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The Pioneers of Cretan Speleology (Greece) I: Paul Faure

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Abstract

Speleology is its people. Crete is a Greek island with more than 5.000 registered caves and pot halls, with significant importance from the aspect of their archaeological past and recent history and tradition. In this paper we will discuss the first steps of speleology in the island of Crete, the contribution of its people, mainly of Eleftherios Platakis, the "father" of speleology in Crete; Paul Faure, the French scholar, whose his major work was about the religious aspect of caves in Crete in the Minoan Period, investigating lots of caves during his scientific trips to the island; Antonios Plimakis, the western Cretan passionate with mountains and caves, whose work and publications put the foundations for many others to follow. Also, we will present the first speleological clubs in Crete, as departments of Hellenic Speleological Society. It is a tribute to the pioneers and the history of Cretan Speleology. In this paper, we will present, Paul Faure.

Résumé

Les pionniers de la spéléologie crétoise. I : Paul Faure. La spéléologie, ce sont d'abord des personnes. En Crète, plus de 5000 grottes et gouffres ont été recensés, intéressant sur le plan archéologique, archéologique et ethnologique. Nous souhaitons faire revivre les premières étapes de la spéléologie en Crète à travers ses grands hommes : Eleftherios Platakis, père de la spéléologie crétoise ; Paul Faure, universitaire français qui visita de nombreuses grottes lors de ses séjours sur l'île dans le cadre de ses recherches sur la religion à l'époque minoenne ; Antonios Plimakis qui ouvrit la voie à de nombreux continuateurs. Nous commencerons dans cet article par l'évocation de Paul Faure.

1. Introduction

Anna Petrocheilou notes that *"Greece has been characterized as the first country of the caves in relation to its area because it is covered by about 65 % of limestone rocks. But the most favored region is Crete"* (PETROCHEILOU 1989, 236 and 2002), because the composition of the rocks of the island, their tectonic structure and other secondary factors, provide the opportunity to the water, which circulates to the surface and underground, to create a multitude and variety of karst forms (caves, caverns, potholes, sinkholes, dolines, poljes, natural bridges, gorges, etc.) mainly in limestone rocks. As Platakis mentions in 1973, *"after the rapid progress of speleological research in Crete, especially in the last two decades, we know a lot about its caves and we do not exaggerate if we say, that this is the most fully studied speleological area of our country"* (PLATAKIS 1973, 10).

Crete was known for its caves from antiquity. There are references about the most well-known caves in at least 56 ancient writers from Homer in 8th c. B.C. to 12th c. A.C. and in inscriptions (found in Crete), according to Platakis (1973), mainly of that of Diktaion Antron and Ideon Antron the birthplaces of the father of the Greek Gods, Zeus (Nilsson, 1990). Ancient worshippers were visiting the important sacred caves of Crete, as we can see from an inscription on the wall outside of the entrance of Melidoni cave (GUADRUCCI 1939).

In later centuries, many European travelers and historians have visited Cretan caves and many of them, wrote about them, from Florentinian Christophorus Buondelmonti in 15th c. A.C. (to whom belongs the most ancient drawing of

cave worldwide, that of the Labyrinth of Crete, dated back to 1414, according to CHIROL 2017, 417) to the English captain (and spy) Thomas Abel Brimage Spratt in 19th century (PLATAKIS 1973).

From the second half of the 19th century, there is a growing interest in the Cretan Minoan antiquities, and from the beginning of the 20th century, the first Paleontological – Geological and Biospeleological research are contacted in Cretan caves.

But the growth of speleological research begins in the 20th century, with the second half of that century being the most productive period in archeological, geological, and biospeleological systematic researches about the Cretan caves.



Figure 1: Paul Faure and Eleftherios Platakis in 1967.

This is the period of the main and most important researchers, Eleftherios Platakis and Paul Faure (Figure 1), as well as many other amateurs who, many of them, were trained by Eleftherios Platakis and formed the members of the Department of Crete (founded in 1962) of the Hellenic Speleological Society (founded in 1950).

I aimed to present in this paper a few of the most important personalities of the exploration and study of the Cretan caves and the founders of Cretan Speleology, such as Eleftherios Platakis, Paul Faure, Antonios Plymakis, Christos

Makris, and others, but the work of each one is so huge, exquisite and unique that can not be described in just four pages. Consequently, I have decided to talk about the work of the only non-Cretan, and one of the most productive, the French scholar, Professor Paul Faure, on the occasion that the 18th ICS is held in France. More papers will follow, as a tribute to all those who contributed to this topic and are considered the pioneers together with Eleftherios Platakis and Paul Faure.

