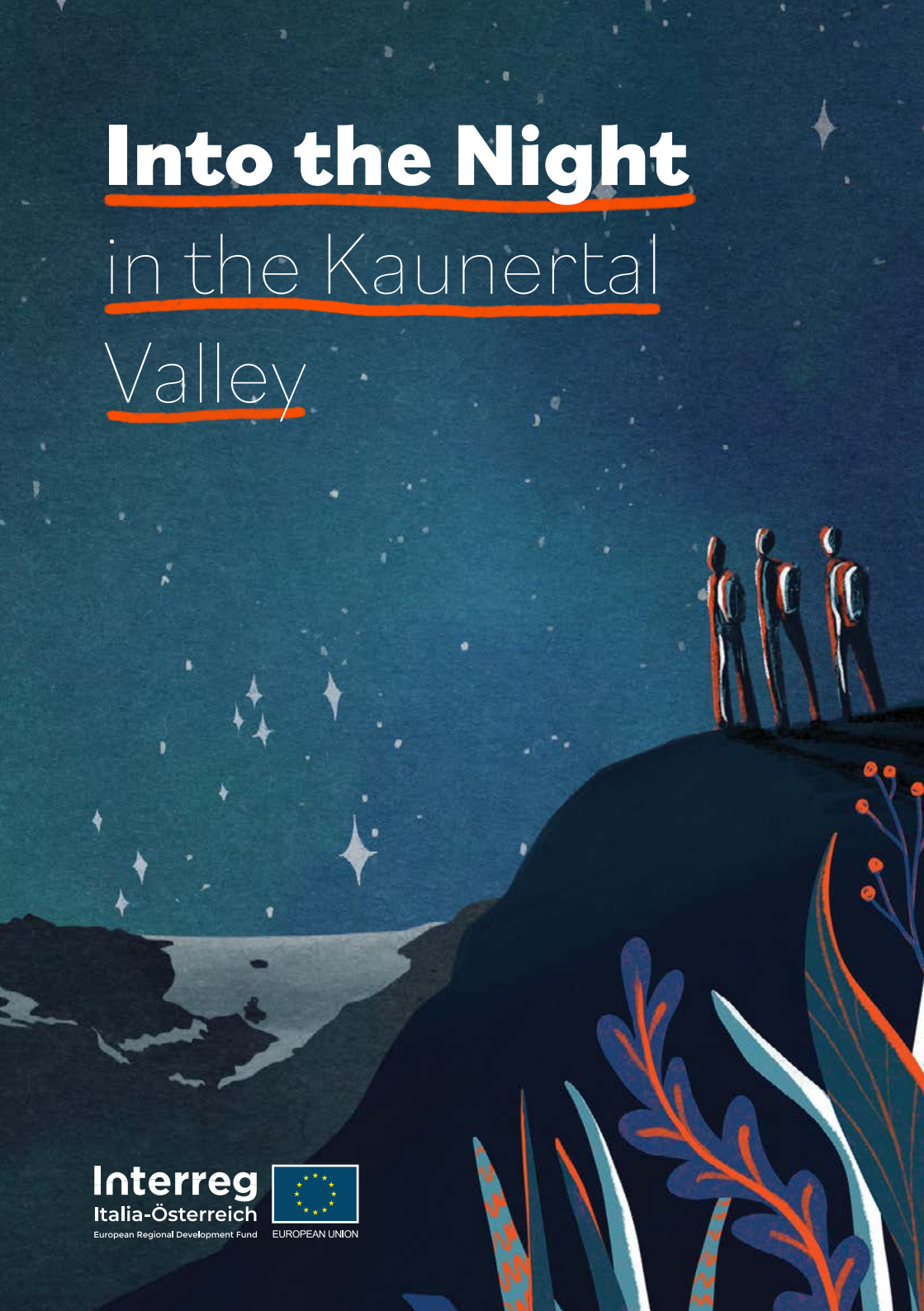
Into the Night

in the Kaunertal Valley



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“The nitrogen in our DNA, the calcium in our teeth, the iron in our blood, the carbon in our apple pies were made in the interiors of collapsing stars. We are made of starstuff.”

- Carl Sagan, **Cosmos**

"Night is much more than just the absence of light. In its composition and its beauty, it is independent and at the same time inextricably linked to the events of the day."

- Ernst Partl, **Managing Director of Kaunergrat Nature Park**

Switch off, forget about your worries, and become entranced with the beauty of the starry sky above. On a lush Alpine meadow, nestled in a verdant forest of stone pines against the backdrop of the Gepatschhaus mountain hut at 2000 metres above sea level, listen to the lull of the babbling of the brook, sit back and relax.

- Christian Kalsberger, **Mayor of the Municipality of Kaunertal**

WELCOMING ADDRESS

MICHAELA GASSER, MANAGING DIRECTOR OF THE TIROLER OBERLAND - KAUNERTAL TOURISM ASSOCIATION

Slowly but surely we are blinding ourselves from the stars. Increasingly, we in the Kaunertal valley are devoting ourselves to the issue of light pollution. It is important, not only for biodiversity, but also for our own biorhythms, to let the night take effect and to withdraw from artificial light. Over the past few years, we have dedicated ourselves to a sustainable approach that is geared to the future – proving that the tourism sector is also committed to adapting to climate change and the goals of sustainability. Thanks to the efforts of the Tyrolean Environmental Ombudsoffice, the “plight with light” in the Kaunertal Nature Park and Glacier Region is also being addressed. Here, in one of the darkest places in Austria, I invite you to marvel at the starry sky above.

WELCOMING ADDRESS

JOHANNES KOSTENZER, TYROLEAN ENVIRONMENTAL OMBUDSMAN

Our environment makes us who we are. It contributes to how we feel and how we relate to the world around us. Physically speaking, we were created from stardust and when we look up at the starry sky, we can visualise where we came from. This is one of the reasons why the Tyrolean Environmental Ombudsoffice is so concerned about preserving the natural beauty of the night and an unobstructed view of the starry sky, because it allows us to recognise ourselves, to look back into our history and to intensively experience our connection to the world around us.

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Your guide to the captivating beauty of the night landscape!

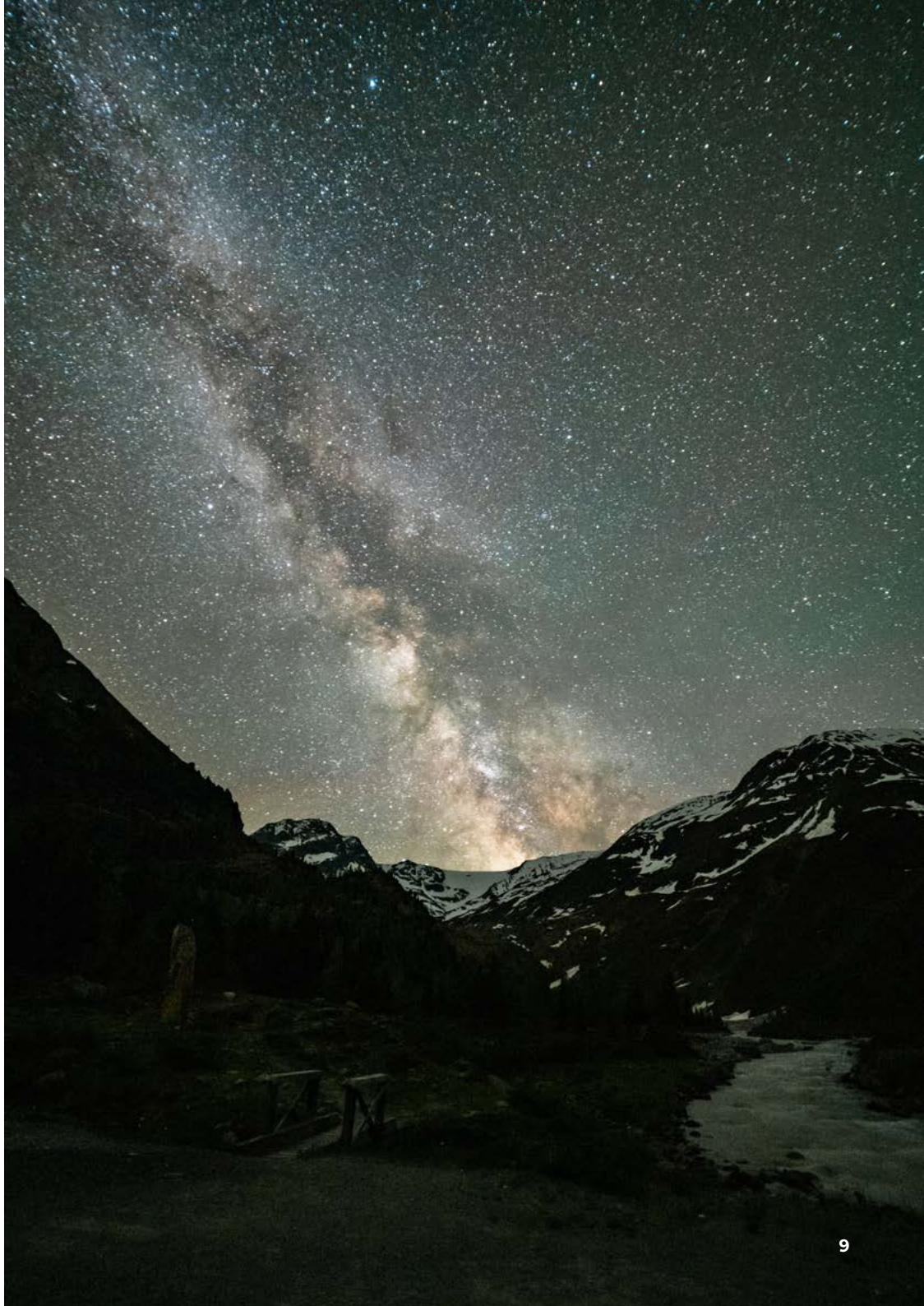
Life on Planet Earth has been shaped by the rhythm of daylight and dark night since its formation. However, being able to experience an unspoilt night in Central Europe with countless visible stars is no longer a matter of course.

Since the invention of electric light, nights have become brighter and brighter. Artificial light in outdoor spaces tends to unintentionally illuminate the surrounding area and even the night sky. In many parts of the world, it is therefore no longer truly dark at night and the stars remain hidden from view.

Due to its geographical location, low population density and the efforts of locals, local institutions, businesses and the municipal administration, you can experience an unspoilt night landscape in the Kaunertal valley that is minimally affected by diffuse reflection!

This book is your guide to the extraordinary power of darkness. Here you will find information and stories about the universe, the starry sky, and life at night. You will also receive tips and advice to help you organise your very own night-time experience, as well as information about night-time events and offers taking place in the valley.

Embrace the magic and join us on a journey through fascinating night landscapes!



The Kaunertal valley: Unique, Day and Night

The Kaunertal valley, which early travellers described as a wild and romantically beautiful gem, is the westernmost valley of the Ötztal Alps in the heart of the Central Alps. It comprises traditionally cultivated landscapes and unspoilt nature spanning over 2,600 metres in altitude.

The Kaunertal valley is also home to the Gepatschferner, the second largest glacier in Austria. The valley, which was carved by the ice age, features a diverse landscape and a special inner-Alpine climate. The valley is also home to many different animal and plant species.

Sheltered by the surrounding mountains with numerous three-thousand metre peaks, visitors to the Kaunertal valley can experience another special feature: unspoilt nights that are minimally affected by diffuse reflection.

Around 83% of the world's population live beneath an artificially brightened sky and recognise only a few of the very brightest stars. In the Kaunertal valley, on the other hand, you can behold an overwhelming six thousand stars and even the Milky Way throughout the year. On a single night, up to 3000 stars can be seen in good conditions. By way of comparison, seeing 100 stars in the city of Innsbruck would be considered a successful evening of stargazing.

Best of all, nature flourishes in the Kaunertal valley as day and night naturally alternate. It acts as ideal habitat and retreat for creatures that depend on darkness.

Animals and plants are not the only ones who have a deep physiological need for darkness! For human beings, darkness is our window to the stars. If we close the door by overusing light, we also lose our connection to the universe, and ultimately our connection to our primordial roots. In the Kaunertal valley, protected by the mountains, this window opens up for us.

The Roman scholar Lucius Annaeus Seneca once stated: "If the stars were visible from only one place on Earth, people would never cease to travel there to see them."

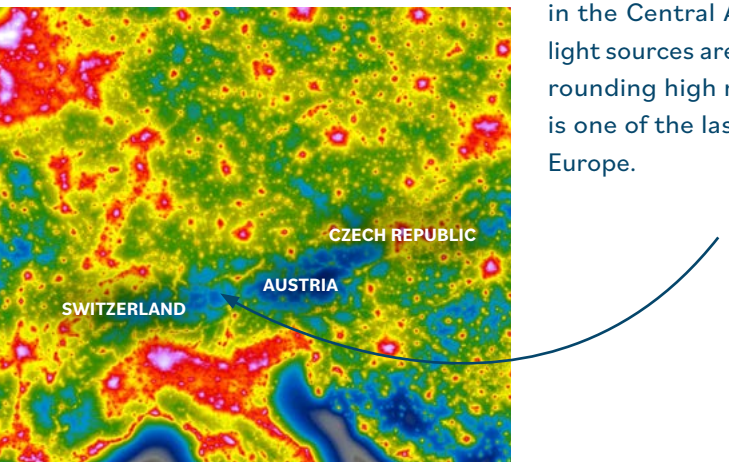
Darkness: A Novel Quality

Central Europe is densely populated and therefore brightly illuminated at night. Excessive light emissions lead to light pollution, which is an unwanted side effect of the artificial brightening of the night sky.

The Alps are still considered one of the darkest areas in Europe, but even here, artificial lighting increasingly illuminates the outdoor environment at night.

The worldwide distribution of light pollution can be viewed using satellite data via the interactive map at www.lightpollutionmap.info, a project by scientist Jurji Stare. The Kaunertal valley is coloured dark blue in the "World Atlas 2015" and is thus one of the valleys least affected by light pollution in Central Europe. Surrounding cities in Italy have red colour scaling to indicate strong light emissions.

The location of the Kaunertal valley in the Central Alps means that the light sources are shielded by the surrounding high mountains. The area is one of the last truly dark areas in Europe.



Jurij Stare, www.lightpollutionmap.info (V 2.8.1)

International Dark Sky Association

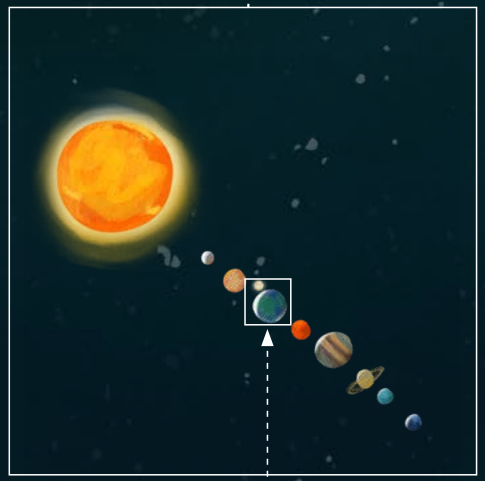
The International Dark-Sky Association (IDA) is committed to protecting the dark night sky and preserving it for future generations. It presents special awards to places that still have unspoilt dark night skies and those that strive to do so.

Among the IDA's fields of activity is the designation of International Dark Sky Places (IDSP). To achieve this status, regions must undergo a rigorous application process. The quality of the night sky, as well as efforts to preserve it and measures to reduce light pollution, are assessed. Ongoing monitoring of sky quality ensures that requirements are met over time.

