

# Travel:

## Lac Souterrain de Saint-Léonard: Show Cave with the Largest Underground Lake in Europe

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Lac Souterrain de Saint-Léonard (French) translates to English as 'Underground Lake of Saint-Léonard' and is located at Saint Léonard in the canton of Valais, Switzerland, part of the Alps Mountain range between Sion and Sierre. The cave entrance is close to the valley floor, nestled in a rich wine growing area surrounded by towering mountains. The tops of some mountains are covered in snow all year round. Stretching from the valley to high on the mountain sides, large rock wall terraces clinging to the steep slopes, are cultivated with grape vines. It is truly breathtaking scenery above ground, but what is hidden below ground is absolutely amazing.

*Figure 1: Vineyards cover the terraces at St Léonard, Switzerland(left)*

This show cave lays claim to containing the largest underground navigable lake in Europe. It measures 260 metres long x 20 metres wide and has a depth up to 10 metres of crystal-clear water. The lake surface area is approximately 6000 square metres and is between 30 and 70 metres beneath the vineyard. The entire length of the cave is 1400 metres, however a rockpile collapse at the end of the lake, blocks tourist access to the dry passage beyond which is accessible only to speleologists (SWI 2022). The Lac Souterrain website advertises the lake as being 300 metres long, however this appears to be including the bits of dry passage at the entrance and from the end of the lake to the rockpile. Other than the bats which use the cave at the end of autumn and the introduced trout, there is very little in the way of fauna (Wikipedia 2022).

### Geology

The cave was formed by groundwater dissolving away Triassic gypsum beds that are emplaced within less pervious Carboniferous strata. The gypsum is preferentially eroded away as it is more soluble than the surrounding rock strata of slate and marble.

While the formation of the rocks in this region was spread over tens of millions of years (beginning of the Mesozoic era through to the Tertiary), the cave is believed to have formed between the late and postglacial period, which is very young on the scale of the earth's history (Futura 2022).

### History

The local inhabitants of Saint Léonard and the surrounding area had known of the existence of groundwater for a long time. The current cave entrance was difficult to access as it was completely covered with vegetation, however a few winegrowers did use the pond at the entrance to cool their bottles of "Fendant" (wine made from Valais Chasselas grapes), as the water remained at a constant 11°C (52°F) year-round. The cave beyond was not obvious at the time as the height of the pond exceeded the height of the cave ceiling.

During spring of 1943 the water level lowered to reveal a large cave beyond the known pond.

Local residents contacted the Swiss Speleological Society to inform them of the cave. The then president, Jean-Jacques Pittard, was accompanied by Jacques Della Santa to investigate (Lac Souterrain de St-Leonard 2022, Futura 2022, SWI 2022). Equipped with acetylene headlamps and an inflatable boat, the two men undertook the exploration during Easter 1943. They travelled the full length of the lake and guessed its length to be several hundred metres. Their journey was difficult because in parts the air space was only a few tens of centimetres.

After several hours inside they returned to the entrance and reported on the amazing beauty of the cave. The following year, soldiers specializing in underground reconnaissance carried out the complete topographical survey of the cave (Futura 2022).

At 5.32 pm on 25 January 1946, an earthquake measuring 6.1 on the Richter scale, with its epicentre in the Sion-Ayent region (Bernardi et al. 2005), rocked the area and caused major cracks in the cave side walls and lake bottom. These cracks allowed a greater loss of water to escape from the cave and flow into the water table. As a consequence, the water level dropped more than 15 metres, making the lake more easily navigable (Lac Souterrain de St-Leonard 2022, SWI 2022). Over time the cracks in the lake bottom are gradually being sealed by fine particles of clay and gypsum.

Driven by the motivation of two young Léonardins, the municipality of Saint Léonard granted them a commercial concession in 1949. Visits were organized using a boat made in the village. In the 1950s, the municipality established a new mining concession, and the cave was named “Lac Souterrain de Saint Léonard”. Around this time new barges were added and electric lighting installed.

In October 2000 a huge section of rock weighing several tons broke off the cave roof at the embarking point, completely crushing one of the visitor barges (SWI 2022). One could imagine the worst if the fall had taken place during a tour.

This almost led to the indefinite closure of the cave, however aware of the importance of this tourist attraction, the municipality of Saint Leonard voted to provide a credit of two million francs to secure the cave roof. Between 2000 and June 2002, access to the lake was closed while stabilisation work was undertaken. This involved draining the 18 million litres of lake water and refilling it once work was completed (SWI 2022). To stabilize the rock, more than 5000 rock bolts were driven into the ceiling\*. A substantial number of the bolts are very large and many metres long. During the closure the boat boarding area was also redesigned.