2. Paul Faure

Paul Faure (Figure 2) was born in Paris on 1st January 1916 and died in Paris at 13th July 2007. He attended the school at Lycées Montaigne and Louis-le-Grand in Paris. He graduated from the École Normale Supérieure (ENS) de Paris (Faculté des lettres) in 1938 and he also studied at the Institut d'Art et d'Archéologie and the École du Louvre in 1939. In 1940-1943, he studies at the ENS for a master degree with the thesis "La légende de Thésée d'après quelques chapitres de Plutarque" and he was admitted at the Agrégation de Lettres. In 1965 he defends his PhD at Paris. He worked as a teacher at various French Lycées from 1943 until 1948 (Amiens, Villemomble, Henri-IV in Paris), the French Institute at Vienna (1949-1950) and in preparatory classes at Henri IV (1951-1955). He taught at French Universities starting from 1955 until his retirement in 1984 (Faculté des Lettres at Paris University, Faculté des Lettres at Nancy University and University of Clermont-Ferrand II) (PLATAKIS 1964 and 1973, DRIESSEN-GAIGNEROT 2009).



Figure 2: Paul Faure

Expeditions in Crete and publications

He had started in 1946 under the guidance of Dr. Charles Picard to prepare a doctorate thesis on the Greek myth of the divine child, with no results ("*Depuis 6 ans, sous la direction de feu Charles Picard, je préparais une thèse de doctorat sur le mythe grec du divin enfant et je n'aboutissais*

à rien", PLATAKIS 1973, 397, on Faure's own words). It was in 1952, when he contacted Fernand Chapouthier, excavator at the Minoan Palace of Malia, Crete, who has advised him to visit and examine first-hand and see by his own eyes the original places "*such as the mountains, the caves, the springs, all the sacred places where the Greek gods were born*" (FAURE 1964; PLATAKIS 1973). He also recommended him to the Department of Cultural Relations from where he got his first mission grant to visit Crete in summer 1953 for a month and a half in an "in situ" investigation. In this period, he has visited 32 caves of archaeological interest 20 known already by the Travellers in previous centuries and by archaeological excavations and 12 new discoveries by him. More research campaigns followed every summer for the next decade, sometimes twice per year, funded by the Direction des Relations Culturelles and the Centre National de la Recherche Scientifique (PLATAKIS, 1973; FAURE, 1964; DRIESSEN-GAIGNEROT, 2009).

In the first decade, it seems that his main interest was the discovery and visiting of the caves and the collection of information. Until 1962 he had made a catalog of 747 caves, and he had visited 400 of them (PLATAKIS 1973; FAURE 1964). His first article about Cretan Caves and their exploration was published in 1955 and his last in 1977.

He published numerous papers, concerning the Cretan caves in international periodicals, he participated in Congresses and he wrote two very important books about the Cretan caves: *Fonctions des caverns crétoises* in 1964 with information on the usage of Cretan caves in the past till present (FAURE, 1964), a book "*so important and necessary for all the next speleological researches that are to follow in Crete*", as Platakis writes (1973, 396) and "*The Sacred Caves of Crete*" (1996), his last book, published in Greek, with bibliography, description of the cave and its surrounding and archeological and other important information for 70 caves considered sacred in the ancient times (FAURE, 1996). He was interested in the religious aspect and usage of caves from the ancient Minoans, the well-known Bronze Age Cretan civilization as well as modern Cretans (they continue to build churches in small caves and rock shelters, often in places that they were sacred in the past). He was the scholar who introduced the seven important elements for a cave to be considered sacred in the ancient world of Crete (FAURE, 1996).

He continues to visit Crete for the next years (until 1996), for his expeditions and field works in caves (until 1977), or researches on the other fields of his scientific interests, concerning Minoan Civilization and the History of Crete, or

participating in all “International Cretological Conferences (1st in 1961 until 8th in 1996) and others organized by the Hellenic Speleological Society (1963: 1^{er} Colloque International de Spéléologie de Grèce, 1971: 2^{ème} Colloque International de Spéléologie de Grèce) (PLATAKIS, 1973; DRIESSEN-GAIGNEROT, 2009).

His scientific interests concerning the island of Crete and his ancient and modern civilization in a more ethnographic perspective, expand to the topics related not only to the caves and their religious and sacred perspective, but also to other deities, the Peak Sanctuaries, the Minoan palaces, the labyrinth, the ancient mines, and the metallurgy, the ancient origin of the names of the places, the interpretation of ancient Minoan writing (Linear A and B) and other inscriptions, the discovery of the ancient cities of the island (100 according to Homer), as well as the history, historical geography and linguistics of the Mediterranean, and especially of Crete (PLATAKIS, 1973). He also wrote books and numerous articles about ancient Greek and Near East civilizations. His bibliography comprises more than 100 articles and books, published between 1949 and 2003.

He walked Crete many times alone from the one edge to the other, and other times he had in company Eleftherios Platakis and others, guides and local friends, and they together had visited the villages for explorations or for collecting information. They were continuing for the rest of the year processing this information and exchanging opinions and ideas in a vast and rich mail (MAKRIS, 2008). Platakis notes that “*Few of the researchers know Crete as Paul Faure, he always prefers the on-site research, and the knowledge derives from autopsy and not the theoretical research derived from the office or the study, which alone, without the knowledge of places and things it is not possible to give the correct solution to the relevant problems*” (PLATAKIS, 1973, 396). And as Faure mentions: “*to come to Crete, to cross the island, more often on foot, to research, to verify, to discover. The number of caves I visited myself and took notes, made reports, took photos, revealed dimensions, noted the temperature, humidity, altitude, etc. exceeds four hundred.*” (PLATAKIS, 1973, 398).