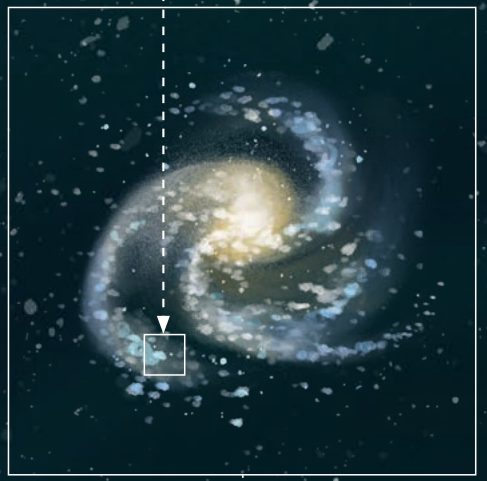
Kaunertal is the first municipality in Austria to pursue "Dark Sky Community" status. Thanks to the joint commitment of the public and private sectors, undesirable, negative effects of artificial light in outdoor spaces are kept to a minimum.

Your Journey into the Universe Begins Here!

EARTH



SOLAR SYSTEM



GALAXY

THE UNIVERSE

EARTH

We live here on **Earth,** the only inhabited planet known to science. It is surrounded by an **atmosphere**. The nearest light objects in the night sky are artificial such as **satellites**. They are located in the outer region of our atmosphere. Earth's nearest larger neighbour is the **moon**. It is located approx. **one light second** away.

Artificial Objects

Artificial objects, such as satellites and space stations, seem to us to shine brightly in the heavens because they are illuminated by the sun. They also move pretty rapidly across the sky. Unlike airplanes, however, they do not flash. The number of satellites in space is steadily increasing, reaching into the tens of thousands as the satellite network expands.

One of the most famous space stations is the International Space Station (ISS). It is the largest, and currently the only, permanently inhabited man-made object in space. It's roughly circular orbit around the Earth takes approx. 1.5 hours.

LIGHT YEAR, LIGHT MINUTE, LIGHT SECOND

Light year, light minute, light second etc. are units of length commonly used in astronomy.
The meanings of these measurements are as follows:

1 LIGHT SECOND = 300,000 kilometres
(approx. distance from Earth - Moon)

1 LIGHT MINUTE = 18 million kilometres
(half the distance from Earth - Venus)

1 LIGHT YEAR = 9.46 trillion kilometres
(distance from Earth - Andromeda Galaxy multiplied by 2,500,000!)

SOLAR SYSTEM

... in a solar system of **planets** and other celestial bodies, as well as gas particles and dust bodies, all of which are bound by the gravitational attraction to the **sun**. Earth is in "our" solar system.

The sun itself is a star, of which there are an unimaginable number in the solar systems, galaxies and the universe. Researchers estimate that there are about 300 billion suns in our galaxy.

Earth is one of eight planets orbiting the Sun: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. With the exception of Uranus and Neptune, these planets can be easily seen from Earth with the naked eye.

The planet closest to Earth is Venus. At its closest point to Earth, it is about two light minutes from Earth. The distance between the Earth and the sun is about eight light minutes.

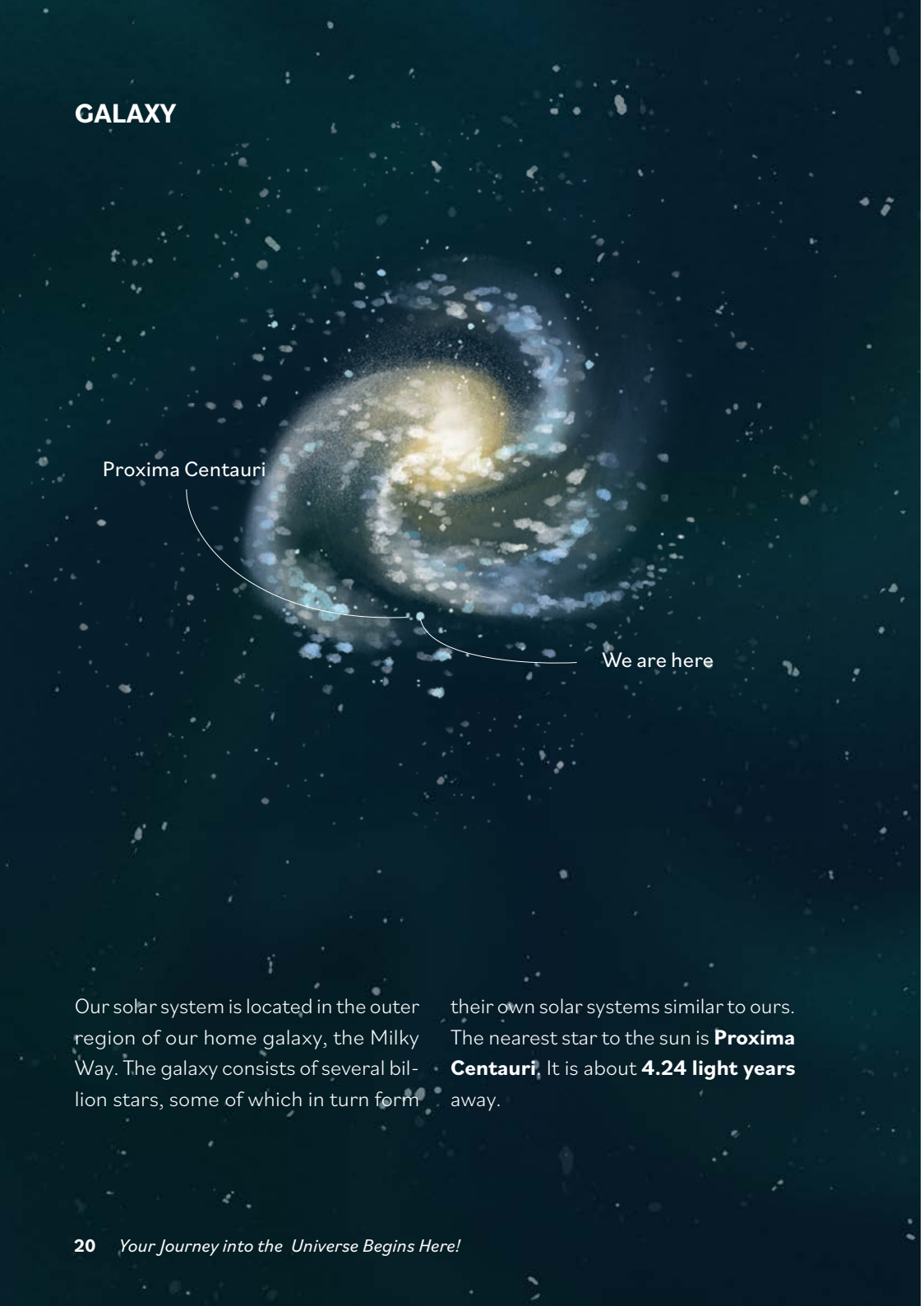
There are also five dwarf planets in our solar system: Ceres, Pluto, Haumea, Makemake, and Eris.

A HELPFUL MNEMONIC!

"**M**y **V**ery **E**ager **M**other **J**ust **S**erved **U**s **N**oodles."

The first letters of the sentence stand for the names and order of the planets to the sun: **M**ercury, **V**enus, **E**arth, **M**ars, **J**upiter, **S**aturn, **U**ranus and **N**eptune.

GALAXY



Our solar system is located in the outer region of our home galaxy, the Milky Way. The galaxy consists of several billion stars, some of which in turn form their own solar systems similar to ours. The nearest star to the sun is **Proxima Centauri**. It is about **4.24 light years** away.

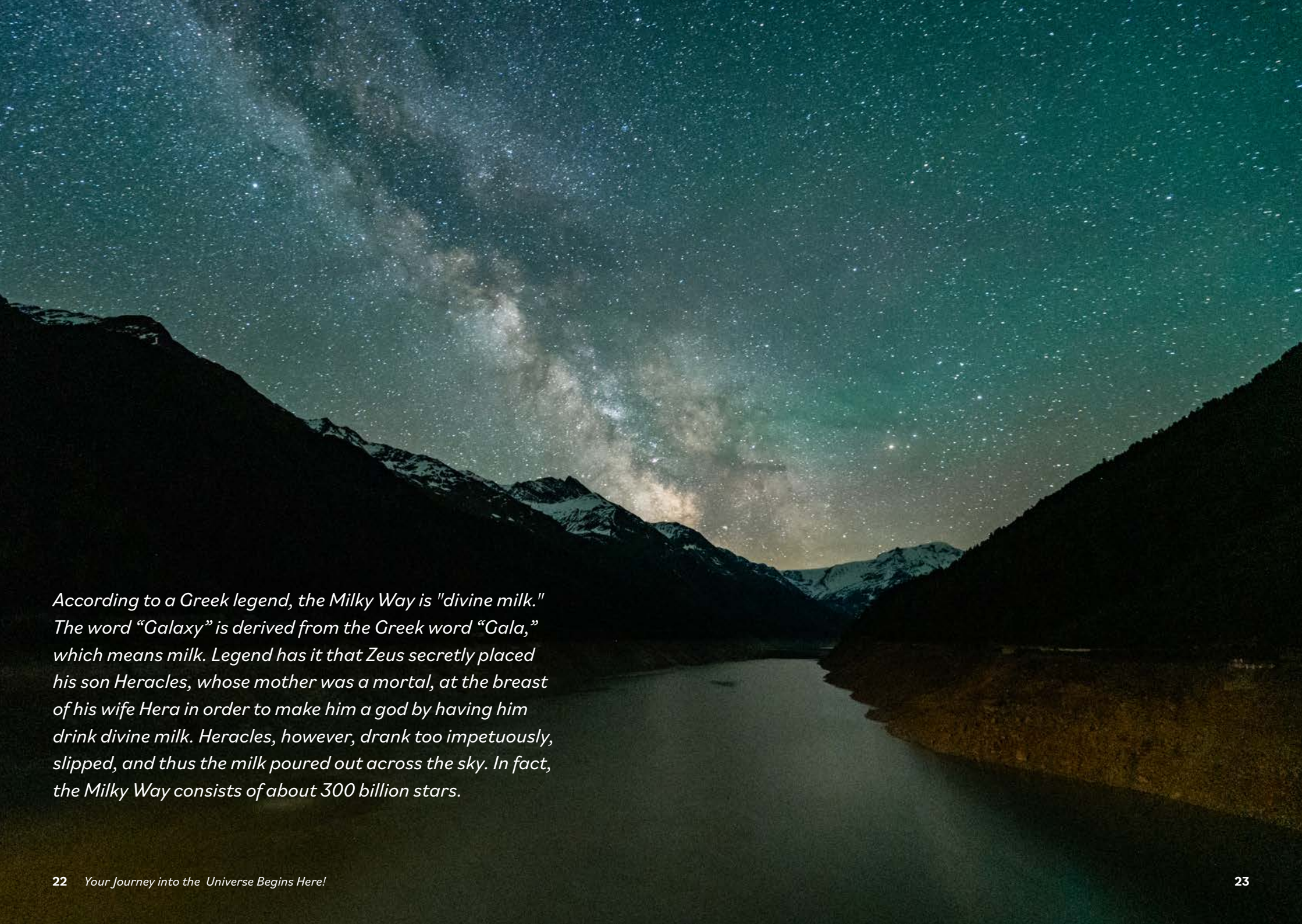
Galaxies consist of collections of stars and other celestial bodies held together by gravity. There are an estimated **1 trillion galaxies** in the universe.

Our **home galaxy** is the **Milky Way**. Within our solar system, we are located at the outer edge of this spiral galaxy.

> *At the rear of the Kaunertal valley, well away from the artificial lighting of the village, you can observe up to six thousand stars and see the Milky Way as a bright, "milky" band in the sky in complete darkness throughout the year. All the stars we can see with the naked eye are part of the Milky Way, i.e. part of our home galaxy.*

In the mid 19th century, Thomas Wright recognised "*That the Milky Way is but an interior view of our cosmic home.*"

He postulated that, were we to observe the Milky Way from the outside, we would perceive it as a flat disc with spiral structures. The shape results from the rotation of the galaxy itself and the resulting centrifugal forces: every 200 million years the galaxy turns once in a full circle. When viewed from Earth, from the “inside," one sees the "cross-section" of the disc as a milky-bright band in the night sky.



According to a Greek legend, the Milky Way is "divine milk." The word “Galaxy” is derived from the Greek word “Gala,” which means milk. Legend has it that Zeus secretly placed his son Heracles, whose mother was a mortal, at the breast of his wife Hera in order to make him a god by having him drink divine milk. Heracles, however, drank too impetuously, slipped, and thus the milk poured out across the sky. In fact, the Milky Way consists of about 300 billion stars.

The Orion Nebula and Running Man Nebula are also part of our home galaxy and are about 1600 light years away. They are not perceptible to the naked eye but can be made visible by means of astro (deep-sky) photography.

THE UNIVERSE

With its many stars and solar systems, our home galaxy lies within a universe containing an estimated trillion other galaxies. The closest galaxy to the Milky Way is the **Andromeda Galaxy**, which is about **2.5 million light years** away. It is one of the few celestial objects outside of our home galaxy that we can see in the night sky without a telescope. Figuratively speaking, it offers a "window" out of our home galaxy and into the universe.

The Origins of the Universe

The following is an explanation of how modern man explains the origins of BEING with the help of scientific models.

In the beginning there was NOTHING.

It all began about **14 billion years** ago. Back then, there was no time, no space and no matter.

Then, suddenly, IT ALL began.

At that time, all space, matter and energy was concentrated, and was even smaller than the mass of a pinhead. When the Big Bang occurred, this extremely hot and infinitely dense mass began to expand at an enormous speed. The universe as we know it, with space, time and matter, was born, at a speed that is unimaginable to us.

In a fraction of a second, the fundamental forces came into being. Matter and antimatter were formed along with the first tiny elementary particles. In the subsequent few minutes, atomic nuclei and the first light atoms were formed: Hydrogen and helium and, in small quantities, also lithium and boron.

It took **380,000 years** to cool the temperature from quadrillions of degrees Celsius to 3000 degrees Celsius. Up until this point it had been dark. The cooling created more and more atoms and the cloudy plasma began to clear. First light reached us from this time. This can still be measured today as background radiation.

The universe slowly continued to expand and cool. The first stars condensed out of the primordial gas due to gravitational pressures. In these first stars, the first heavier elements formed through nuclear fusion in their cores.

When a star dies, its explosion, visible as a “supernova," disperses the atoms formed inside throughout the universe. New generations of stars were formed and with each generation new, heavier elements were created. This is how the matter in our solar system, galaxy, and neighbouring galaxies, and everything we know today, came into being.

This includes the matter in the mountains, streams and glaciers that shape the Kaunertal valley. The iron of the red rocks in the Kaunertal valley was also created inside stars. So too was the matter inside our bodies: we are born from stars.

The Movements of the Earth

During a single year, the Earth orbits the Sun, which lies at the centre of our solar system. This orbit around the sun causes the seasons to take place.

The Earth rotates once around its own axis in almost exactly 24 hours. This rotation results in our familiar day-night rhythm.

On the side facing the sun, the Earth is illuminated by sunlight; it is daytime there. Meanwhile, on the opposite side of the Earth, it is nighttime. In a sense, the Earth creates its own shadows here.

As twilight sets in, the Earth's shadow, or more precisely its penumbra, can be seen rising in the east.

WE ARE MOVING QUICKLY!

One orbit around the sun is about 940 million kilometres.

The Earth covers this distance at a speed of **30 kilometres per second**.

BUT THERE'S NO NEED TO WORRY!

Because the Earth always moves in the same way and at an almost constant speed, we notice nothing.

