the 42-metre arch of the limestone Solis Viaduct spans both sides of the gorge. At the start of the 20th century, this type of arch was a complete innovation that had to be highlighted. This is why the pillars are widened and provided with masonry parapet attachments that form a type of bridgehead.

Traversing mountain passes was once a dangerous affair, and many travellers would offer prayers to have a safe journey. The Church of St Peter in Mistail, below Tiefencastel, dating from the 8th century can testify to this. It is a three-apsed church similar in design to the wonderful Carolingian church in Müstair. The Rhaetian Railway gently arcs its way round this small church, which is situated at a slightly higher altitude.

The line's most photogenic construction is the 142-metre-long stone Landwasser Viaduct. Built without the use of scaffolding, the 65-metre-high pillars follow one another at a distance of only 20 metres. The reason for

this narrow span is that the viaduct draws a curve with a radius of only 100 metres. The elegance of this masterly construction is enhanced by the south-eastern tunnel entrance, where the last arch is directly anchored in the sheer rock face.

Filisur Railway Station was once a stage stop for the railway. This was the point where the line's increased incline began, which involved either attaching an additional steam locomotive or changing to a more powerful one. Due to the incline of 35 per mille, reverse loops were required which amounted to the equivalent of a line extension. These enable the track to cross itself several times creating a carousel-effect that allows for breathtaking views of the landscape, particularly between Ber-
gün and Preda.

The Albula Tunnel is nearly six kilometres in length and was built between 1899 and 1903 using the most modern techniques available at the time. The first station on the sunny south side of the tunnel is Spinas, which possesses a virtually intact wooden station building dating from the time the line was constructed. The most important station in Engadine is Samedan, where several train lines converge. Alongside a workshop, this location also has a goods trans-shipment centre with a container crane system. The final station on this line is St Moritz which became an internationally famous tourist resort towards the end of the 19th century, in part due to the Rhaetian Railway, and where, thanks mainly to its English visitors, new types of winter sports were developed. It comes then as no surprise that the first winter Olympic Games were staged in St Moritz in 1928. Twenty years later it was again accorded the honour of staging the Games, and the current railway station was built especially for the occasion.

Albula line | Station Spinas

Bernina pass

Alp Grüm

Whereas the Albula line goes through the mountain, the Bernina line snakes over the crest. Inaugurated in 1910, it is 61 kilometres long, has 52 bridges and viaducts, and 13 tunnels and galleries. Financing for its construction was solely private and the intention was to complete it as cheaply as possible, something that is shown by the tight curves and steep inclines (up to 70 per mille). The routing was chosen, on the one hand, to be attractive to tourists and on the other to serve as a means of transport for the power station on the other side of the pass. In 1944, the Rhaetian Railway took over this line, which had been electrified from the very beginning.

The Charnadüra Tunnel had to be built at the demand of neighbouring communities and the Swiss Heritage Society in order to leave the rare moorland of the Stazer forest untouched. A highlight of the climb up to the Bernina Pass is the view of the Morteratsch Glacier from the Montebello Curve. It can be seen from both sides of the train due to the loop which draws a curve with a minimum radius of 45 metres. At the top of the pass (2,253 metres above sea level) two lakes provide reminders of the construction of the central power stations. Here, the northern dam of the Lago Bianco also forms the watershed: the southern rivers flow in the direction of the Adriatic, and the northern ones feed the Black Sea via the Inn and the Danube.

We now leave the Engadin and enter the Italian-speaking Val Poschiavo. The drop in height on the descent from Alp Grüm is truly spectacular, and the line here is reminiscent of the serpentine pattern of mountain passes. The more altitude the train loses, the richer the vegetation. The main town, Poschiavo, offers many architectural sites worth visiting. Then we come to the Brusio Viaduct. Here the entire stretch of line forms a spiral with a gradient of 70 per mille, so that ultimately the train passes beneath the fourth arch of the viaduct. This section has become a symbol of the Bernina line. After Campocologno, the line continues across Italian territory for the last three kilometres. The journey ends at Tirano Railway Station (429 metres above sea level) with its Italian Liberty and Art Deco style.

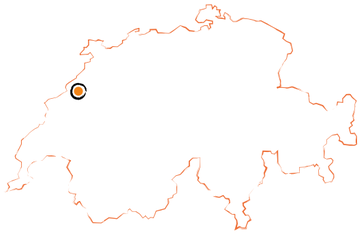
The Albula and Bernina lines of the Rhaetian Railway form the core of this World Heritage property. To preserve their authenticity and integrity, they are surrounded by three buffer zones: the qualified buffer zone immediately adjoining the railway, the near area, and the buffer zone in the distant area which encompasses the landscapes visible from the train.