Today the cave is one of the most visited in Switzerland and attracts more than 100,000 people every year (SWI 2022).

### Cave Tours

Visitors are asked to be at the reception area at least 15 minutes before the start of their tour. At the visitor entrance, guests have their QR code scanned from their booking confirmation email and are provided with a printed ticket indicating their designated boat and departure time. While waiting for the tour to start, visitors can enjoy a cake and coffee in the gift shop or browse the rock and mineral samples for sale. There is also a terrace and slippery slide for the children to play on and an education area with information about the formation of the Alps and the lake cave.

At the allotted time the guide leads visitors down the 50-step metal staircase to the platform and jetty at the lake edge. There are several large row boats (barges) tied up and visitors are directed to board their allotted boat, the largest of which can carry up to 40 passengers.

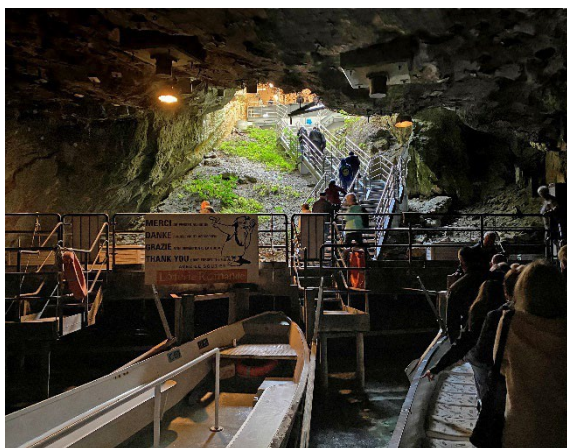


Figure 2: Looking out the entrance of the cave (left)



Figure 3: Start of the tour at Lac Souterrain (right)

One is immediately awestruck by the beauty of the illuminated lake stretching down the sculptured passage. There are perfect mirror image reflections on the motionless lake surface. Fluorescent colours of turquoise and aqua emanate from the water and provide an eerie atmosphere.



Our guide boards last and sets the boat adrift from its mooring. He starts slowly rowing as he begins a well-rehearsed welcome spiel in German, French and English. Tours are available in other languages on request depending on availability of guides.

Some lights point along the cave walls while others are directed into the crystal-clear water. The lighting appears to be a mixture of incandescent (orange yellow) and fluorescent (blue), or possibly a mixture of LEDs warm and cool white, which provide different colour casts. At each light, the crystal-clear deep water glows either brilliant turquoise or aqua colour. There may be some lights with lightly coloured filters over the fittings to enhance the water's natural turquoise colour.

As we slowly glide down the illuminated passage our guide tells us about the geology, history and features of the lake cave. Wall mounted lights illuminate three sunken wooden boats in the deep crystal-clear water. These boats were deliberately sunk in the past to add additional points of interest for visitors (SWI 2022).

Despite our guide delivering his multi-lingual commentary in three languages, I did have lots of trouble understanding his English and, on the whole, comprehended very little of the explanation about the cave. Luckily, I had read the English literature about the cave on the internet before the tour.

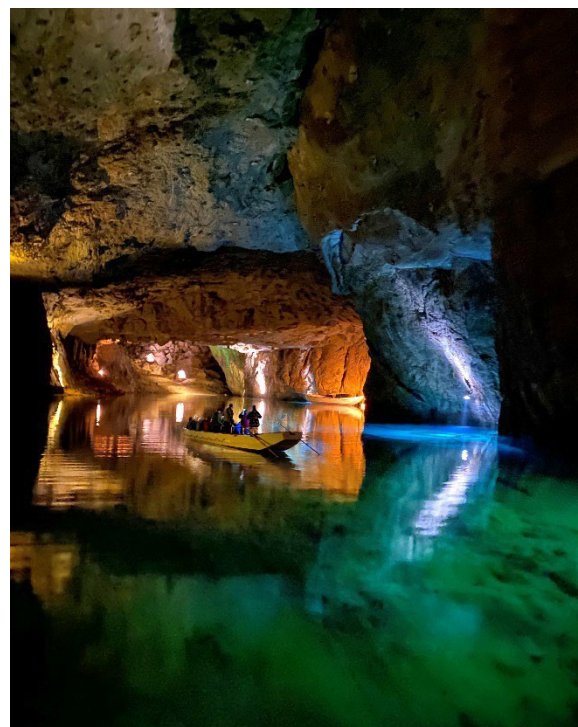


Figure 2: Lac Souterrain de St Léonard (above)

There are quite a few very large fish (trout) swimming well inside the cave. They become quite lively as our boat approaches the back of the cave. It appears the guide had thrown some food in the water as we passed one of the lights. I asked the guide at the end of the tour whether the fish were introduced to the cave. He said, “yes a long time ago”, and that they periodically replenish the fish stock as they die, presumably from old age.