Stargazing

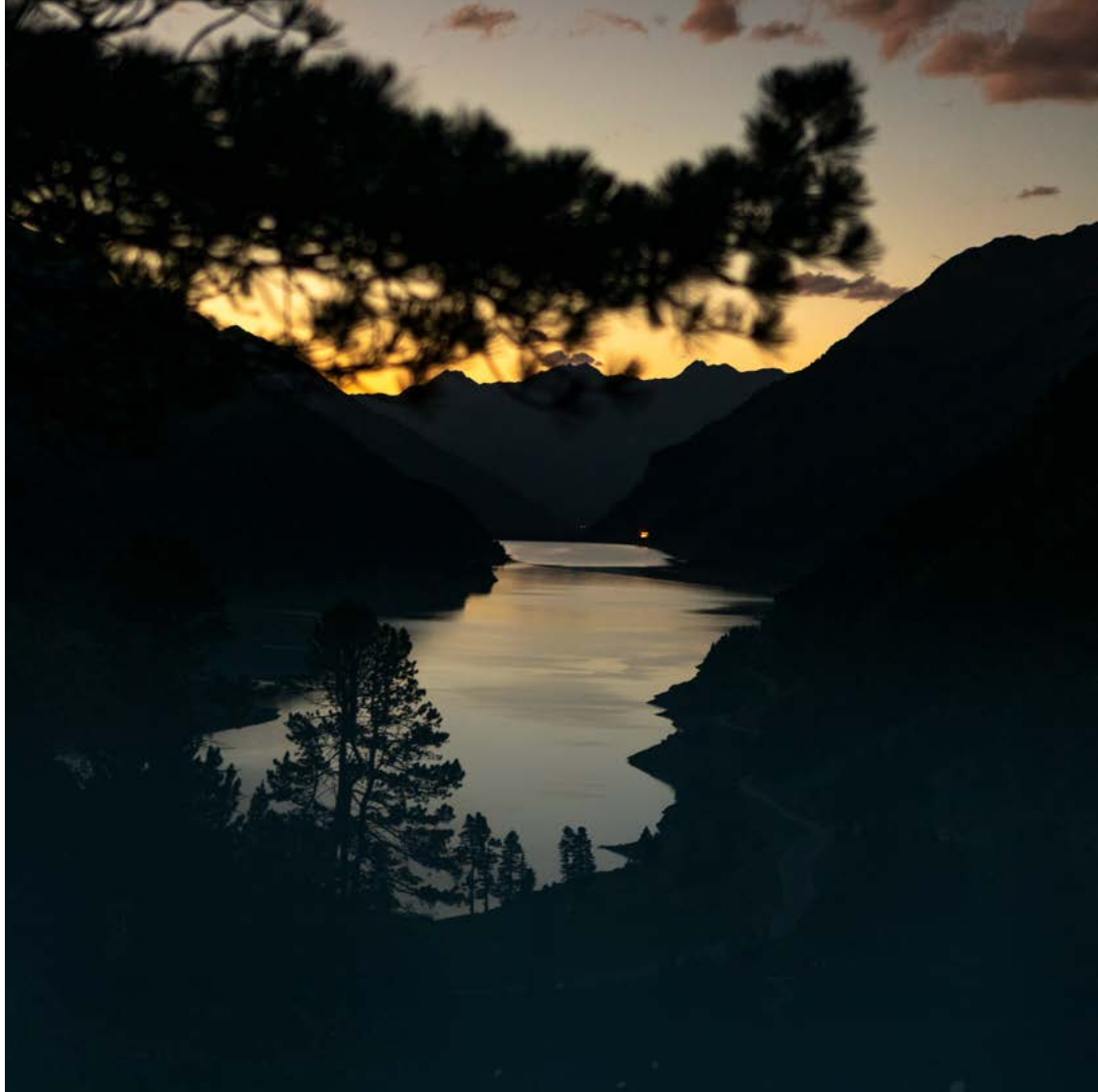
To enjoy stargazing, we need darkness. The less the night sky is affected by artificial lighting, the more stars, and possibly even star clusters and nebulae, will be visible to the naked eye.

The transition from bright day to dark night is called twilight. This is further subdivided into several phases that can be consciously perceived.

PHASES OF TWILIGHT

In the Alpine region,**civil twilight** begins at sunset and lasts about 40 minutes. During this phase, it is still possible to read outdoors without artificial light. Towards the end of this phase, the **first, brightest stars become visible.**

Nautical twilight begins when the centre of the solar disk is 6 degrees below the true horizon. At this point, **first constellations** become recognisable. During this phase, seafarers are already able to spot both the stars necessary for navigation and the horizon at the same time.



Astronomical twilight begins when the centre of the sun is 12 degrees below the true horizon. Slowly, **fainter stars** become visible.

It no longer gets darker when the centre of the sun is 18 degrees below the true horizon. From an astronomical perspective,**true night** has begun.

From this point on, light in the sky is only produced by stars or the moon.

In the morning - before sunrise - these three phases take place again, but this time in reverse order.

Stars Twinkle.
Planets do not!

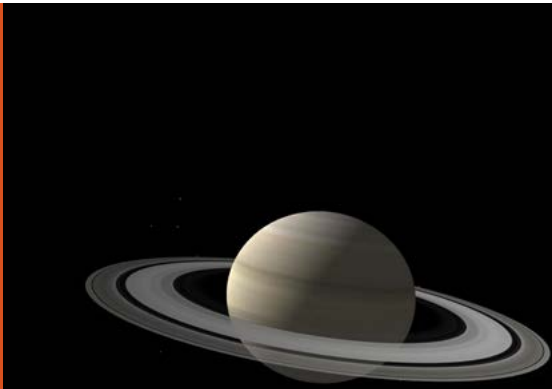
We can readily distinguish stars and planets with the naked eye. Stars themselves shine because of their extremely high temperatures inside. Planets, on the other hand, are illuminated by their suns.

Stars twinkle because the starlight passes through turbulence in the layers of air in the Earth's atmosphere. During this process, the light rays from the point-shaped light sources are deflected, resulting in flickering.

For comparison's sake, the glow of the planets is more uniform because they are much closer to us than stars. Because of their relative proximity, they are also perceived as disk-shaped rather than a single point. Consequently, when looking at planets, a cone-shaped beam of light hits the eye and the many rays of light mutually cancel out any flickering. Thus, the glow of planets appears calm.

SATURN

Saturn is notable for its ring system, which can be viewed well through a telescope! The rings are composed of chunks of ice. The planet itself consists of rock and ice and the atmosphere is mainly made up of hydrogen and helium.



Comets

Comets consist of frozen, volatile substances, such as water or carbon monoxide and dust.

If a comet gets too close to the sun, its volatile substances vaporise and a comet tail is formed.

Comet C7/2020 F3 (NEOWISE) was particularly easy to observe in the Kaunertal valley in spring of 2020.

Shooting Stars

Rock fragments orbiting our sun as asteroids and meteoroids can change their trajectories and enter the Earth's atmosphere. There they burn up and are visible to us as shooting stars.

PERSEID METEOR SHOWER

The Perseids return annually in mid-August.
At this time, a particularly large number of shooting stars can be observed, including from the Kaunertal valley!

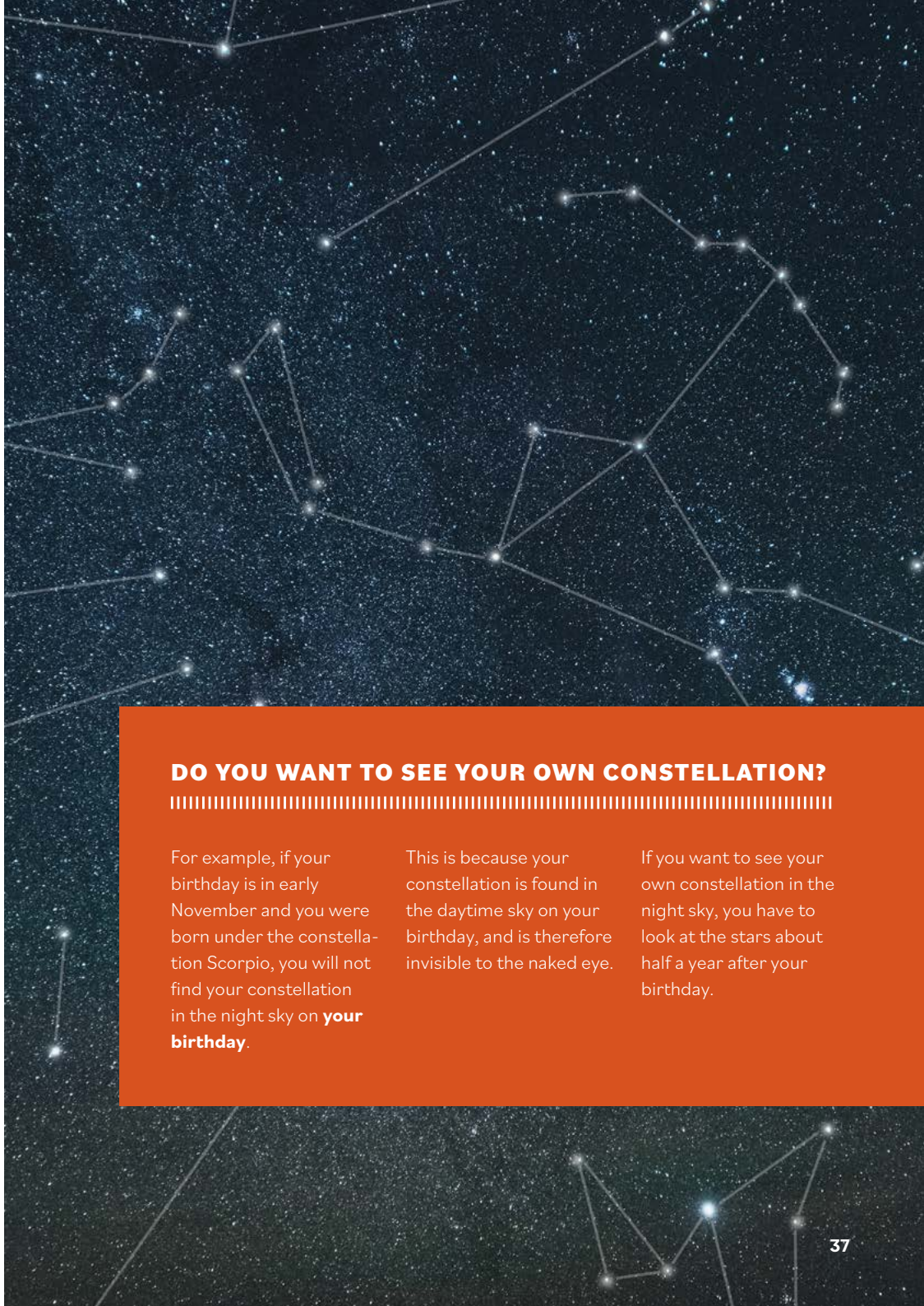
Constellations

In order to bring human order to the overwhelming sea of lights in the heavens, for thousands of years clusters of stars have been grouped into units based on their positions and similar brightness. These were given names and woven into stories, myths or legends.

In 1922, **88 constellations** were established, whose names were defined in 1930. The names of 48 common constellations, such as Ursa Major, Auriga, or Orion, originate from Greek mythology. For the stars of the southern sky, European seafarers on their voyages of discovery named constellations to mirror parts of their ships (i.e. Puppis (the Poop Deck), Carina (the keel and hull), and Vela (the sails of the ship)). Other constellation names, such as the Fornax, Crater, or Horologium sound perhaps a bit less adventurous.

Probably the best known constellations are the **12 signs of the zodiac**. They tend to lie close to the apparent orbit of the sun, on what is known as the **ecliptic**. During the year, the sun therefore moves through these 12 signs of the zodiac and stays in each of them for about a month. The zodiac sign Taurus was already well-known to the peoples of Asia Minor 5000 years ago.

To the human eye, this group of stars appears spatially close, even though they are light years apart. Constellations describe not only the star groups that give them their names, but all the stars that occur in the respective section of the sky.



DO YOU WANT TO SEE YOUR OWN CONSTELLATION?

For example, if your birthday is in early November and you were born under the constellation Scorpio, you will not find your constellation in the night sky on **your birthday**.

This is because your constellation is found in the daytime sky on your birthday, and is therefore invisible to the naked eye.

If you want to see your own constellation in the night sky, you have to look at the stars about half a year after your birthday.

Orientation in the Night Sky

The “Big Dipper” or “Plough” is one of the most important asterisms for **orientation.** (As important and famous as the Big Dipper is, strictly speaking it is not a constellation of its own. It’s actually a part of the constellation known as Ursa Major.) It consists of seven stars, three of which make up the 'handle' and the other four create the ‘body.’

Once located, you can use the Big Dipper to locate other stars, such as Polaris (The North Star). The two outermost stars of the Big Dipper (at the top of the bowl or body, opposite the handle) point to it. For centuries, Polaris (The North Star) has probably been the most important star for orientation, since it is located directly above the North Pole. It is the only star that is always in the same place in the night sky during the night and throughout the year.

If you extend the line from the the Big Dipper even beyond Polaris (The North Star), you can make out Cassiopeia, named for the Ethiopian queen.

STAR EYE TEST

This eye test has been used for thousands of years!

The second star from the end of the handle of the Big Dipper is an optical double star. If you can see this, your vision is in great shape!

HOW DID BEARS GET INTO THE SKY?

Zeus had an affair with the nymph Callisto, resulting in a son named Arkas. Out of jealousy, Zeus' wife Hera turned Callisto into a bear. Arkas grew up to be a handsome warrior, who one day met a large female bear while hunting. What he didn’t know was that this bear was actually his mother. To prevent an unfortunate ending for mother and son, Zeus also transformed Arkas into a bear and hurled the pair of them up into the heavens. This formed the constellation Ursa Major, or Great Bear. But why do these two bears have such long tails? Because Zeus was holding them by the tail as he flung them up into the sky.

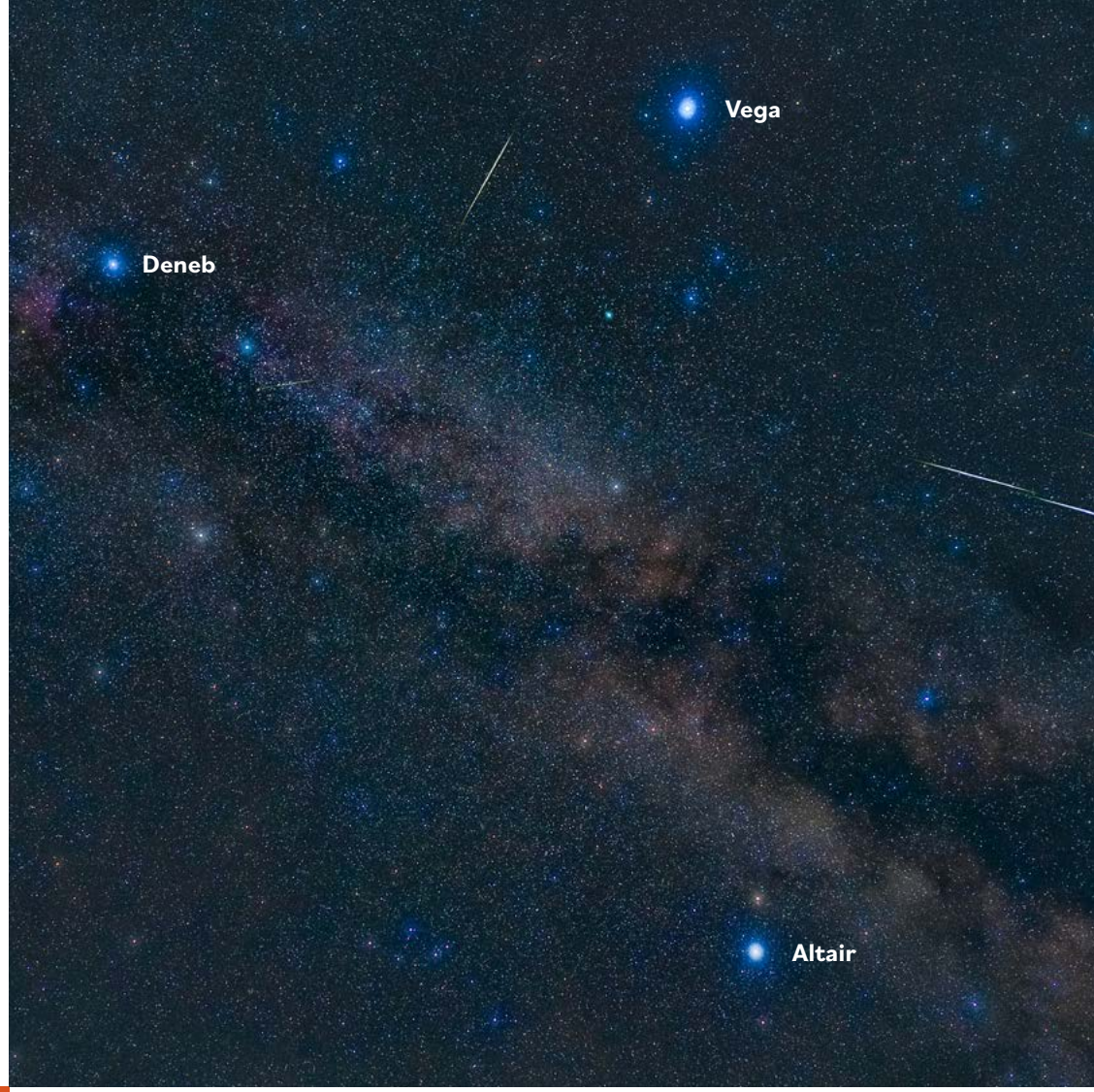
Constellations
During the Year

Due to the movements of the Earth, the part of the night sky that you can see at a particular location depends on the date and time of day.