Landwasser viaduct

Viaduct near Preda

The Albula and Bernina lines are the relatively "modern part" of a much older and larger transport and cultural landscape. When the Romans conquered the area in 15 BC, their domination had an influence on the culture on both sides of the Alps. This can still be best heard in the languages: Romansh in the north, Italian in the south. These culturally distinct areas also differ in their economic systems which are strongly determined by the local topographical and climatic conditions. To the north of the Albula, an economic system developed based on farming at three levels: the village, the intermediate terraces (known as Maiensäss) and the high Alps. Due to its altitude, the Engadin developed a system based on two levels: the villages, often marked by beautiful, thick-walled houses, and the high Alps. And it can be seen how Val Poschiavo changes from a mountain pass landscape shaped by the Alps into an area of livestock farming and agriculture, and further down in the border area into one where agriculture and vineyards predominate. The coming of the railway accelerated the growth of a new sector of the economy, tourism. This turned villages such as St Moritz into fashionable resorts. The influence of the service sector on the cultural landscape will continue, and bring further changes.

Over the course of its 128 kilometres from Thusis to Tirano, the Rhaetian Railway uses some outstanding engineering structures built primarily during the pioneering days of the railway. They present an exceptional technical, architectural and environmentally-friendly ensemble that is seamlessly and harmoniously integrated into the landscape.



Swiss cities can usually trace their origins all the way back to Antiquity, or at least to the Middle Ages. Typically their historic centre consists of narrow, winding streets with perhaps the remains of ancient city walls. Not so La Chaux-de-Fonds and Le Locle, whose urban pedigrees date from only the 19th century, when they were planned and built for and by the watchmaking industry according to a pattern of straight streets intersecting at right angles. They are the expression of a rational, purposeful and pragmatic thought process.

Watchmaking back in the old days

Crêt-Vaillant Street in Le Locle | Farmhouse in the Neuchâtel hills

The watchmaking origins of the two cities is a hallowed legend – all true! It goes back to the year 1679 when 14-year-old Daniel JeanRichard, an apprentice blacksmith, first set eyes on a watch made in far-off London, which he managed to repair. Inspired by this success he decided to make a watch himself. Before long he had the whole family at work in their farmhouse, where he established a workshop. The character of JeanRichard was typical of the inhabitants of the region: a bold spirit of enterprise, industriousness and tenacity together with a readiness to adapt and, last but not least, a strong sense of social equity and justice.

The fact that the first family workshops were created in farmhouses is not surprising. The winters in the Jura mountains are long and hard, making it difficult to continue with agricultural work. Farmers and their families had to use this enforced idleness in other ways to secure their meagre incomes. In this context, watchmaking was a perfectly suited activity. A glance at the oldest houses in the two cities soon reveals their peasant origins, in style and structural elements: they stand alone and are encircled by their own modest green belt. The only concession made to watchmaking was the relocation of the kitchen to the middle of the house – the darkest part – to maximise the use of daylight elsewhere. Soon however new houses were built that were norrower but higher to allow in more light. They had a more urban appearance, being built directly onto the street, with the green banished to the back of the house as a small garden. This trinity of street/house/garden was later adopted by the urban planner of La Chaux-de-Fonds and Le Locle, Charles-Henri Junod, in his blueprints.

Towards the end of the 19th century, the forces of competition sounded the death knell for watchmaking as a cottage industry. It gave way to a mechanised organisation which again was to be reflected in the architecture: workshops with big windows were added to existing houses. The ongoing process of mechanisation ultimately resulted in the building of factories. The homes or villas of the entrepreneurs would either be contiguous with their factory or built separately very close by. The employees were lodged in neighbouring multi-storey houses.

In 1794, fire destroyed La Chaux-de-Fonds and in 1833 also Le Locle. These disasters were turned to good advantage however, making way for genuine urban planning. The plans were drawn up by Charles-Henri Junod, in 1836 for Le Locle, in 1841 for La Chaux-de-Fonds. Starting from the few houses that survived the fire, he drew one main axis following the valley floor and added parallel streets, which could be extended for miles if necessary. At regular intervals, other streets cut across these rows at right angles, creating the pattern of a grid. Junod's blueprints were anything but utopian. They followed a rational, pragmatic, utilitarian and efficient design that is just as valid in the present day.

Thus, like the proverbial Phoenix, new cities arose from the ashes of the old villages. By 1914, roughly a century after the fires, the entrepreneurs and artisans of La Chaux-de-Fonds and Le Locle were supplying an estimated 55 per cent of the world's watches. This was made possible thanks to their ability to meet every challenge of a constantly evolving industry. And since here watchmaking and architecture always went hand in hand, each new building was a witness to this symbiotic process.

Watches are very complex objects. They require the handling of minutia and the know-how of many specialists. In 1870, there were 48 different trades engaged in watchmaking – despite the automation, there are still about twenty of them. All these people worked in smaller or larger groups dotted all over the city. That is why in Das Kapital Karl Marx refers to La Chaux-de-Fonds as a "huge factory-town". Today, specific aspects of the process are entrusted to specialists who produce genuine masterpieces in small workshops, usually in complete anonymity. This is particularly true of the gem setters, engravers and jewellers. Such is their reputation that they are also much in demand by foreign manufacturers of prestige watches.