Large sections of the cave roof are covered in very large rock bolts in order to stabilise the more brittle gypsum and reduce the risk of collapse. Most tourists would not particularly notice the bolts across the roof as the lighting is installed so as to not highlight them, however I was specifically looking for speleothems and at the geology. The cave appears to be devoid of speleothems throughout its length.

Non-flash photography is allowed, so I needed to change my digital camera onto a very high sensitivity ISO setting to get reasonable images. I also used my phone camera, which did capture quite reasonable images in the low light situation, provided it was held still enough while taking the photo. A bit of a challenge in a slowly moving boat.

Our guide slowly rows our boat containing 40 visitors along the length of the cave while providing a well-rehearsed commentary of things we were passing, such as the three sunken boats, trout, geology and cave history. At the turnaround point at the end of the lake, our guide explains that there are periodically recitals played by musicians on a barge and that the sound of their orchestral performance is enhanced by the acoustic qualities of the cave. Speakers mounted somewhere in the cave provide a short example of the cave's acoustics. This was very tastefully presented, and it certainly highlighted the wonderful acoustic sound that is produced in this subterranean world.

The tour of this amazing and tranquil place via boat, lasts approximately 30 minutes. A short but memorable experience.

### Getting to the Cave

Like (almost) everything in Switzerland, the cave can easily be visited using public transport. An easy option is to catch the train to Saint Léonard station, then there is a 15-minute walk (1.1 km) to the cave. Visitors travelling by car can park at the large free parking area less than 100 metres from the cave. From the carpark there is a concrete staircase alongside a paved ramp. There are toilet amenities in the carpark as well as at the reception building. The cave is accessed through the reception building at the back of the gift shop.

## Booking Tours

Online booking with a credit card is required via the website [www.lac-souterrain.com](http://www.lac-souterrain.com), as access is not guaranteed without an online booking. When booked online an email is sent to the purchaser, so that the E-ticket barcode can be presented when checking in for the cave tour. If there are available places on tours, tickets can be purchased in person at the ticket counter in the reception building.

Note that the website booking will only allow credit card payments (not direct debit), to secure cave tour tickets. I found there was an issue with using a debit card (that can also be used as a credit card) for payments through this website. The online application form for tickets, requires a security code to be sent to my mobile phone (as listed in my bank's database), and then entered into the website before payment would be accepted. This can be very frustrating if you don't have your Australian mobile phone set up for international roaming while in Switzerland. In my case I had purchased a new SIM card to use while in Europe, however as Switzerland is not in the EU, it didn't work when I crossed the border.

Cave tours are organized daily from mid-March to 1 November, from 10am to 5pm with the exception of July and August when opening time is from 9am to 5.30pm.

Ticket-prices are 12 CHF (Swiss Francs) for adults and 7 CHF for children 5-15 years old. Under 5s are admitted free of charge, however a "Free Ticket" must be booked to save them a seat.

The website suggests that visitors arrive at least 15 minutes earlier than their booked tour to allow time for check-in. Visitors are also advised to bring a jacket as it is between 11 and 12°C in the cave.

Unfortunately, the cave cannot be accessed by wheelchair due to the steps and transfer to boats. Understandably swimming and diving are prohibited.

Special concert tours are periodically scheduled and can be booked in advance. The artistic performances take place on the lake toward the back of the cave. The musicians perform on a boat reserved for them while guests are on other boats only a few meters away. Numbers are limited, so reservations are mandatory and can be made directly online.



### Cave administration contact details:

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Case postale 75  
Rue du Lac 21  
1958 Saint Léonard, Suisse  
Email: [admin@lac-souterrain.com](mailto:admin@lac-souterrain.com)  
Telephone: +41 027 203 22 66  
Website [www.lac-souterrain.com](http://www.lac-souterrain.com)

Figure 5: Reception building and café (left)

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\*Andy Spate visited the cave in 2005 and was greatly impressed by the scale of the rock bolting and images in the visitor centre showing heavy earthmoving machinery trundling around on the drained lake bottom!