Only stars close to the north celestial pole can be seen all year round in the northern hemisphere, because they never disappear below the horizon. These stars are called **circumpolar stars**. These include the two bears, Great Bear and Little Bear (Ursa Major and Ursa Minor), the Ethiopian Queen Cassiopeia and her husband Cepheus, as well as a dragon (Draco) and even a giraffe (Camelopardalis).

All other stars rise in the east and set in the west and are visible only at certain times of the year.

There is a constellation of stars, however, that is particularly striking no matter the time of year. It contains some of the brightest stars from different constellations. This constellation includes the Spring Triangle, the Summer Triangle, the Great Square of Pegasus, and the Winter Hexagon.



TIP:

Keen to know precisely which constellations are shining in the night sky? Then we recommend looking at the *"Rotating Cosmos Star Map"*

The Summer Triangle is not strictly speaking a constellation, but consists of three fixed stars, each of which is assigned to a different constellation: Vega in Lyra, Deneb in Cygnus and Altair in Aquila.

The Summer Triangle can be easily observed during summer nights in the northern hemisphere.

Kaunergrat **Nature Park**

The municipality of Kaunertal has been a defining part of the Kaunergrat Nature Park region since 1998.

Since the founding of this association, the "Kaunergrat" mountain range, which gives the park its name, has transformed from a partitioning element of the landscape to an indispensable link between the nature park communities. In 2021, the Kaunergrat was officially declared a protected landscape area. There are currently 7 protected areas within the nature park according to the Tyrolean Nature Conservation Act. The nature park currently covers an area of 240 km², which corresponds to 40.7% of the nature park region (589.2 km²).

The goal of the Kaunergrat Nature Park is to preserve its diverse natural resources, the cultural-historical richness of the region and the extraordinary cultivated landscape, and to make them accessible to visitors. The environmentally compatible use of natural and cultivated landscapes should also ensure that they retain their distinctiveness for future generations. This will be achieved primarily through visitor guidance, environmental education, low-impact mobility and comprehensive protected area management.

Other tasks of the nature park include the sustainable promotion of the special features of the region through attractive visitor facilities (Kaunergrat Nature Park House and surroundings, Tyrolean Ibex Centre in St. Leonhard i.P., the climate and glacier exhibition in the Kaunertal valley, and the Swiss stone pine exhibition in Jerzens).

Night Full of Life

"When you drive up to the mountain pasture late in the evening, you always see a deer running across the path, or a hare or even a badger. That's really what the night is all about: wild animals."

- Urban Lentsch, **Verpeilalm** mountain pasture

A NOCTURNAL WALK

The day presents only one side of nature. At night, a whole new world opens up. The entrance gate to this new world opens up as soon as the sun sets. Come on in!

At dawn, those who have slept during the day awaken. Can you hear them?

The crickets and frogs have begun their evening concert. In the transition from day to night, light changes along with the acoustic landscape. When it gets dark, our hearing improves because our sense of sight recedes somewhat into the background.

Ears, now it's your turn! Who's that rustling behind the tree? Is it a hedgehog, a marten or just a house cat? Many mammals, like little mice, stay hidden. Having heard us from afar, they are too shy to show themselves. That's too bad actually, as they would have found plenty of food here. There is also snail crawling along, and next to it a centipede. But what is that rustling noise? A fox appears roaming across the field. In the sky above, a bat chases a moth and the hooting of an owl echoes through the night.

The wealth of different habitats, such as those found in the Kaunertal valley, enables biodiversity by day and by night.

As dusk turns to night, animals come out that remain hidden during the day.

Many animals, such as hedgehogs or mice, are nocturnal because they are better protected from predators in the dark. Others, such as owls or foxes, specialise in hunting at night. Amphibians, earthworms and snails prefer the cool of the night because their bodies are better protected from dehydration. Some plants use the night to encourage pollination, attracting specialised nocturnal creatures.

Learn more about the rich habitats of the Kaunertal valley and discover which animals and plants you can encounter on nocturnal forays.

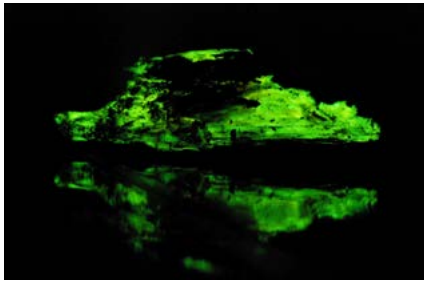
Mountain Forests

From the valley floor to the mid-elevations, spruces dominate the forests in the Kaunertal valley.

Larches and stone pines become more common with altitude. Stone pine forests change into dwarf shrub heaths and Alpine grasslands above about 2100 m elevation.

Especially for larger nocturnal animals, mountain forests are a key refuge. In the caves and dense branches of old trees, they enjoy numerous hiding places during the day. In the forest at night, you may encounter owls, deer, badgers and even glowing mushrooms!

GLOWING MUSHROOMS



Even though it may sound like science fiction, glowing mushrooms really do exist!

The Hallimasch (fungus genus Armillaria), with its dense hyphal network, grows on dead wood.

In autumn, with a little luck, you can see this mesh glowing green. The glow is produced by chemical processes, a reaction of luciferin with the enzyme luciferase in the presence of oxygen.

It's a mystical sight to behold!

DEER

Were it not for the influence of human beings, European Roe Deer *(Capreolus cap-reolus)* would be actually be diurnal. At night, they would sleep in small hollows in the foliage.

The rise of human disturbance, however, means that they have increasingly shifted their active times to dusk, dawn and the night. They now stay in their hiding places during the day, and only dare to come out at dusk to graze.

"In the winter, deer and hares scamper around outside the window. We are in the middle of the forest surrounded by nature, and the animals don't feel disturbed. I have even experienced that during the transitional period, after it has snowed, the deer have scraped away the snow on the terrace in order to get to the grass."

- Georg Praxmarer, **Ögghöfe mountain farm**

BADGERS

European Badgers *(Meles meles)* feel right at home in forests and richly structured cultivated landscapes.

Once dusk settles in, they go in search of food: tree fruits, crops, small mammals, and the nests of ground-nesting birds are all on the menu. These animals, closely related to martens, spend the day sleeping in their burrows.

OWLS

Owls (animal order Strigiformes) are capable of locating their prey even with the smallest amounts of light. They have eye tubes called sclerotic rings that give them binocular-like vision.

Because their ears are slightly offset and not symmetrically positioned on the head, noise sources are precisely localised. The facial ruff, a ring of stiff feathers, specially directs sound waves to the ears, so that even the quietest of sounds can be perceived.

Owls are silent hunters: Due to small serrated structures on their feathers, they fly in almost complete silence.

THE EFFECTS OF ARTIFICIAL LIGHT ON OWLS

Artificial lighting in valleys and cities penetrates into natural areas and affects both habitats and species.

The Eurasian Eagle-Owl is one of the largest owls in the world. These magnificent birds can turn their heads up to 270 degrees. Their most important sensory organ is the ears. Their hearing alone allows them to locate and strike their prey. Nocturnal mammals avoid open areas during full moonlight (max. 0.3 lx) and limit their activities, likely to avoid being seen by predators. Conversely, Eurasian Eagle-Owls have been observed to be especially mobile around the full moon, travelling longer distances and flying faster.

Many animals change their behaviour even at very low night-time light levels.

TENGMALM'S OWL

In the Kaunertal valley, high in the branches of old trees, lives a very special little owl: the Tengmalm's Owl.

This bird, which is sensitive to disturbance, breeds in abandoned Black Woodpecker cavities in large forests and is strictly tied to true darkness.

It wakes up about 13 minutes after sunset and ceases its activities about 3 minutes before sunrise! The natural alternation of day and night sets the timer for this clearly defined window of activity.

The presence of the Tengmalm's Owl is proof of the quality of dark Kaunertal valley nights.

These animals are very sensitive to disturbances. Between February and July, they lay their eggs and care for the chicks.

We respect the needs of this small owl and under no circumstances jeopardise the rearing of its young. We therefore only use the Alter Gepatschweg trail **(page 114-115)** from the middle of July each year. This ensures the continued presence of this special owl in Gepatsch.

In the Kaunertal valley, stone pines usually form the treeline.

Tengmalm's Owls raise their offspring in abandoned woodpecker cavities.

Meadows and Mountain Pastures

Agricultural practices in the Kaunertal valley are still extensive to this day. Meadows and mountain pastures, which have been laboriously cultivated for centuries, remain a part of the cultivated landscape to this day.

Comprehensive management results in low nitrogen input into the system and mowing frequency adapted to the site. This promotes the growth of many different plant species and subsequently also the occurrence of many animals that depend on the plants as a source of food or habitat.

On some meadows in the Kaunertal valley, more than 80 plant species occur on just 10 m^2, making them some of the most species-rich habitats in all of Europe!

At night, moths flutter across the meadows, feeding on the nectar of fragrant flowering plants and providing pollination. Occasionally, fireflies stage a special light display in midsummer. Above, bats zoom through the air and hunt moths.

WHITE CAMPION

White Campion (*Silene latifolia*) is a flowering plant pollinated by moths.

Like other nocturnal plants, it emits its lovely fragrance only after dark.

Moths are capable of perceiving these scent molecules over long distances and follow them to the flowers. The plant's white colour ensures that the flowers remain visible even in low light.

Other plants pollinated by moths include the Evening-Primrose (*Oenothera biennis*), the Lesser Butterfly-Orchid (*Platanthera bifolia*), the Bladder Campion (*Silene vulgaris*) or the Hedge Bindweed (*Calystegia sepium*).

FIREFLIES

The eggs, larvae, pupae, males and females (the latter are not capable of flight) of the firefly (*Lamprohiza splendidula*) all glow. This special gift, called bioluminescence, is used for defense against enemies and finding mates.

The luminescent substance luciferin is oxidised by the enzyme luciferase, and the reaction energy makes the organisms glow.

On some summer nights, fireflies appear in particularly large numbers. The splendour of this light show is magical.

The Effects of Artificial Light on Fireflies

Artificial light can inhibit the reproduction of this beetle species, e.g. by severely limiting the range of its light display.

Moths in the Kaunertal valley

With more than 3800 different species in Austria, moths are an extremely species-rich bunch. In just a single night, about 100 of them were documented in the Kaunertal valley.

Just like our noses, butterflies' antennae can detect particles in the air. This acute sensory organ is important for foraging, but also for reproduction. Some sexual attractants (pheromones) can be sensed even at a distance of several kilometres. In some cases, males have combed or feathered antennae because the increased surface area is associated with a better sense of smell.

As with all insects, the eyes of moths consist of several thousand individual eyes with which they can also perceive ultraviolet light.

GARDEN TIGER MOTH
(ARCTIA CAJA)

The striking colour patterns on the wings of this moth serve to warn predators of their toxicity.

SETINA AURITA
(SETINA AURITA)

The wing pattern of this endemic Alpine species depends on the altitude. As the altitude increases, the black dots are replaced by dashes.

DARK-BORDERED BEAUTY
(EPIONE VESPERTARIA)

Found throughout Europe, this is a rare species of wet habitats, such as swamps and forest edges.

CHIMNEY SWEEPER
(ODEZIA ATRATA)

Very conspicuous diurnal moth, which can be frequently observed in the meadows of the Kaunertal valley.

The Effects of Artificial Light on Moths

About 85% of Lepidoptera, a genus that includes butterflies and moths, are active at night. Moths are important plant pollinators.

Many plants that rely on nocturnal pollinators are characterised by beguiling fragrances and bright flower colours. Nocturnal artificial light has been shown to reduce pollination, resulting in fewer fruits and plant seeds being produced. Light pollution and the attractiveness of artificial light in particular play a role in causing the comparatively severe loss of moths.

Spider webs can often be observed near light fixtures. For example, Bridge Spiders like to build their webs on building structures near water bodies and benefit from attracting insects. Walnut Orb-Weaver spiders, on the other hand, require natural darkness to build their webs.

Bats

Echolocation is a fantastic adaptation to life at night. Bats use short, high-frequency pulses of sound (about 20 to 140 kilohertz) to orient themselves at night. Some species can reach volumes of up to 130 dB! Different species use different frequency ranges and have particular pulses of sound that they employ. When sound waves hit an object, they are reflected back and picked up by bat's relatively large ears. Bats can thus get an very good idea of their surroundings.

Through precise echolocation, bats can detect an object's location, size, and speed, as well as its shape and surface texture. All of this is possible in complete darkness!

At least three different bat species have been discovered in the Kaunertal valley so far: Common Pipistrelle (*Pipistrellus pipistrellus*), Brown Long-Eared Bat (*Plecotus auritus*), as well as representatives of the genus Myotis. The latter could not be more closely determined from its call alone.

The parish church in Feichten is used by the Brown Long-Eared Bat as a resting and roosting place during the day. While resting, bats hang from the roof rafters.

The **Brown Long-Eared Bat** lives in forest habitats and open country from the valley up to 2000 m. The species calls very softly and the sounds are emitted through the mouth or nose. It makes its home in trees and buildings, and also lives in the tower of the parish church in Feichten!

It catches its prey in mid-air or collects it from plant cover: it locates its prey visually in slow flight or by means of rustling noises and then locates it in shaking flight. It feeds mainly on moths and other flying insects. Spiders, weavers and caterpillars are also on the menu.

The **Common Pipistrelle** lives in urban environments, villages and forest habitats. It especially likes to live in the crevices of buildings.

In agile flight, they "patrol" certain structures on fixed trajectories and capture prey in rapid manoeuvres and swoops. The Common Pipstrelle can also hunt in the same place for a long period of time, e.g. around illuminated street lamps. As a generalist, it is not a choosy eater, though flies form a large part of its diet. They emit pulses of sound, mainly around 45 kHZ, which are easily recognizable.

Dry Stone Walls

Dry stone walls are walls constructed of natural stones, in which the spaces between them have not been sealed with jointing material.

The gaps of different sizes between the stones provide hiding places and habitats for many different animals. Larger holes in the upper part of the wall are suitable as nesting places for birds. Mice, other small mammals and numerous insects like to stay in the dry, confined interior spaces lower down. Meanwhile, lizards enjoy basking on the sun-warmed stones above.

Dry stone walls are biodiversity hotspots! They act as particularly habitats within the cultivated landscape of the Kaunertal valley.

MICE AND SHREWS

Mice and shrews enjoy finding hiding places in stone walls, where they often make nests out of foliage.

These crepuscular and nocturnal animals are mostly solitary.

ARACHNIDS

Arachnids have many means of catching prey: some make webs, while others lurk in hiding or actively hunt in the dark.

Rocks, fences, woodpiles and dry stone walls are great places to find hunting spiders!

Harvestmen, aka Daddy Longlegs, which feed on plants or decaying material, are among the more peaceful arachnids. With just a few exceptions, Harvestmen are nocturnal.