La Chaux-de-Fonds | Watchmakers' tools

These decentralised operations require functional architecture and an urban planning that makes it possible for each individual work unit to be reachable in all weathers and without delay, including when the city is knee-deep in snow. This is one of the reasons why, in both cities, there are neither residential nor industrial zones. Here workplace and living space intermingle.

The first serious mechanisation of watchmaking operations was brought about by the Philadelphia Centennial International Exhibition, which took place in 1876. It was then that the cottage industry truly gave way to factory methods. The pioneer of this transformation was Georges Favre-Jacot, the first Swiss entrepreneur to produce watches applying the American system of manufacturing. In Le Locle he arranged for the building of a whole complex of units that would enable him to have complete control of production from A to Z. There was even a telephone system to maintain the various workshops and offices in constant communication. In 1901, Favre-Jacot had more than 600 employees who in a single year produced 100,000 watches, marketed under the brand name Zenith. What Ford was to the automobile industry Favre-Jacot was to watchmaking (all due proportions guarded!). Unlike industrialists in other parts of the world however the Swiss entrepreneur considered his employees a valuable asset. To pre-empt a speculative real estate market in Le Locle he arranged for the creation of a new district, La Molière, built between 1902 and 1907. This provided decent accommodation in the form of small terraced houses within an enclosed estate. The artisans of La Chaux-de-Fonds and Le Locle, in view of their unique training and know-how, had a bargaining position that could not be found in other industries.

Le Locle, Town Hall, fresco by Ernest Biéler

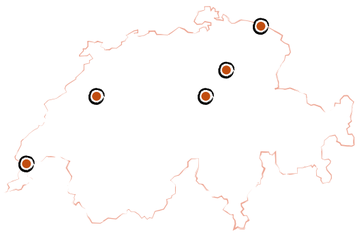
Watch manufacture Zenith | Row of houses in La Chaux-de-Fonds

Watch factories yesterday and today

Favre-Jacot was well able to acknowledge this, to the advantage of all concerned.

The automation of watchmaking paved the way for the mass production of reasonably priced timepieces. As of 1890, Swiss brands began to make a much heralded appearance, assisted by marketing and manufactured in buildings designed with self-advertising in mind. After World War II, the architecture became more function-driven, as illustrated by the Tissot factory in Le Locle. With the crisis of the 1970s that resulted from the competition of foreign quartz and electronic watches, leading to a drastic restructuring of the industry in the 1990s, architecture again responded to the new requirements. Swiss watchmaking know-how and skills being the *sine qua non* of quality, it was only natural to give the manufacturing process the greatest possible physical visibility. A fine example of this new trend in transparency is the Corum factory in La Chaux-de-Fonds with its see-through glass facade. As we see, the architectural trend towards "form follows function" is still very much alive. The high level of education and appreciation of artistic craftsmanship among the local population is fertile ground for a rich cultural life. This was already the case in the 19th century when the Theatre of La Chaux-de-Fonds was built before even the local hospital! The city's fame is not however due exclusively to exceptional watchmaking skills, for indeed it has famous sons in other fields of endeavour. These include the racing driver and pioneer automobile manufacturer Louis Chevrolet, whose name, and a cross not unlike that of his country of origin, still distinguish one of the major brands of the General Motors Corporation. Also born in La Chaux-de-Fonds were the celebrated writer Blaise Cendrars and the architect Le Corbusier. His rational approach to architecture harkens back to the urban landscape of his birthplace with its neat rows of houses. It is here too that he experimented with his first villas.

It is not only the early days of watchmaking in the two cities that is the stuff of legends but equally their development as the hub of a flourishing industry. Nothing favoured the rise of two prosperous cities in such an unpromising environment: geographically isolated in a harsh climate, lacking in water resources and other raw materials, and surrounded by agricultural lands of low fertility. Even so, these Jura uplands proved fertile indeed in the hands of the watchmakers. The inhabitants knew how to wrest great value from the few raw materials they imported and to triumph over the many challenges they faced. Their cities are the product of a unique social, technical and industrial symbiosis. UNESCO has listed the two cities as a World Heritage property, unique living examples of organic urban ensembles entirely dedicated to a single industry. They bear witness to an uninterrupted tradition of watchmaking that has achieved worldwide recognition and has been able to withstand the crises of today's world, economic and socio-technical.



How can we understand the past in the absence of written sources? As far back as 1828, the Bernese art patron Franz Sigmund von Wagner saw this lack of documentation as an opportunity to "let the bowels of the earth speak". Unfortunately, in many cases these “bowels” no longer exist or are in a poor condition. The Alpine wetlands are an exception. Remains of human activity found in Alpine lakes, swamps and marshes are unparalleled sources of information on the settlements, culture, economy and environment of the first agricultural communities that lived in Europe between 5000 and 800 BC. The discovery by Zurich historian Ferdinand Keller of pile dwellings some 150 years ago attracted worldwide attention. Several other sites were brought to light in Switzerland, triggering popular enthusiasm.