Wetland Meadows & Bodies of Water

Animals and plants that live in and around water generally find appropriate habitats in various biotopes in the Kaunertal valley. Wetland meadows have high soil moisture due to waterlogging or spring seepage. Meanwhile, meadow streams meander gently through the valleys. These habitats are home to rare amphibians, such as the Alpine Newt, and endangered plants, such as the Globeflower.

Numerous clear, naturally flowing mountain streams also wind along the slopes of the Kaunertal valley. These are home to riparian vegetation, algae, amphibians, small and tiny aquatic animals (macrozoobenthos), and sometimes even small fish.

EUROPEAN COMMON FROGS

European Common Frogs (*Rana temporaria*) spend most of their active lives at night. They become active at dusk and their calls are audible over long distances.

They also take advantage of the night to forage or to migrate to other spawning grounds. Their sense of sight is exceptional and well-adapted to low levels of light.

European Common Frogs are even capable of seeing colour in the dark!

ALPINE NEWTS

The Alpine Newt (*Ichthyosaura alpestris*) is both diurnal and nocturnal.

Especially when in the water, it makes use of both periods of day. Activities on land, however, are typically limited to the nighttime or cool, damp weather. Like many other amphibian species, it thus protects itself from drying out.

Nocturnal movements in water

STANDING WATER

Activity at night is not limited to the skies and the land. Water bodies are also bustling at night. In stagnant waters such as lakes or ponds, **vertical migration** takes place in the **day-night rhythm**. During the day, algae that carry out photosynthesis are mainly found in the upper, sunlit water layers, while the small, free-swimming aquatic animals (zooplankton) are found in deeper zones. At night, the zooplankton swim towards the water surface to feed on the algae.

This migration is very important for maintaining water quality. Aquatic animals are very sensitive to artificial light. Their migratory rhythms can easily be disturbed.

RUNNING WATER

Animals are also moving in streams at night. A large number of small animals live at the bottom of streams and rivers, which are grouped together under the term macrozoobenthos. A large number of these are nocturnal, including mayfly larva (*Ametropus fragilis*).

Other small stream animals rely on the night for at least part of their life cycle. These include for example, **Caddisflies**, which hatch from their pupae only at night. From then on, they live as both crepuscular or nocturnal adults.

Aquatic insects in rivers drift at night when light intensities are very low; the darkness protects them from predators. Such drifting is actually a dispersal strategy. The absence of individuals in a stretch of water is compensated for by females that fly upstream and are ready to lay eggs.

Village & Garden

Some creatures can adapt quite well to human structures.

Hedgehogs, for example, a resident of diverse cultivated landscapes and forest edges, are also able to find attractive habitats in structurally rich gardens and parks.

Many creatures that occur near settlements are also useful to us humans. The predatory Leopard slug, for example, will eat other slugs in your garden, protecting vegetables from being eaten!

EUROPEAN HEDGEHOGS

European Hedgehogs can actually smell their prey, including earthworms, earwigs, beetles or woodlice, even when they are still several centimetres deep in the ground. Their excellent sense of smell helps them find their food in the dark!

NIGHT VISION

When walking at night, you may sometimes see mysterious pairs of eyes glowing in the dark by torchlight. This is due to a layer of tissue, the “tapetum lucidum,” in the eyes of many vertebrates. These layers are located behind the retina and reflect the incoming light in such a way that the light rays are sent through the retina a second time. In effect, the light is "used twice." This feature contributes to the superior night vision of many nocturnal vertebrates and results in "glowing eyes" when caught in the light of your torch!

LEOPARD SLUGS

Snails love damp and cool conditions, which is why so many of them are nocturnal.

While snails usually only eat dead plant material, slugs prefer fresh greenery and can thus become a nuisance in your own vegetable garden.

The Leopard Slug (*Limax maximus*) predates slugs and their nests. Patterned like a leopard, this slug can thus help curb the spread of the Spanish Slugs in your garden.

This beneficial creature is easily recognisable: Leopard Slugs can grow up to 20 cm!

Alpine Pastures

Alpine meadows and pastures play a major role in shaping the special landscape of the Kaunertal valley. Once deforested by man, these areas are now an integral part of culture and nature.

Especially in the Kaunertal valley with its rich Alpine history, Alpine pastures have probably been traversed countless times by hikers and mountaineers.

In addition to being useful in terms of agricultural production, Alpine pastures are also a unique recreational area with a great diversity of species.

Grazing animals such as cows, sheep, goats and their shepherds and Alpine farmers are responsible for maintaining the open pastures. If these animals did not carry out their daily grazing activities, the pastures would soon become overgrown with bushes.

For centuries, the activities of grazing animals and their movements have followed the day-night rhythm.

What do Cows
Actually do at Night?

As a general rule, the night is the time of rest at the mountain pasture. Cows are generally not nocturnal and spend most of the night resting and ruminating.

Urban Lentsch of the Verpeilalm mountain pasture reports that he never visits the animals at night. *"It's just too dangerous then."* Nevertheless, hardly any accidents happen to the animals at night. *"I think the cows are even more cautious at night,,"* says Urban.

"And in the morning, when they start feeding and moving around again, then you have to make sure that you are with the animals again. Especially if they're on steep rocky terrain."

"When dusk falls, they usually lie down to chew the cud for a while. Sometimes they wander a little further afield during the night. Often they are not in the same place in the morning as they were in the evening. That's why it's important to take them where it's safe in the evening. But generally they are rather quiet at night."
- Urban Lentsch, Verpeilalm

The nights are more restless when it begins to snow in the afternoon. Joachim Braunhofer, shepherd of the Birg Alpe mountain pasture: *"At night things are usually quiet. It's different in snowy weather. When it starts snowing in the afternoon, the cows move all night. If it only starts snowing at night, there can be half a metre of snow on the ground, they don't care, they stay calm. But if the snow starts too early, when they're still moving about, then they are restless."*

Glacier & Glacier Foreland

The Gepatschferner, Austria's second largest glacier, towers above the end of the Kaunertal valley. When viewed from the lower valleys, its size can be misleading: it is actually 25 square kilometres. The glacier tongue, on the other hand, can be easily seen from afar.

This world of perpetual ice is one of the most extreme habitats in the world. Very few organisms can live there. Those that can include microorganisms such as bacteria, algae, viruses and protozoa.

The European Snow Vole and the Stoat are among the few mammals that venture to such heights.

CRYOFAUNA & CRYOFLORA

Cryofauna and cryoflora are animal and plant microorganisms in ice, such as bacteria, algae, viruses and protozoa.

Like all life, these communities are influenced by light. Research findings, including from glacier caves in Tyrol, show that the composition of species depends on the quantity and quality of light.

The effects of the increasing illumination at night on the living creatures at glaciers is currently unknown.

EUROPEAN SNOW VOLES

European Snow Voles (*Microtus nivalis*) are among the few mammals that occur even in the highest regions of the high mountains characterised by rock, snow and ice. Maybe you've even seen their tracks in the snow!

European Snow Voles build their nests in Alpine grasslands or log piles. Special ability: these animals practice a kind of "**hay harvesting**": plant remains are dried in the sun in autumn and stored for the winter!

LEAST WEASELS & STOATS

The Stoat (*Mustea erminea*) is a species of predator in the marten family.

It inhabits a range of open, structured landscape types and is common in the Alps up to about 3000 m.

Their occurrence is tied to the distribution of their prey. They feed primarily on Eurasian Snow Voles in high Alpine terrain.

People at Night

As dusk falls, the quality of our perceptions changes. Weak visual or auditory signals are perceived more clearly than during the day. Our senses become sharpened. In addition to the senses of sight and hearing, we also rely more on our senses of smell and touch at dusk and at night, according to the experiences of people of the Kaunertal valley:

"At night, you feel like you hear more of nature. When darkness comes, you absorb everything much more intensely. Some of this is also due to anxiety. The feeling that you can hear every noise. When you walk through well-lit parts of the village, you don't notice it so much. But when it's really dark, you notice everything, every crack, every sound, every movement of any animal."

- Josef Raich, **Former Mayor**

"It is not only the sense of hearing that sharpens, but also the sense of smell, so that all of a sudden everything smells very intensely."

- Georg Praxmarer,
Ögghöfe mountain farm

"As children, we often spent the night in the forest. When there's no light, it heightens your senses. Suddenly you hear everything in the forest, and you have wild fantasies about what could be out there."

- Georg Praxmarer, **Ögghöfe mountain farm**

Its no long possible to travel as far during the night as during the day because you can't see as well. And you feel more strongly with your feet what's happening below you and what you're stepping on. It seems to me that at night you are more sensitive to the path.

- Urban Lentsch, **Verpeilalm mountain pasture**

Seeing at night

In Austria we have a saying: All cats are grey at night. This is because the human eye cannot see colours at night, and we can only distinguish shades of grey. But why is this?

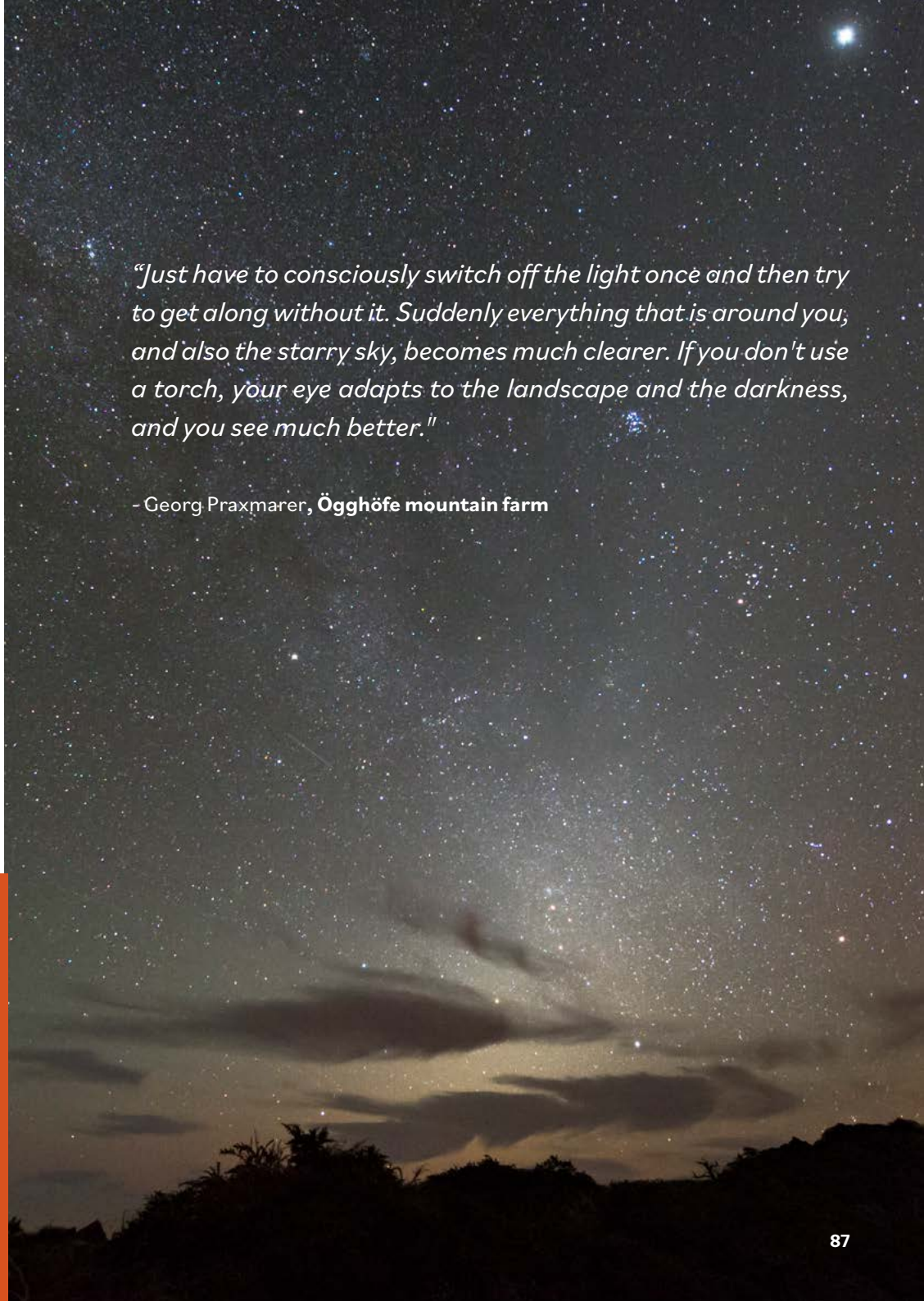
In our retinas, there are two types of **photoreceptor cells:** the cones and the rods. The cones in our eyes enable colour vision. A high number of these cells provides sharp, colourful images during the day. But the cones only function with sufficient light. As darkness falls, they become non-functional. At this point, we rely on the rods. Rods distinguish light and dark, but not colours. Since there are fewer rods in the retina, images at night are less sharp and appear to be in soft focus.

Nevertheless, our eyes are capable of doing amazing things at night. Thanks to **dark adaptation,** our eyes adapt in the best possible way to low light conditions. One factor is that the pupil dilates so that more light enters the retina.

DARK ADAPTATION TAKES TIME

It takes about half an hour for the eye to adapt to complete darkness. Yet, by just glancing into a light source, dark adaptation is eliminated within seconds!

Tip: Use red-light torches for your night-time excursions. Red light does not affect your dark adaptation.



"Just have to consciously switch off the light once and then try to get along without it. Suddenly everything that is around you, and also the starry sky, becomes much clearer. If you don't use a torch, your eye adapts to the landscape and the darkness, and you see much better."

- Georg Praxmarer**, Ögghöfe mountain farm**

Ancient Wisdom

PEOPLE AND THE UNIVERSE

Darkness has been part of life on Earth since creation and until the invention of the light bulb. Since the advent of electricity, artificial light has obscured the dark night sky, so that limitless views of starry skies are becoming rarer and rarer.

The sparkling countenance of the celestial firmament was taken for granted for millions of years. The bright band of the Milky Way was with us as humans whenever we stepped outside at night. Was the relationship to our place in the universe and to nature different then?

Since time immemorial, people have tried to understand and describe events in the sky. Celestial events and their occurrences throughout the year were linked to terrestrial events. Hence, predictions were made on the basis of astronomical observations, for example, regarding favourable times for agricultural work.

Over time, "rules" were developed that can be found in “Medieval farming” or “lunar” calendars.

Only fragments of this millennia-old treasure trove of knowledge are known to us today. This makes places like the Kaunertal valley, where so much knowledge is still preserved and put into practice, all the more valuable.

The Influence of the Stars

THE MOON

The moon has a great influence on life on Earth. It acts like a magnet upon the oceans' water masses and is thus responsible for the ebb and flow of the tides. But the moon causes more than just the tides!

The moon stabilises the rotation of the Earth’ axis and thus regulates the climate known to us through the seasons. It also influences the behaviour of the animals. Migratory birds and insects orientate themselves by the moon, for example, during their nocturnal flights. In the plant world, the germination and growth of some plants are also impacted.

The Waxing and Waning Moon

We are able to see the moon because it is illuminated by the sun.

Its position in relation to the sun and the Earth determines whether we recognise it as a waxing, waning, full moon or new moon.

If the moon is positioned between the sun and the Earth, we are unable to see its illuminated side. We call this stage the new moon.

As the moon continues to orbit around the Earth, its illuminated side becomes visible. Initially, this is just a narrow crescent that becomes wider and wider. We thus observe a waxing moon.

When, in the course of its orbit around the Earth, the moon reaches the side facing away from the sun, it is illuminated in a circular pattern. We call this a full moon.

As it continues to orbit the Earth, the illuminated crescent becomes smaller again. We observe a waning moon until we can no longer perceive it as a new moon.