The recently founded Confederation welcomed these findings as evidence that the different Swiss language groups shared a common cultural origin and used this as a means to strengthen national identity. Recent research has disproved this theory, distinguishing some 30 different cultural groups. Some 937 pile dwelling sites have been registered to date in Austria, France, Germany, Italy, Slovenia and Switzerland. In 2011, 111 of these sites were inscribed in the World Heritage List. 56 are located in Switzerland (see page 142).

The first traces of agriculture are to be found in the Middle East. Around 8,000 years ago, a sedentary lifestyle, pottery-making, sowing and harvesting of plants, and animal husbandry gradually reached Central Europe via the Danube and the Mediterranean. The first wetland settlements by the lakes at the foothills of the Italian Alps appeared about 1,000 years later. The oldest pile dwellings north of the Alps, dating to 4300 BC, have been excavated in Egolzwil in the canton of Lucerne.

Because the lake levels fluctuated, villagers left their pile dwellings when the water rose. They settled elsewhere and, over time, deposits would cover the abandoned village. But when the water receded and suitable locations were available again, they would go back and build a new village. As a result, in some places the remains of up to 25 settlements have been found on top of each other. Since pile dwellings were invariably made of wood, they are ideally suited for dendrochronological dating, also known as tree-ring dating. This method reads annual tree-trunk rings like a bar code and compares them with reference chronologies. It provides the most accurate data on the year the tree was felled as well as on the environment and climate changes it experienced. Studies of various construction stages have shown that wetland settlements existed only in certain periods. Today, analyses of the beryllium levels in Greenland's ice sheet explain this discontinuity. During periods of increased solar activity, characterised by low beryllium levels, the climate became warmer, lake and groundwater levels dropped, and lakebeds dried out, enabling people to resettle. The years in which trees were felled to build pile dwellings are consistent with low beryllium levels.

How did pile dwellers cope with these climate fluctuations? During the first cold phase between 3700 and 3500 BC, called Piora I, they changed their eating habits, as is evident from the skeletal remains. They now had to hunt and fish to meet most of their calorie requirements, whereas before and after Piora I the meat of domesticated animals made a much greater contribution to their diet. During longer cold phases, such as the Löbben period between 1900 and 1300 BC, the pile

Dress ornaments, bonze pins, Lake Neuchâtel

Metal finds, between Lake Zurich and Obersee | Wooden vessels, Niederwil-Egelsee (TG)

dwellers abandoned their lakeside settlements and retreated inland.

During the almost 4,000-year history of pile-dwellings in Switzerland, there was a remarkable variety of constructions and settlements. Dwellings were built at ground level or raised above the ground. Some villages were arranged into clusters, other had rows of houses lining one or several streets. Sometimes, farmers also built access paths and defensive palisades, such as those of Sutz-Lattrigen on Lake Biel, which date to 3205 BC.

The first pile dwellers had no knowledge of metal; they only used wood and stone tools. This period is therefore called the New Stone Age or Neolithic Age. Even if – from the vantage point of the present – their tools may seem primitive, they were highly inventive and practical people. A new tool was required to build huts: they created the axe. The earliest blades were made of sharpened stone. Naturally curved tree branches or crotches were often used as helves, to make the blades easier to handle. An antler sleeve placed between the helve and the blade helped absorb the recoil of each blow and extended the usable life of the blade. After the invention of metalworking, stone blades were replaced by copper blades and later by bronze blades. Given the importance of axes and shaft-hole axes in prehistoric communities, it is not surprising that these tools were not only used for utilitarian purposes. Some axes had symbolic value, as evidenced by the ceremonial axe of Cham-Eslen, whose helve is enclosed in a fine birch bark with lozenge-shaped carvings.

Fields where wheat, spelt, barley, emmer, poppy, flax and peas were cultivated were originally laid out in clearings in the dense forest. During the Early Neolithic period, farmers used hand-held furrowing sticks to sow seeds, but from 3000 BC, they began to use cattle-

drawn ploughs. Special knives and sickles with blades made of flint, and later of metal, were used for harvesting.

Because their livelihood was based on subsistence agriculture, farmers obtained most of their resources from their immediate environment. The birch tree, for example, served multiple purposes. Its bark was used not only to decorate the ceremonial axe mentioned above, but also earthenware vessels. Bark pitch was used as a glue. Oak and lime bast fibres were used to make shoes, hats, clothes and ropes, and flax to make fabrics.

Dugout canoes were the pile dwellers' first means of transport. But soon they were also using ox-drawn sledges to convey goods on land. Around 3400 BC, that is to say 900 years before the Great Pyramid of Cheops was built, our farmers invented the wheel and the cart. Some of the oldest wheels and carts in the world have been found in pile dwelling sites. Although theirs was a subsistence economy, pile dwellers obtained some raw materials from considerable distances. For example, because of their superior quality, some flints came from deposits located hundreds of kilometres away. The Alpine foothills were not a self-enclosed region. On the contrary, they were at the crossroads of several cultures. Pottery finds in different styles are evidence of a

Axe, Auvernier-Nord | Wooden wheel, Saint Blaise – Bains des Dames

multiplicity of contacts and zones of influence. Two cultural groups can be cited by way of illustration. From the mid-39th century BC, the Cortaillod culture, named after the municipality where the first remains were discovered, extended all the way from Lake Neuchâtel to the lakes of Zurich and Pfäffikon. It evolved seamlessly from the Egolzwil culture. The Cortaillod culture, with its characteristic round-based pottery, was replaced some 100 years later by the Pfyn culture and its flat-based pottery, which spread as far as Central Switzerland. The Alps were crossed very early, nearly 7,000 years ago. Artefacts dating to 4800–4300 BC have been found at Schnidejoch, west of the Lötschen Pass. They are more than 1,000 years older than Ötzi, the South Tyrolean glacier mummy whose discovery caused a sensation in 1991.

Metalworking was a crucial development in human history. The people of the Pfyn culture in eastern Switzerland used copper as early as 3800 BC. Their copper-working skills had come from south-east Europe. In western Switzerland, copper was first worked 900 years later, as a result of influences from southern France and northern Italy. From 2200 BC onwards, tools, weapons and jewellery began to be made of bronze. Bronze, an alloy of copper and tin, caused social changes by

Wooden ladle in situ. Meilen – Obermeilen Rorenhaab | Diver

Fish trap , Zurich – Alpenquai | Base of a pile, Zurich – Alpenquai | Taucher, Stansstad – Kehrsiten

deepening the division of labour and creating more strictly demarcated hierarchies. But social differentiation already existed during the Neolithic Age. Remnants reveal that there were two economic groups in the settlement Arbon–Bleiche 3, on the shore of Lake Constance. Whereas the people living near the lake ate mainly pork and open-water fish, the inhabitants of the landward dwellings ate mainly beef and fish caught close to the shore. Graves generally provide the clearest indication of social stratification. But because burial grounds are rarely found on pile dwelling sites, archaeologists rely on evidence from contemporaneous burial sites in the hinterland. In the 5th and 4th millennium BC, people buried their dead in coffins made of stone or wood. In the 3rd millennium BC, the departed were laid to rest in dolmens, and in the late Bronze Age (from 1200 BC) they were cremated. Beliefs and cultic practices were closely related to burial rites. Evidence for this are the menhir sites in Yverdon and Lutry as well as the stone pillar with a human face in Bevaix Treytel-A Sugiez. Amulets and cup-marked stones are also likely to have been connected to religious activities.

The late Bronze Age was a flourishing period for pile-dwelling settlements. The settlements grew in size and the villages remained in the same location for longer periods, in some cases up to 100 years. Numerous amber and glass beads, finely decorated ceramics, elaborately crafted clothes pins and engraved bracelets have been found, indicating an increase in wealth. All this came to an abrupt end as a result of a cold phase that began in 850 BC.

Thanks to the preservative properties of wetland soils and to scientific research, the "bowels of the earth" have yielded an extraordinary wealth of information about prehistoric populations. These archaeological sites must be protected for they have certainly not yet revealed all their secrets. They are not easy to visit because they are often lying at the bottom of lakes or buried underground. The most significant archaeological finds can however be seen in museums and parks. Guided tours of excavations are organised and the application *Palafittes Guide* is free of charge.





Sickles, Egolzwil 3 | Menhir, Bevaix-Treytel- A Sugiez | Flint daggers, Lake Neuchâtel | Bronze bracelets, Lake Neuchâtel

Bevaix, lake Neuchâtel

Prehistoric Pile Dwellings around the Alps. 111 sites in Austria, France, Germany, Italy, Slovenia and Switzerland are included on the World Heritage List. www.palafittes.org

THE 56 PILE DWELLING SITES IN SWITZERLAND

Canton of Aargau

CH-AG-01, Beinwil am See–Ägelmoos
CH-AG-02, Seengen–Riesi

Canton of Berne

CH-BE-01, Biel-Vingelz–Hafen
CH-BE-02, Lüschez–Dorfstation
CH-BE-05, Seedorf–Lobsigensee
CH-BE-06, Sutz-Lattrigen–Rütte
CH-BE-07, Twann–Bahnhof
CH-BE-08, Vinelz–Strandboden