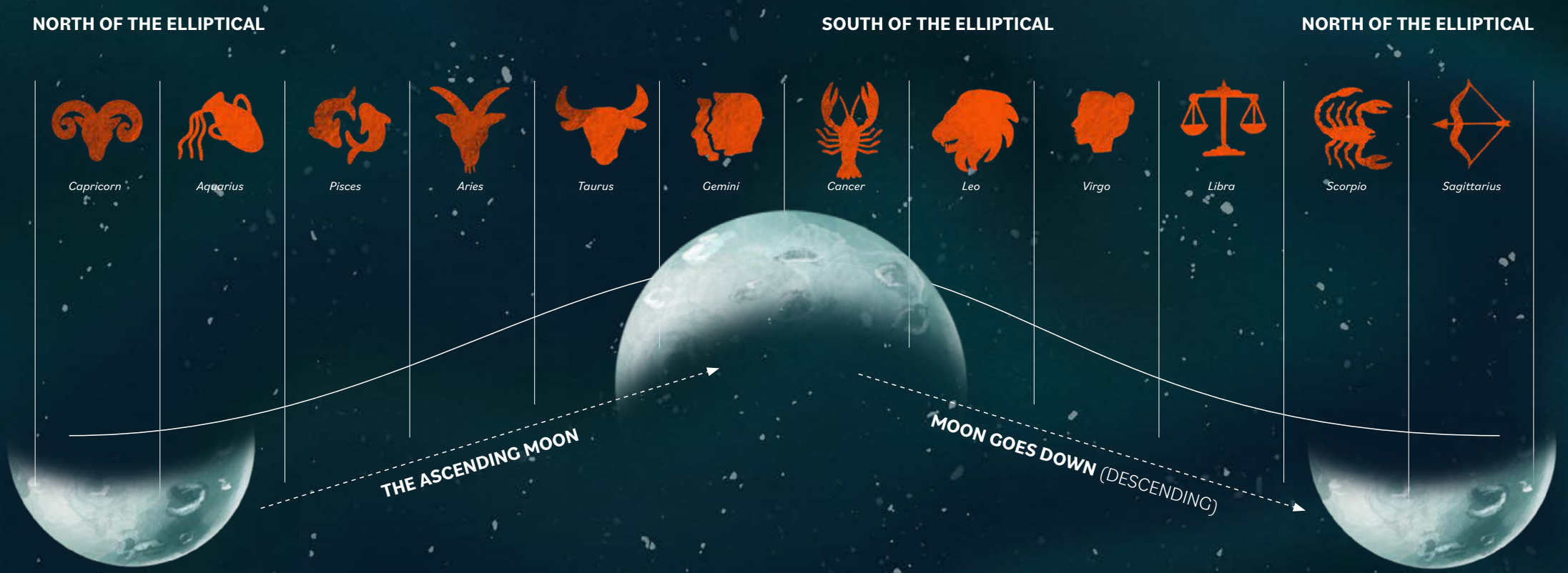
TIP:

The crescent of the **waxing** moon is dark on the left side. It resembles a punctuation mark bracket that closes a sentence fragment **“)”**. The **waning** crescent moon is dark on the right side and looks like the punctuation mark bracket that opens a sentence fragment **“(“**.

CAN YOU REMEMBER THAT?

) → waxing moon

(→ waning moon



Moon phases:
Waxing and Waning

Regardless of whether the moon is perceived by us as new, half or full, it wanders across our sky. Sometimes it is high in the sky and sometimes low, close to the horizon. On its journey, it crosses through the 12 signs of the zodiac. Different qualities have been attributed to the signs during interpretation, for example, there are "hard" signs such as Capricorn, Scorpio and Cancer.

At its lowest point, the moon can be seen in the zodiac signs of Sagittarius and Capricorn. From there, it reaches a higher and higher point in the sky every day. In this period it is called **“rising"**or **“ascending"** moon.

It rises until it reaches its highest point in the sky in the constellations of Gemini and Cancer. It then begins to descend. Once this turn takes places, the moon is said to be **south of the elliptical**.

In the following days, one speaks of the moon as **“sinking"** or **“descending."** It can now be observed as a little lower each day until it is back in Sagittarius and Capricorn.

At this point, the moon has finished its southward arc and then turns again to begin a new cycle with its ascent.

The stars and agriculture

Direct and indirect effects of the moon on plant and animal life have implications for agriculture. Many people from the Kaunertal valley still pay attention to the moon when they carry out certain tasks. When interpreting the moon, it is important to know whether it is waxing or waning or rising or sinking.

“In agriculture, for example, farmers look to the moon when they spread manure on the fields. They are guided by whether the moon is sinking or rising. For example, you should spread the manure when the moon is sinking, because then it is better absorbed by the soil.”

- Josef Raich, **Former Mayor**

"If a cow is about to give birth, I think it's more likely to be at or around the full moon."

- Urban Lentsch, **Verpeilalm**

"In the old days, people still slaughtered animals at home. For such things, they always looked to the moon. You always have to do this in a hard sign because the pork fat is different, firmer, than it is during a soft sign."

- Josef Raich, **Former Mayor**

"You should never drive cattle under the sign of Capricorn because the cows tend to knock against each other a lot more."

- Joachim Braunhofer, **Shepherd at the Birg Alpe mountain pasture**

In addition to the moon, the observation of other celestial bodies was relevant for agricultural activities, for example in choosing favourable times for sowing or harvesting.

In many cultures of the northern hemisphere, the constellation Pleiades marks the agricultural year.

Because of the arrangement of the brightest stars in the Pleiades, this cluster is often confused with Ursa Minor. The Pleiades, however, are much more compact.

Pastures with views of the Kaunergrat mountains.

Many ancient cultures used the star cluster **Pleiades** in the constellation of Taurus to determine the best time to **sow seeds**. Astronomical investigations suggest that in the town of Nebra (site of the "Nebra Sky Disc") in Saxony-Anhalt, Germany, sometime around 1600 BC, the Pleiades were not visible in the firmament during the growing season, i.e. from March to October.

Accordingly, when the Pleiades disappeared from the firmament, sowing took place in March, and when the Pleiades appeared in the firmament, harvesting took place in October.

Finds in Munich and Ingolstadt also suggest that the Pleiades were also of great importance to **Celts**. Celts used the areas in the Kaunertal valley as pastures, so too did the Raetians and the Romans sometime later.

Besides the moon and other celestial bodies, the “dog days” and “critical days” are also important in agriculture. The “dog days” are derived from astronomical events, whilst the “critical days” are defined calendar days. Both allow predictions of weather conditions and thus of favourable times for various agricultural activities.

DOG DAYS

The heliacal rising (at dawn) of Sirius in the constellation of the “Canis Major” (Great Dog) announced the flooding of the Nile in ancient Egypt. In the process, the fields were flooded with fertile Nile mud.

The Romans recognised that the rising of Sirius is accompanied by particularly hot days: the dog days (dies caniculares) between 23 July and 23 August have since been considered to be very hot days.

CRITICAL DAYS

Critical days are defined days that, according to the beliefs of ancient folklore, prophesied the weather of the coming weeks. This were thus significant for the performance of certain agricultural activities.

Critical days include the Ice Saints in mid-May, when frost usually occurs. The weather on Seven Sleepers' Day on 27 June would determine the weather pattern for the next seven weeks.

Georg Praxmarer explains: *"The Kaunertal is basically a very harsh valley. The village is situated at almost 1300 m and the climate shapes everything here. The seasons are very intense for us, and people have naturally had to come to terms with these conditions.*

*So for centuries, people have relied on **critical days**.*

"Because things have recurred on a very regular basis. For example, there are the Ice Saints in May. And it has always been true that after a warm period in April, it suddenly gets cold in May. And before the Ice Saints were over, for example, plants were never put outside. They always waited, because otherwise everyone would have known that the plants would have frozen to death. Lettuce and cabbage and onions and potatoes - that's what the people needed to survive. That was necessary for survival and that's why these critical days were also very important at that time."

- Georg Praxmarer**, Ögghöfe mountain farm**

Critical days also play an important role in the hay harvest: *"Rain on Ascension Day heralds a poor hay harvest."*

Moonwood

On the western slope above Feichten, encounter time-honoured beliefs about the connection between the moon and wood first-hand.

For generations, the farmers at the Ögghöfe mountain farm have been passing on a wealth of knowledge.

Georg Praxmarer recalls: *"My grandfather, who was born here at the Ögghöfe mountain farm at the turn of the century, was always around wood all his life and he showed a lot to me."*

For example, his grandfather explained to him the timing of logging, and how it must be precisely matched to the intended use of the wood. After all, the wood had 'different properties' depending on the phase of the moon at the time of felling. *"You need to cut the wood at the right phase of the moon depending on whether you need firewood or timber, whether you want it to last longer and not rot, or to stop drying out and shrink."*

During renovations of the Ögghöfe mountain farm, some wood was used directly from the forest, i.e. without drying it first. The beams have *"not changed a single millimetre since they were installed,"* i.e. they have not contracted, as usually happens with drying wood. Georg explains that this was only possible by cutting the wood in the right sign.

"**Fatwood**" is a very special example. At a certain moon sign, all the tree resin is said to be drawn into the tree root. If you extract the wood close to the roots at this time and make chips out of it, it burns like a torch. From the Paleolithic Age until the 19th century, fatwood was one of the most important means of creating light.

The opposite effect was also observed: wood from a different moon phase, i.e., wood that did not burn at all, was used to make **chimneys.**

TIP:

There are also scientific investigations on the influence of the moon on the stability and durability of wood. A Swiss study was able to show that wood felled at the new moon had a higher density and was therefore less easily degraded. The scientists explained this in terms of the moisture content of the wood at the time of felling, which was influenced by the moon.

The Stars and Orientation

AT SEA

In seafaring, the starry sky has been used for navigation for centuries. For this purpose, the position of certain stars was determined with the help of a sextant. In combination with precise clocks, the position of the ship and its course could thus be determined with great accuracy.

Georg Praxmarer from Kaunertal valley was himself on the high seas for years: *"All ship navigation at that time was based on the position of the stars. There's a tremendous amount of expertise behind it all."*

Even though today's large ships are steered by GPS, navigation using the starry sky is still part of the curriculum for captains. If there is a problem with the technical navigation systems, then manual navigation based on the stars can be used.

IN THE MOUNTAINS

The stars are also used for orientation in the mountains, both at night and during the day.

"I used to spend a lot of time in the mountains and once it was night time, you could orientate yourself by the stars." - Eugen Larcher, Former Mayor

"When you look up in the sky and see the Milky Way, you know which direction you're headed."

- Urban Lentsch, **Verpeilalm**

"In the past, when we got into the fog on the glacier, we looked for the position of the sun. Then we knew: aha, ok, now it's noon. We should actually head in that direction."

- Eugen Larcher, **Former Mayor**

Forecasting the Weather by Observing Nature

Folklore and lived experience ascribe the influence of the moon to the weather and the weather conditions. In particular, changes in the weather influence the behaviour of wild animals, such as ibex and chamois.

By carefully observing wildlife, conclusions can thus be drawn about changes in the weather.

These observations are especially important for herders and shepherds. The safety of animals depends on decisions made.

"Today you have a radio and listen to the weather report, but in the past people really looked at the chamois. My father used to tell us: when the weather is warm, the chamois always have their particular spot. But as soon as the weather changes, they are somewhere completely different." - Joachim Braunhofer, Birg Alpe mountain pasture

In the Kaunertal Valley, shepherds listen intently to nature's cues when it comes to forecasting the weather. Urban Lentsch, shepherd of the Verpeilalm, says: *"It's always better to look around you at what's really happening than to look at your mobile phone."*

For example, ibexes can also provide information about the snowline: *"When snow is approaching, the weather forecast may report snowfall above three thousand metres. But when the ibexes come down towards the hut (Verpeilalm 1780 m), then I know I have to hurry and drive the cows down as well. Because experience shows that it will almost certainly snow much lower down. But if the ibexes are way up high, then the weather isn't a threat."* - Urban Lentsch, Verpeilalm mountain hut

And the weather in turn seems to be influenced by the moon: *"When the moon is full, the weather changes. If there are three or four days of good weather and then the full moon comes, then usually bad weather follows after that," says Joachim Braunhofer.*

Ancient Customs by Night

In the Alpine region and also in the Kaunertal valley, some ancient customs are still very much alive. These deal with the change from day to night, the contrast between light and darkness, and the connection between this world, destiny and the supernatural. The night, but also the light of the fire in the darkness, has special significance at certain times of the year according to ancient traditions.

INCENSE RITUALS AT NIGHT

"On Christmas Eve, New Year's Eve and Epiphany, we perform smoke rituals." - Josef Raich, Former Mayor

On these nights, people go through the house and stable with incense or special herbs. Incense is meant to cleanse from all that is bad and welcome the good.

MOUNTAIN FIRES

On special days, fires are lit on the mountains at the time of the summer solstice. In Tyrol, this custom is associated with the celebrations of the Sacred Heart of Jesus Fires.

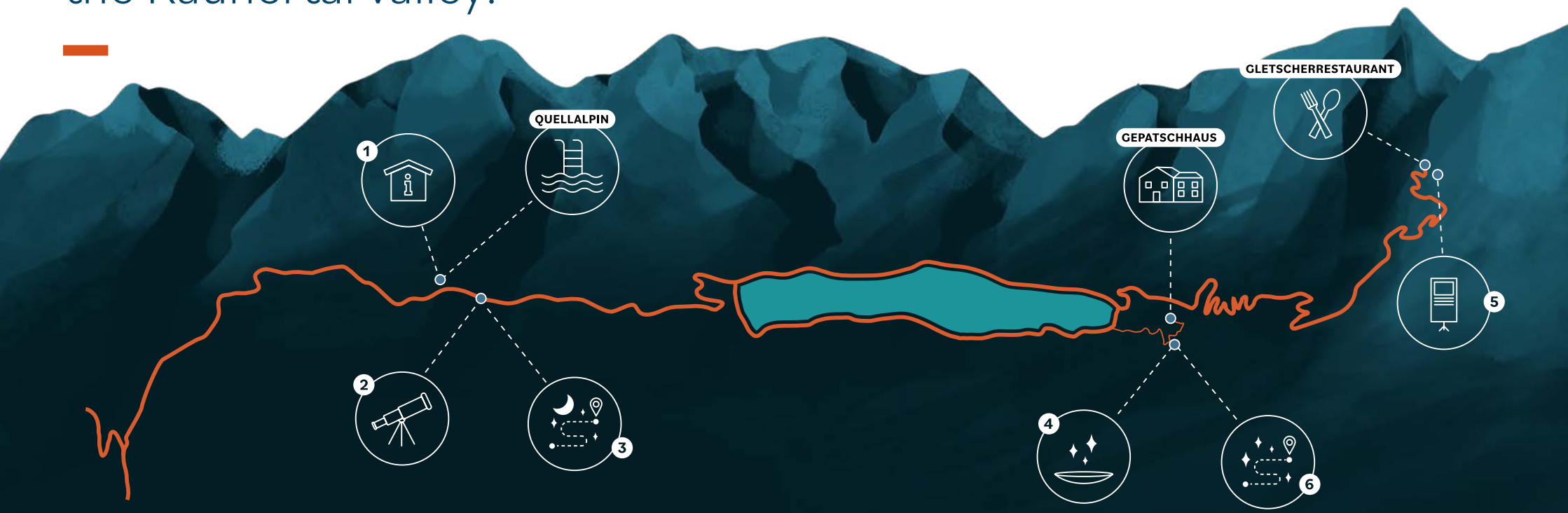
SCHEIBENSCHLAGEN

This is a traditional practice in which glowing disks are flung from the mountainside whilst certain phrases or wishes are uttered. This is done to drive away evil spirits and usher in spring.

„Dia Schaiba, dia Scheiba, die will i iatzt treiba! Schmolz in d´r Pfonna, Kiachla in d´r Wonna! Pfluag in d´r Erd, dass dia Scheiba weit außi geaht!“ - Wiesenhof, Kaunertal. (This rhyme captures the spirit of this traditional practice and the hope of a plentiful harvest as a result.)