Canton of Fribourg

CH-FR-02, Gletterens–Les Grèves
CH-FR-03, Greng–Spitz
CH-FR-04, Haut-Vully–Môtier I
CH-FR-05, Murten–Segelboothafen
CH-FR-07, Noréaz–Praz des Gueux

Canton of Geneva

CH-GE-01, Collonge-Bellerive–Bellerive I
CH-GE-02, Corsier–Corsier-Port
CH-GE-03, Versoix–Versoix-Bourg

Canton of Lucerne

CH-LU-01, Egolzwil 3
CH-LU-03, Hitzkirch–Seematte
CH-LU-06, Sursee–Halbinsel

Canton of Neuchâtel

CH-NE-01, Saint-Aubin–Sauges–Port-Conty
CH-NE-02, Gorgier–Les Argilliez
CH-NE-04, Bevaix–L'Abbaye 2
CH-NE-06, Auvernier–La Saunerie
CH-NE-07, Auvernier–Les Graviers

Canton of Nidwalden

CH-NW-01, Stansstad–Kehrsiten

Canton of St Gall

CH-SG-01, Rapperswil-Jona / Hombrechtikon–Feldbach
CH-SG-02, Rapperswil-Jona–Technikum

Canton of Schaffhausen

CH-SH-01, Thayngen–Weier I-III

Canton of Solothurn

CH-SO-01, Aeschi SO–Burgäschisee Ost
CH-SO-02, Inkwil BE/Bolken SO–Inkwilersee Insel

Canton of Schwyz

CH-SZ-01, Freienbach–Hurden Rosshorn
CH-SZ-02, Freienbach–Hurden Seefeld

Canton of Thurgau

CH-TG-01, Arbon–Bleiche 2-3
CH-TG-03, Eschenz–Insel Werd
CH-TG-04, Gachnang-Niederwil–Egelsee
CH-TG-05, Hüttwilen-Uerschhausen–Nussbaumersee

Canton of Vaud

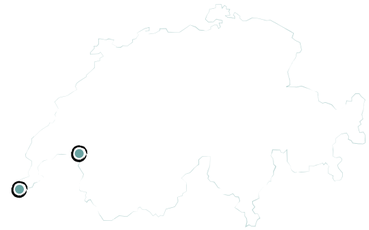
CH-VD-02, Chabrey–Pointe de Montbec I
CH-VD-03, Chevroux–La Bessime
CH-VD-04, Chevroux–Village
CH-VD-05, Corcelles-près-Concise–Stations de Concise
CH-VD-10, Grandson–Corcelettes Les Violes
CH-VD-11, Morges–Les Roseaux
CH-VD-12, Morges–Stations de Morges
CH-VD-13, Mur–Chenevières de Guévaux I
CH-VD-15, Yverdon–Baie de Clendy
CH-VD-16, Yvonand–Le Marais

Canton of Zug

CH-ZG-04, Zug–Otterswil/Insel Eielen
CH-ZG-05, Zug–Riedmatt
CH-ZG-06, Zug–Sumpf

Canton of Zurich

CH-ZH-01, Erlenbach–Winkel
CH-ZH-02, Greifensee–Storen/Wildsberg
CH-ZH-06, Meilen–Rorenhaab
CH-ZH-07, Wädenswil–Vorder Au
CH-ZH-08, Wetzikon–Robenhausen
CH-ZH-09, Zurich–Enge Alpenquai
CH-ZH-10, Zurich–Grosse Stadt Kleiner Hafner



The Modern Movement was for architecture what cubism was in painting – it approached the world from a fresh angle, challenging long-established practices. No wonder it met with a certain resistance. “Will the tenants still be happy to be here in twenty years?” was the awkward question put to Le Corbusier when he was trying to raise a second mortgage for the Clarté apartment block in Geneva. Eighty years on, none of the building’s apartments stand empty. One photo of the newly finished building with a car parked out front illustrates just how ahead of its time the building was: the car is a vintage model, while the building is the very embodiment of modernity.

La Petite Villa au bord du lac Léman

It is the remarkable way in which Le Corbusier's architecture responds to fundamental debates in the 20th century society and architecture that makes it so emblematic of the Modern Movement. The buildings that emerged in the course of what the architect termed his 'patient research' over the decades between 1910 and 1960 had an unprecedented influence on architectural practice worldwide.

A selection of Le Corbusier's works now deservedly features on UNESCO's World Heritage list. The transnational serial property is comprised of a series of works by the French-Swiss dual national, who was born in 1887 in La Chaux-de-Fonds in Switzerland and died in 1965 in Roquebrune-Cap-Martin on the Côte d'Azur.

What were the criteria for selecting the listed works? The 17 works (listed at the end of the document) span three regions of the world. They were chosen from among the 65 buildings designed by Le Corbusier in four continents. Together, the buildings illustrate four characteristics of the architecture of the Modern Movement, which Le Corbusier spearheaded: they sparked debate, developed a new architectural language, contributed to the invention of new techniques and responded to the needs of society and the challenges of modern living. Two of the 17 listed buildings are in Switzerland: Petite villa au bord du lac Léman in Corseaux and the Clarté building in Geneva.