“Scheibenschlagen is a traditional practice in which wooden discs are fashioned and flung from the mountainside. We do this on Clean Sunday, the first Sunday of Lent. The place where we did this was called “Scheibeneggele.” - Eugen Larcher, Former Mayor

Lights out, eyes open, and out into the night: Experience natural night in the Kaunertal valley!



A series of programmes invite you to learn more about the different aspects of natural night and the connection between our world and the stars.

Whether accompanied by specially trained guides or on your own, by day or by night, suggestions for special hikes, observation sites, and events can be found from the village to the glacier.

1. **Tourist Information Office:** general information. Get your Night-Experience Backpack here. **(p.120)**
2. **Places to Experience the Night:** take your Night-Experience-Backpack out into the wild. **(p. 110-111)**
3. **Guided tour:** Night full of life, lunar landscapes.
4. **Stargazing Bowl (p. 114-117)**
5. **Exhibition:** Diligent use of artificial light. Experiencing starry nights **(p. 118)**
6. **Guided Tour:** Starry-night hike **(p. 115)**

Places to Experience the Night

Experience nature at night along with boundless views of the starry sky at selected sites in the Kaunertal valley!

The special 'night adventure places' presented here are particularly suitable for your first excursion into the night in the Kaunertal valley. They are easily accessible from the village centre after just a few minutes' walk and are located directly along hiking trails that are safe to walk even in the dark with the appropriate equipment.

MEDITATION AREA AT THE FOOT OF THE VERPEIL WATERFALL

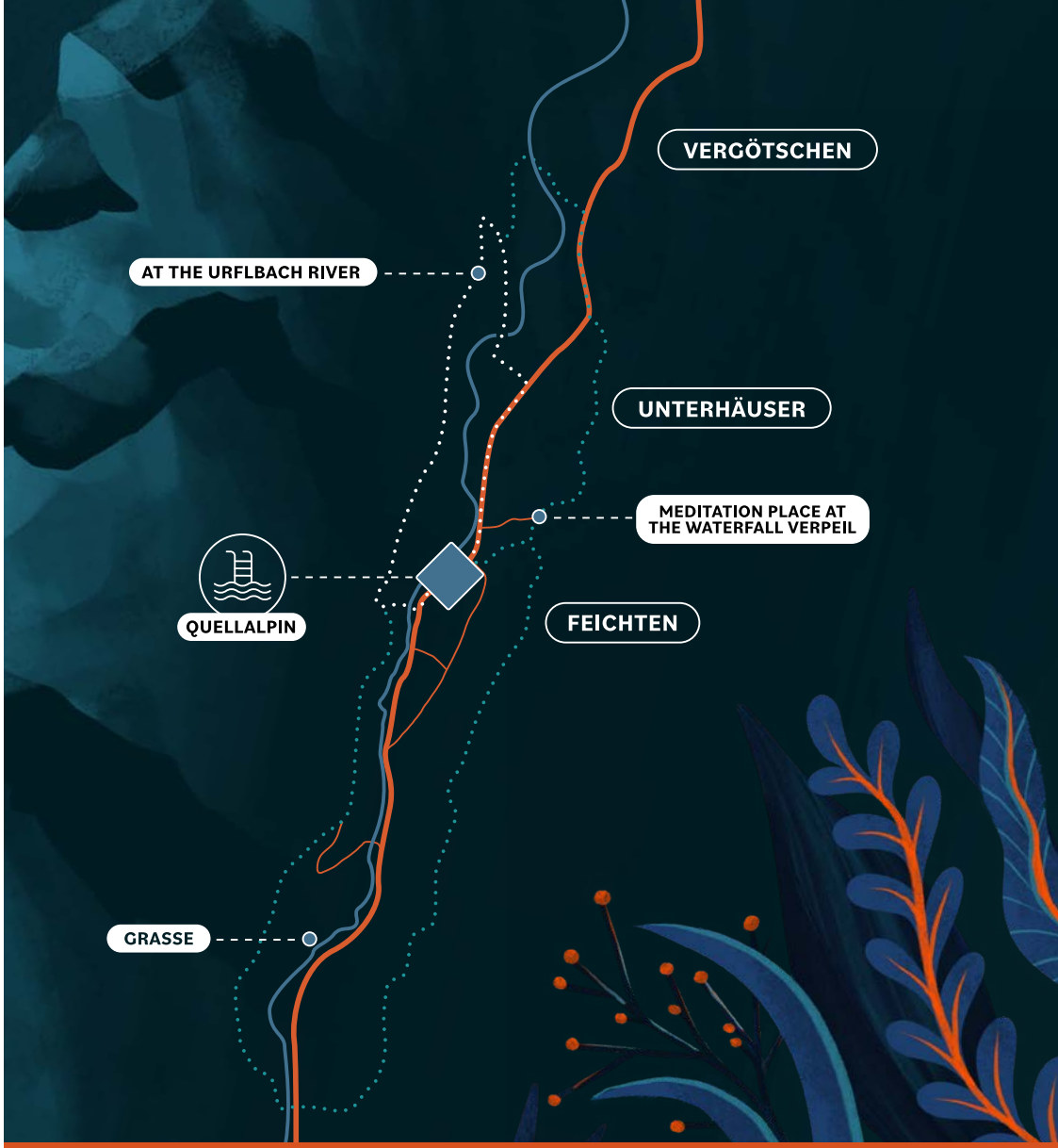
This special meditation area is located directly above the village of Feichten in the district of Mühlbach. Especially at night, the sound of the water has its own special effect! Here, on comfortable wooden loungers, you can let the night influence all your senses.

THE URFLBACH AREA

Above the meadows, along the edge of the forest, the path leads from the village of Feichten to the district of Vergötschen. At dusk, the nocturnal animals of the forest awaken here in the trees, bushes, rocks and streams. At the bench with table at the Urflbach area, listen to the animal sounds of the night with an unobstructed view of the starry sky or perhaps enjoy a nocturnal snack.

GRASSE AREA

Situated at the southern end of the village, the area between the football pitch and the Mairhofbach stream is undoubtedly one of the darkest places close to the village of Feichten. This night observation site is particularly suitable for making your first astronomical observations using the star chart.



TIP:

For an optimal experience and out of consideration for our environment, consider the code of conduct and observation tips on **p. 122-123.**

The Night-Experience Backpack allows you to enjoy a special evening with all your senses! **More info on p. 120**

Routes to Experience the Night

An observant walk at night can open up a whole new world and reveal things that normally remain hidden. It is always exciting to discover which nocturnal animals can be observed on a given evening!

The Night Nature Trail is a section of the valley hiking trail in Feichten. It leads through selected, special habitats of the Kaunertal valley cultivated landscape, which include exciting aspects and encounters with nighttime nature. These areas are also described starting on **p.44** of this guidebook and are narrated in the audio guide.

The starting point is the information office at Quellalpin in the village of Feichten. The Night Nature Trail then leads along the western side of the valley to the district of Vergötschen and in a leisurely loop along the Faggenbach stream back to Unterhäuser. You can return to Feichten in a matter of minutes on the sidewalk along the valley road.

The valley hiking trail is traversable from spring to fall, given the right conditions. Please take note of the latest information from the tourist board. Sections may still be closed in spring due to the risk of avalanches!

MAKING THE MOST OF YOUR NOCTURNAL EXPERIENCE IN NATURE:

Book the **"Night full of life" guided tour.** An expert will guide you through the special features of the Kaunertal valley at night!

Additional information is available from the tourist info office in Feichten.

Stargazing Bowl
Gepatsch

Gepatsch is a picturesque Alpine pasture at the end of the valley. It is easily accessible via the Kaunertal Glacier Road. Located around 5 kilometres from the main Alpine ridge and the Gepatschferner glacier, it is far away from artificially illuminated settlements and is the most naturally dark place in the entire valley, if not for many miles!

The connection between the truly dark and star-studded night sky and the landscape shaped by the harsh forces of prehistoric times is uniquely palpable here. After all, the balance between the forces of nature and the cultivated landscape of the Gepatschalm is a delicate one.

INFOBOX:

Note that the Gepatschweg trail is only open as a hiking trail from **Middle of July**. We respect the needs of the nesting Tengmalm's Owl.

STARGAZING BOWL

The special stargazing bowl erected in Gepatsch offers a unique opportunity to experience for yourself how our world, with us as part of the solar system, relates to stars, planets and the infinite expanse of the universe.

The stargazing bowl is in a millennia-old tradition along with other celestial observation sites in the Alps and is both a guide to gazing at the stars and a place to linger. Nowhere else can you so intensely experience the meeting of infinity and the ground beneath your feet!

The stargazing bowl is easily accessible on very easy hiking trails. Head either via the "Alter Gepatschweg" trail from the Gepatsch reservoir, or via the bridge over the "Gepatsch-Urfel," starting from the Gepatschhaus.

Star Trail

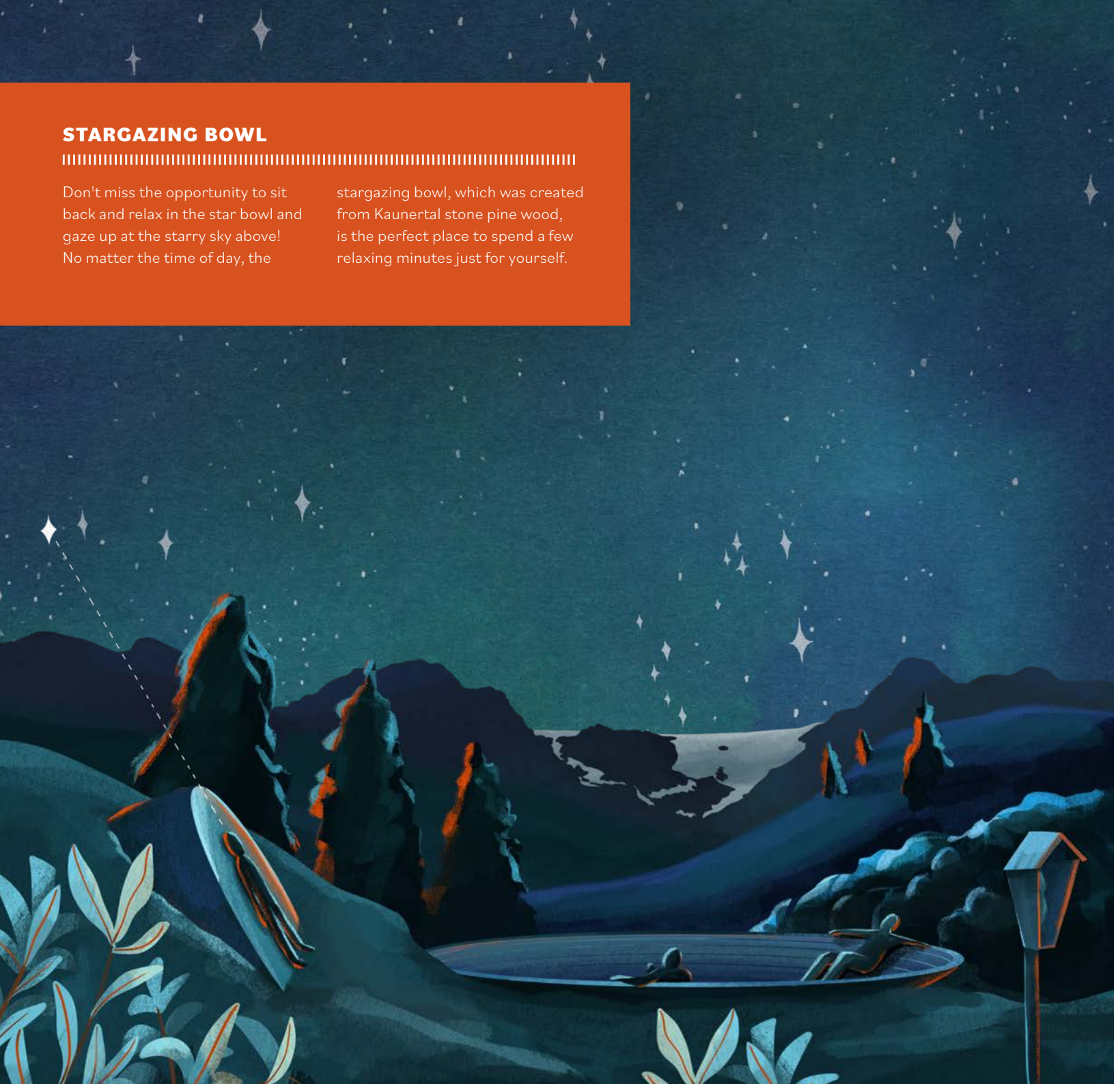
THIS IS AN ALPINE PASTURE!

To ensure that your time here at the mountain pasture is pleasant for all, please follow the Code of Conduct on *p. 122*

MAKING THE MOST OF YOUR NOCTURNAL EXPERIENCE IN NATURE:

Book the **"Starry-night hike"** guided tour, which takes place on a regular basis in summer in Gepatsch. Along the way, learn interesting facts about the starry sky from experts.

More info from the Tourist Information Office in Feichten.



STARGAZING BOWL

Don't miss the opportunity to sit back and relax in the star bowl and gaze up at the starry sky above! No matter the time of day, the stargazing bowl, which was created from Kaunertal stone pine wood, is the perfect place to spend a few relaxing minutes just for yourself.

HORIZON OBSERVATORY

If you look from the centre of the star stargazing bowl, just above the markings at the edge, your gaze will be drawn to the horizon. The specially marked points define the rising or setting of celestial bodies on special days, including:

Sunrises and sunsets at summer and winter solstice

Moonrises and moonsets at the major and minor lunar solstice

The points marked on the horizon will be continuously expanded and modified in the future by experts from the Kaunertal valley!

BENEATH THE NORTH STAR

The stone slab directly next to the stargazing bowl is at that angle to the horizon which corresponds to the latitude of this location (46°54'7.14'').

If you lean with your back against the plate, you will be standing parallel to the Earth's axis and will have the North Star directly above you!

PAVILION EXHIBITION
AT 2750 M ON THE KAUNERTAL GLACIER

Diligent use of artificial light. Experiencing starry nights

This exhibition features a unique room-within-a-room concept that teaches visitors about the inestimable value of the natural night and describes the impact of artificial light at night.

The exhibition pavilion consists of a series of panels and addresses the following themes in German: In Praise of Shadows, Night Landscapes, Astronomy, Light Overdose - Effects on Humans, Flora-Fauna-Ecosystems. Possibilities to curb light pollution are presented. There is an 8-minute film to view inside, which also deals with the history of light.

The pavilion exhibition is located at the highest point of the Kaunertal Glacier Road, at the glacier centre. The drive along the Kaunertal Glacier Road is an experience in itself: 26 kilometers, 29 hairpin bends, 1,500 meters difference in altitude are covered along the "most beautiful dead end in the world". Along the Kaunertal Glacier Road there are numerous opportunities for adventure in a breathtaking mountain and glacier panorama. The opening times of the exhibition are linked to the opening hours of the Kaunertal Glacier. These are available on the homepage kaunertaler-gletscher.at.

Night-Experience
Backpack

If you want to enjoy your own personal night experience, you can borrow a Night-Experience Backpack from the tourist information office in Feichten.

Equipped with a **seat pad** made of Tyrolean sheep's wool, a **thermos** with warming tea and a **red-light lamp,** head out into the night for a special listening experience.

The best way to do this is to download the **audio experience** to your smartphone. This is not possible in some places in the Kaunertal valley.

Now look for a suitable observation site - preferably already at dusk. Close to the village, the night experience places at the Verpeil Waterfall or the Urflbach or Grasse areas are suitable for this purpose **(p.110-111).**

If you spend the night in the Gepatschhaus, you can take advantage of the unique stargazing bowl.

Make yourself comfortable here and observe how light changes the natural environment. The approximately 20-minute listening experience in four chapters guides you into night, ensures an immersive experience and provides information about nature at night, stargazing and the influence of the stars on agricultural and forestry activities in the Kaunertal valley.

When the points of light above you begin to shine, make use of the **star map** to better **orient** yourself in the **night sky**. Be sure to use only red light and no other artificial light source. Red light has a minimal effect on your dark adaptation.

AUDIO EXPERIENCE DOWNLOAD TIPS

You can download each chapter separately as an mp3 for free and save them to your device. Alternatively, you can download the audio experience as one file by following these instructions:

LISTENING EXPERIENCE:

1. scan the QR code. Click on “Entire listening experience." A video will open. Copy the URL.

2. Open the SaveVideo.me website and enter the URL here.

3. Click the "Download" button and wait until the video is recognised.

4. Select the quality level and click “download video file"

5. The download will start. If the video starts instead of downloading, select “save video as" with the right mouse click.

Code of Conduct at Night

- The landscape and nature are meant for everyone. They are places for rest and relaxation. Do something positive for yourself and others: Help ensure that the evenings are peaceful and calm.
- Be prepared before setting off on a route. Check the difficulty, weather conditions and fitness of group members. For nighttime excursions, choose short and easy routes without obstacles.
- Stay on the marked trails - for your own safety. Do not damage our environment and our farmers' land. Be respectful of landowners!
- Take care when crossing meadows with grazing cattle. Please behave accordingly, stay calm and close all gates behind you. Grazing animals are not for cuddling or petting. Mother cows will protect their calves. Special care should be taken with dogs. Keep a safe distance! In the event of an attack, release the dog immediately.
- Especially at dawn and dusk, wildlife is very sensitive - please keep quiet.
- Rubbish has no place in nature - please take it back with you when you leave.
- Stay calm in case of an accident and make an emergency call as soon as possible. Alpine emergency call: 140. International emergency call: 112.

Tips for stargazing and observing animals at night

- Check the weather in advance. In the mountains, the weather can change rapidly and become really cold, especially at night and even in summer!
- Good, non-slip hiking boots increase surefootedness and ensure that you have a safe experience at night.
- Warm, rainproof clothing and a seat pad make things much more comfortable when stargazing. In the Kaunertal valley, and especially at high altitudes, it can be cool and damp at night even in summer.
- Please use red light lamps. They have less of an affect on wildlife and do not hamper dark adaptation. You will therefore be able to perceive the stars better.

Plight with Light

Light has fascinated people since time immemorial. Light has an emotional, aesthetic and soothingly safe effect on us. Once people learned to make fire, they soon felt a power over the darkness. More and more, they illuminated the world, leading up to the invention of the light bulb.

Light pollution is the superimposition of natural light by artificial light. **Too much light in the wrong place at the wrong time.** The resulting illumination of twilight and night has been shown to have negative impacts on our health and our ecosystems.

PLANTS, ANIMALS & ECOSYSTEMS

Nighttime is not necessarily bedtime, at least not for many animals. Some only wake up when the sun goes down! About two-thirds of the world's animal species are nocturnal, including about half of all insect species. Nocturnal animals rely on darkness and natural light from the moon and stars to successfully orient themselves, move, reproduce, hunt or forage, not to mention avoiding predators and competitors for food. Artificial light at night affects vital life functions and processes as well as animal behaviour. This can manifest itself in attraction, displacement, or loss of orientation.

Light pollution further accelerates the current biodiversity crisis! In addition to the death of individuals, species shifts occur within communities. This can lead to the extinction of isolated populations, especially habitat-dependent, specialised and endangered species.

People increasingly feel disturbed by the excessive use of light by their neighbours. At least people have the opportunity to speak to one another to come to a solution. If you have the secretive, endangered Garden Dormouse as a neighbour, however, it is critical to know that it is a nocturnal rodent and needs darkness to avoid predators and to forage with its sensitive, specially adapted senses. The dormouse is an omnivore and will even eat slugs. Garden Dormice also like to live in the forest, in spite their common name. Nocturnal artificial light reduces and fragments mammalian habitat. The risk of ending up as easy prey is dramatically increased! Even full moon brightness (max. 0.3 lx) causes reduced activity and feeding in many rodents. In fact, plants also regenerate at night. Continuous exposure to light damages their photosynthetic ability.

HUMAN HEALTH

People in economically highly developed countries spend a significant amount of their lives in artificial light. It's worth recognising, however, that the ability to extend the day with artificial light has drawbacks as well. Our bodies produce the hormone melatonin only in the dark evening and night hours. Melatonin controls our sleep-wake rhythm. Blue light, as often emitted by screens, inhibits the formation of melatonin, which disrupts the sleep-wake cycle. Distorted sleep rhythms have been linked to a wide variety of diseases. Excessive use of artificial light in the evening hours and room brightening in our bedrooms can directly threaten our health!

THE STARRY SKY IS A CULTURAL ASSET

Light pollution denies us a view into the stars above. The ability to appreciate the cosmos helps us to reflect on who we are. It also helps us to better understand our place in the universe and to better navigate our way around it. Spending time in a naturally dark night landscapes is a special experience thanks to the magical interplay of shadows, celestial bodies and the shift of our perception to intense auditory and olfactory experiences. The night in all its facets is connected to our identity as human beings. If we lose the natural night sky, we lose, in a sense, a part of ourselves and our connection to nature.

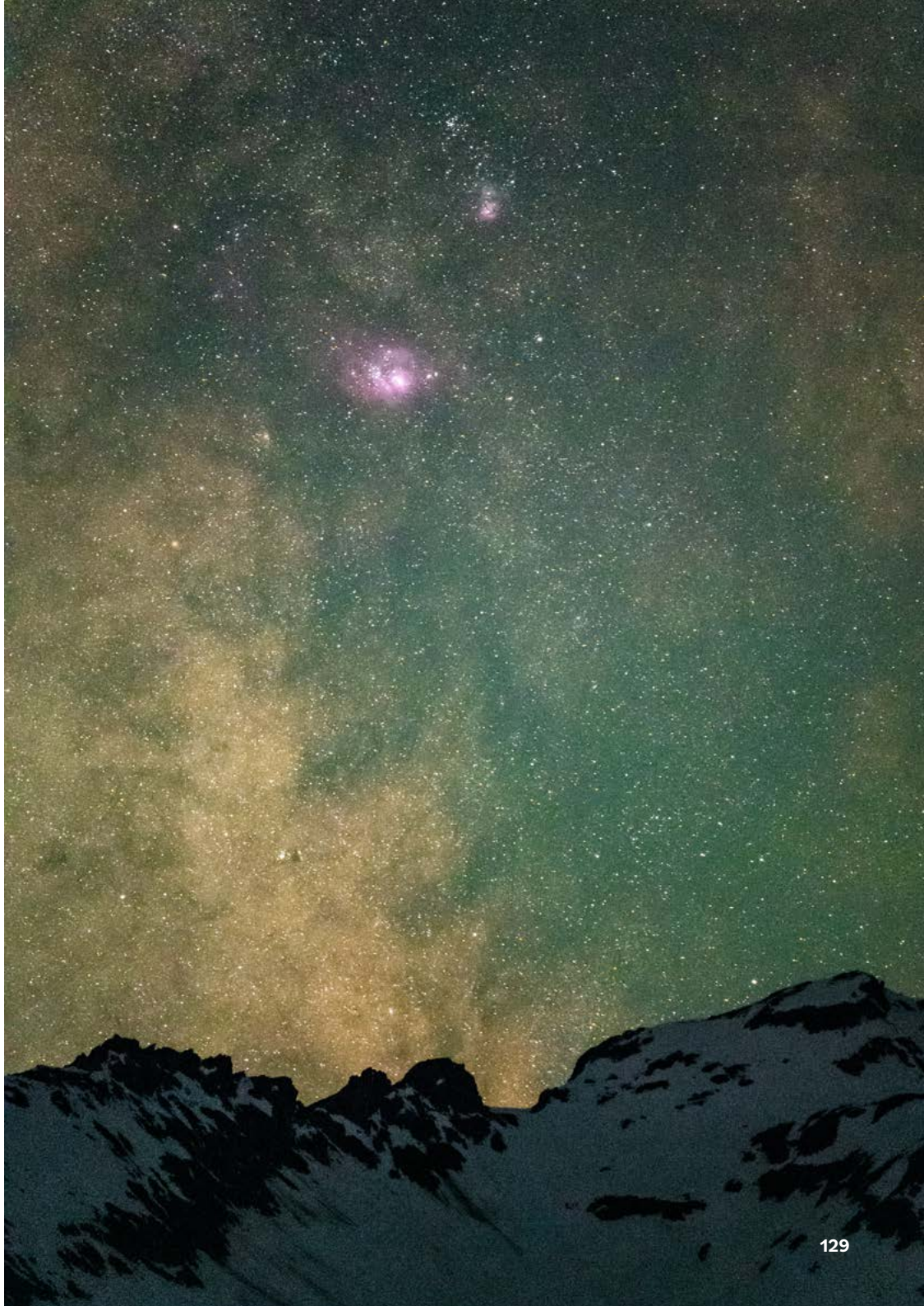
Light pollution–
What you can do about it

Light pollution can be reduced without sacrificing the benefits of artificial light. The following principles apply to "good" lighting:

- **Use lighting only where it is required.**
- **Help preserve contiguous areas of darkness.**
- **Use of targeted and fully shielded lighting and do not illuminate beyond the usable area.**
- **Do not use spotlighting to highlight plants or bodies of water at night.**
  Use night switch-off, night dimming and intelligent control systems.
- **Use warm white LEDs (below 3000 Kelvin) or amber LEDs (below 2200 Kelvin).**
- **Adjust brightness to the visual requirements of the environment.**
- **When it comes to public or commercial lighting, invest in prudent lighting design and long-lasting lighting technology with easily replaceable components.**

MORE INFO:

www.hellenot.org



The History of Light in the Kaunertal Valley

When and how did electric light first arrive in the Kaunertal valley? How is light managed today? Two former mayors of the Kaunertal valley tell their stories.

According to Former Mayor Eugen Larcher: *"In the Kaunertal valley, a municipal plant was built as early as 1924. What did people do for electricity before that? In every room there was a light bulb or perhaps there was an iron plugged in, but not much else. That was enough, after all, my generation experienced such times. In 1952, the power plant burned down. As a result, we were without power in that winter for month. We had only candlelight. In the barns, everywhere. A larger power plant was then built in 1953/54. At that time, the first electric stoves were introduced and things like that. Soon, people had to have so much more. And through the construction of the power plant, TIWAG (Tiroler Wasserkraft AG) soon stepped in. We have actually been connected to TIWAG since the mid-fifties. The first street lighting came into play at the beginning of the 1960s. At that time there were 10 street lamps! And then in the late seventies, we totally stepped things up."*

Until a few years ago, when the power lines were all above ground, it was probably more common for there to be no electricity for a few days in winter because an avalanche had damaged the lines. Today, however, as Eugen Larcher points out, the Kaunertal valley *"actually still has well-functioning street lighting."* And the people of Kaunertal valley are doing their best to contain their light pollution.

The story behind this is told by Former Mayor Josef Raich: *"A few years ago, we converted the street lighting to LED, and aligned the lamps so that the light shines downward rather than upward. And we reduce the brightness of the lights several times during the night. In addition to having a positive lighting effect, this also saves energy costs. We saved about 30% in electricity costs by making the switch."*

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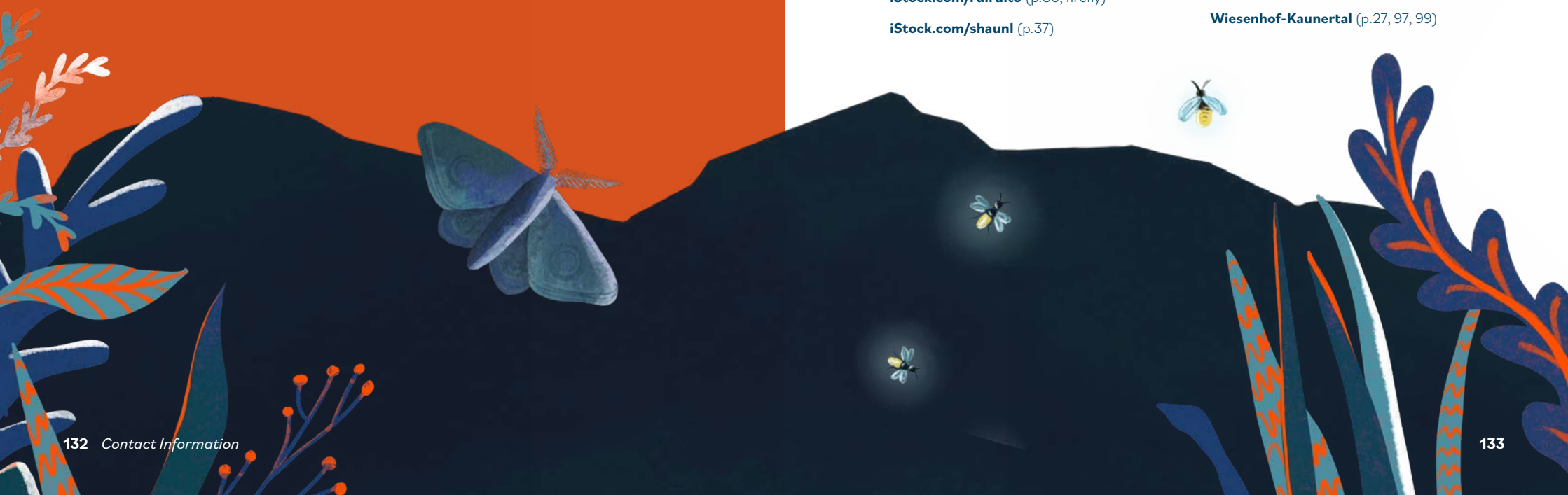

IMAGE SOURCES

Bennet Thimothee (p.82, European snow vole)

commons.wikimedia.org/Hectonichus (p.59, Setina aurita, Epione vespertaria)

commons.wikimedia.org/Jeffdelonge) (p.59, Odezia atrata)

Falchi et al. (2016): Supplement to: The New World Atlas of Artificial Night Sky Brightness. GFZ Data Services. http://doi.org/10.5880/GFZ.1.4.2016.001; Falchi et al. (2016): The new world atlas of artificial night sky brightness. Science Advances. 2016 Jun 1;2(6):e1600377. (p.12)

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Kirschner Andreas, webart.at (p.24, 31, 34, 53, 94, 96)

Lugerbauer Katrin (p.48, glowing mush-rooms)

Malin Christoph, christophmalin.at (p.9, 23, 32, 87, 126, 129)

Kaunergrat Nature Park - Auer Bernhard (p.43)

Ospanova Zarina (p.101)

Pixabay (p.11, 33, 45, 49, 52, 56, 58, 66, 70, 74, 75, 89, 103, 104, 113)

Pontasch Stefanie (p.63, Brown Long-Eared Bat, p.79)

Schattanek Petra (p.63 Common Pipistrelle)

Suchy Stefanie: Storyboard (p.50-51, 57, 60, 125)

TVB Tiroler Oberland - Kaunertal - Thomas Vielgut (p.10)

Wiesenhof-Kaunertal (p.27, 97, 99)

Here in one of the darkest places in Europe, completely devoid of artificial light, it's actually not all that dark. On the contrary, the landscape is illuminated by the light of the stars above.

These stars, that we never see in cities, now shine so brightly that they are our only source of light, and we can still see at night. The light from the stars is so strong here that it even casts diffuse shadows on the ground.

In such places, we are very close to the universe. The mountains rise high into the starry sky. It looks as if the peaks of our mountains and the stars might touch. We become one with the heavens and the Earth. And we are one. One universe. One natural environment.

The Milky Way is reflected in the small pond. It's almost as if the stars fell from the sky to gather in the water. In a sense they did: as the light has collected here... light from suns so far away, which has been travelling to us for so many years, is now hitting this Earthly surface. Here the light particles from the universe and the water particles from the Earth meet and mix to ONE.

A frog jumps and breaks the surface of the water. He bathes in the Milky Way. And we can see it! But this is only possible when we keep our lights off: otherwise this magic would be extinguished.

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