Petite Villa au bord du lac Léman

In 1917, the architect born Charles-Edouard Jeanneret moved to Paris, where he assumed the pseudonym 'Le Corbusier' after his mother's great-grandfather who had been called Lecorbésier. There he met the painter Amédée Ozenfant, who introduced him to purism, an artistic trend which prioritised simplicity of form. Le Corbusier subsequently sought to apply purism in architecture; his villa on the shore of Lake Geneva is part of this purist project.

"Petite Villa au bord du lac Léman", as Le Corbusier referred to it, was the second house he had designed for his parents. His 'Maison blanche' in La Chaux-de-Fonds had proven too costly to maintain. After it was sold in 1919, his parents could only afford to buy a cheaper plot of land. In 1923 a rectangular 358m2 plot became available on the shore of Lake Geneva. Sandwiched between the lake and the Route de Lavaux, then known as 'Chemin Bergère' and resting on backfilled material, the site was by no means ideal for the building of a villa. Le Corbusier nevertheless made use of the land to create an authentic work of art with a surface area of 64m2: truly a compact 'machine for living' – the archetype of the minimalist house.

The house is a single-span construction 20.5m long and 4.5m wide which follows the line of the terrain. The residence has walls on three sides. Le Corbusier made use of inexpensive materials to clad the façades; the north-facing wall with the entrance uses zinc sheeting, and the side of the house facing the lake features aluminium sheeting arranged in horizontal rows. He thus intended to protect the residence from the elements and above all to disguise the cracks at foundation level. The self-draining roof terrace was so resolutely different that Vevey's municipal council proclaimed it a crime against nature, to discourage people from copying the idea.

The north-facing façade | Lobby and living room

The south-east side of the grounds features a fourth wall with a window which frames a grandiose view of the lake and the contours of the Valais. Branches of a paulownia tree originally formed a roof over this space, which Le Corbusier named the 'salle de verdure' and which brought the inside and outside spaces together. The architect later went on to use this landscape window idea in his Villa Savoye.

Inside the villa, the layout follows an ergonomic, functional design. On walking into the house, the visitor embarks on a sort of 'architectural promenade', entering through a hallway where a door - which might at first glance seem poorly placed - conceals the living room on the left, and actually draws the visitor's gaze to a reception table on which a telephone once had pride of place. Organised in this way, the space constitutes a lobby. It is only when the door is closed that the living room is revealed, sunlight pouring in through the 11m-long window. Walking behind the reception table, it becomes clear that the architect's mother must have used it to store her piano scores. Along the west wall stretch the shelves of a library. A purist painter, Le Corbusier had written to his father that he must not under any circumstances change the colour scheme: brown for the frame, grey for the shelves.

Parents' bedroom (paintings: exhibition by Adrien Couvrat, 2017) | Bathroom | Guest bedroom | "La Fruitière"

A sliding partition opens into a small sitting room which doubled as a guest room. It was here that the architect's brother Albert slept from time to time. This multiple use of space is a concept which was to reappear in Le Corbusier's work years later with the Unité d'habitation design in Marseille, in which guest bedrooms have made way for a hotel integrated into the building. A second door gives access to a covered entrance hall and to the garden.

From the living room the space opens seamlessly onto the parents' bedroom, extending from which are a bathroom and a storage space. The kitchen, utility room and boiler room are to the right of the entrance. At the back a stairway leads to a bedroom which Le Corbusier had intended for his wife and himself, and which he called 'La Fruitière'. Another flight of stairs leads to the cellar.

Le Corbusier was not reputed to be overly concerned with improving his own buildings. He did not want to hear about the structural problems of his Villa Savoye, for example. However, the small villa in Corseaux received preferential treatment. Out of consideration for his parents, he tried to resolve the problems they encountered. To improve the insulation of the roof terrace, he had a layer of earth added to absorb the heat. He also thought to clad the building as mentioned above, and even included a look-out post for his mother's fox terrier in the form of an opening in the wall between the house and the road. He spared no effort in securing his parents' approval, especially that of his mother, who favoured his brother Albert.

In addition to La Fruitière, features he built for his own use include a diving board, which he had installed on the wall overlooking the lake and whose fixtures are still visible. "Petite Villa au bord du lac Léman" is one of the creations which provide the most insight into Le Corbusier's personal universe and family environment. It has recently become a museum.

The Clarté building, Geneva

Balconies and stairwells

The Clarté building

Le Corbusier was deeply interested in creating spaces that enabled a balance between the collective and the individual in society. Most of his urban planning schemes and residential housing designs were never built. They generally resulted in works partially based on his designs, like the Terrassière quarter in Geneva. Structured in two sections, the Clarté building was built between 1931 and 1932 to create 50 rental apartments.

The entrepreneur Edmond Wanner commissioned Le Corbusier and Pierre Jeanneret, his cousin, to develop the plans. The building used dry construction or 'montage à sec' and was a forerunner in the application of prefabrication, standardisation and industrialisation in the building of apartments. It is rectangular in shape with two longitudinal façades featuring windows that run the length of the building, letting in a maximum of light and earning the building its name 'Clarté'.

The façades have three rows of balconies which lend rhythm to the nine-story composition and offer shade to the apartments on the lower levels while protecting the façades. The balconies' alignment is accentuated by brightly coloured canvas sunshades, while the windows have rolling shutters made of wood.

The rows of balconies positioned on alternate levels on the north and south faces of the building provide each of the large duplex apartments with a viewing gallery. In this way, Le Corbusier was able to implement his concept of 'l'Immeuble-Villas'.

The ninth floor hosts two loft studios and the vaulted glass windows which let light into the stairwells. A sun deck occupies the remaining space. On the ground floor of the north façade two large porch structures mark the entrances through glazed doors which open into a great entrance hall. The ground floor is on two levels: the entrance area and a raised level with terrace gardens.

In 1927, Le Corbusier had published his famous Cinq Points d'une Architecture Nouvelle [Five Points for a New Architecture], which comprised what he termed 'pilotis' in reference to ancient pile dwellings, roof terraces, open-plan design, a ribbon window and a façade design which reflects freedom from structural constraints. The Clarté building features four of these five characteristics: the structure does rest on pillars, but since the building's façades reach the ground, there is no space beneath the construction, unlike the Villa Savoye, for example. The technique of arc welding was used to create the metal structure – a first at the time in the construction of a residential building. This constituted the supporting structure for the whole building, freeing up the façades and the interior walls while greatly facilitating the layout of different types of apartments.

In the interior design of their apartment, residents were allowed to choose from a catalogue of wallpaper by the company Salubra. However, a single model of curtain was imposed on them and inside all of the apartments the uniform polychromatic colour scheme was limited to dark brown and light blue. In the communal areas, these carefully studied nuances were designed to highlight the proportions of the space while correcting or accentuating the fall of light. The exterior surfaces were painted in 'vert wagon', the green typically used on tramcars at the time. On the ground floor are spaces reserved for shared utilities such as heating, laundry, bicycle storage and the rooms of the concierge and individual garages.

Unlike other residential buildings, the Clarté building does not have internal corridors ('rues intérieures'). Instead, two large colourful stairwells/lift shafts serve as skylights. Comprised of metal rods, the lighting system in these shafts is designed like the whole building to be rational and functional: the rods are suspended on a system of rails and can be pulled towards each landing in order to facilitate the change of spent light bulbs. The glass blocks which pave the steps and the floor of each level increase the luminosity of the stairwells and further accentuate the shine of the railings and metal protection grids. The Clarté building was initially built with upper middle class tenants in mind.

The building's current appearance is the result of the large-scale and highly successful renovation carried out between 2007 and 2011. More than 80 years after it was first erected, this avant-garde building which received so much criticism at the time remains an emblem of the Modern Movement, which has shaped architecture the world over.

"Petite Villa au bord du Lac Léman", Guest room | Interior views

CHRONOLOGICAL LIST OF THE ELEMENTS OF THE SERIES

1923	Maisons La Roche et Jeanneret, Paris	Île-de-France	France
1923	Petite villa au bord du lac Léman, Corseaux	Vaud	Switzerland
1924	Cité Frugès, Pessac	Aquitaine	France
1926	Maison Guiette, Anvers	Flanders	Belgium
1927	Houses of the Weissenhof-Siedlung, Stuttgart	Baden-Württemberg	Germany
1928	Villa Savoye et loge du jardinier, Poissy	Île-de-France	France
1930	Immeuble Clarté	Geneva	Switzerland
1931	Immeuble locatif à la Porte Molitor, Boulogne-Billancourt	Île-de-France	France
1945	Unité d'habitation, Marseille	Provence-Alpes-Côte d'Azur	France
1946	Manufacture à Saint-Dié, Saint-Dié-des-Vosges	Lorraine	France
1949	House of doctor Curutchet, La Plata	Buenos Aires Province	Argentina
1950	Chapelle Notre-Dame-du-Haut, Ronchamp	Franche-Comté	France
1951	Cabanon de Le Corbusier, Roquebrune-Cap-Martin	Provence-Alpes-Côte d'Azur	France
1952	The Capitol Complex, Chandigarh	Punjab	India
1953	Couvent Sainte-Marie-de-la-Tourette, Éveux	Rhône-Alpes	France
1955	National Museum of Western Art, Taito-Ku	Tokyo	Japan
1965	Maison de la Culture de Firminy, Firminy	Rhône-Alpes	France





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Lavaux, Vineyard Terraces
Emmanuel Estoppey

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