Paul Faure, recognizing the contribution of the local people of Crete, who were those who gave him all the information he needed, not only the people of the villages but also his companions to the field trips and the scholars with whom he discusses the scientific information and his theories, he expresses his appreciation many times in his writings “*But one more time, none of these would be accomplished without the friendship and the cooperation of the Cretan people. They should be given all the honor and thanks*” (PLATAKIS, 1973, 401). According to his grand daughter, Florence Driessen-Gaignerot, “*What drove Paul Faure along this path? He would often say that he had set out for Crete in search of the gods and instead had found men. And indeed [...] what was to him the most important: the close friendships that he formed with Cretan villagers, whether farmers or teachers, and his strong ties with various local cultural authorities. [...] we must also remember that behind each toponym, behind each place, lies also a personality, the shepherd who showed him the way, the friend who kept him company on the journey, the host who welcomed him into his home, offering him bread and wine, inviting him to a daughter's wedding.*” (DRIESSEN-GAIGNEROT, 2009, 137).

He, himself, explains his method for retrieving information: “*I attempt to find out from the inhabitants of modern Crete where the caves of their villages are located, not the best known but the best hidden, the ones that are considered to contain, if not treasures, at least remnants of ancient times. And here I must mention that a great expert in the natural sciences of Crete, the President of the Department of Crete of the Hellenic Speleological Society, Mr. Eleftherios Platakis, helped me incalculably in this work. Without his relentless action and his great kindness since I met him personally (Wednesday, September 6, 1961) I could not have seen and learned everything I saw and learned. To him and the people of Crete, the sailors, the shepherds, the villagers, the teachers, the priests, etc. is awarded any price of what I discovered. Undoubtedly, this method will not seem very accurate to future researchers: it will appear to be directly connected to random information, that it is incoherent, incomplete, without a system. But how else can one act if we do not cross the countryside slowly, asking elderly villagers we meet, getting guides, whom we pay more and more, and penetrating the caves ourselves? A whole human life would not be enough to get to know the 3.300 karst forms that have already been recorded: so one must proceed not systematically and exhaustively, but first visit what the inhabitants themselves characterize as the most important. And finally, he has to gain their trust and friendship, because they are suspicious, they do not want to make public the caves of refuge, the κρησφύγετα, they believe that we will discover a treasure instead of them or that we will exhaust or contaminate a place with water, we will desecrate a sacred place. Cave archeology must be linked here to psychology and diplomacy.*” (PLATAKIS, 1973, 399).

Honorary events

His contribution to the development of Greek History was recognized by many authorities and institutions in Greece and Crete. He was a Doctor Honoris Causa at the University of Athens in 2003. The Hellenic Speleological Society, recognizing the great offer of Paul Faure, announced him an honorary member (PETROCHEILOU, 1989). Faure was made an honorary citizen of the Municipality of Heraklion, Crete in 1992, because of his strong interest in the history and civilization of the island. And finally, at the 3rd Pancretan Speleological Symposium, held in Rethymnon Crete in 2006, the Department of West Crete of Hellenic Speleological Society suggested, and approved by the participants in the conference, to honor Paul Faure by giving his name in one of the caves he explored (the cave Kalika or Notiki Tripa- South Hole- at the village Nithavri in the Amari Region, Rethymnon Prefecture, with an ancient inscription of the name ONYMA[P]XOC, at the entrance, that was discovered by Faure (FAURE, 1996). He was invited to participate, but he was too old and ill to make this trip, as he writes in his letter. The ceremony was finally held on the 13th of July in 2008, a year after his death, as a memorial (ARETAKI et al, 2008).

What the others say about Paul Faure

His friend and companion in many explorations, Eleftherios Platakis (1964, 565) writes about Faure: “*The caves of Crete [...] found in the person of the eminent French Professor of the University of Paris, archaeologist, philologist and speleologist, Mr. PAUL FAURE, the excellent and ruthless*

researcher. He repeatedly traveled through Crete from one end to the other and visited and studied hundreds of caves. Gifted with admirable sharpness, research ability, language learning, thorough scientific training, proverbial kindness, simplicity, and excellent character, he was loved and appreciated, as few, by the Cretans. He admires and loves Crete. An example of his feelings towards Crete and the Cretans is the fervor with which she so successfully engages in his research on the island. The writer gratefully dedicates these letters to the distinguished and humble Scientist, and a respected friend and valuable collaborator”.

Christos Makris (2008, 19), another important researcher and scholar characterizes Paul Faure as "The famous friend of the shepherds and farmers of Crete and her strolling lover, as his idealized mistress". His granddaughter, Florence

Driessen-Gaignerot, an archeologist who contacts archeological excavations on the island of Crete at the site Anavlochos, a place close to the birthplace of Platakis cites: "He was in love with the island. He spoke to me from a very young age about Crete. I came here when I was 14 years old, and I felt that I had seen the island again [...] He will feel proud that his love for the island continued in the next generations of his family" (PATRIS, 2007).

Everyone who knew Paul Faure can assure about his real love and passion for the island of Crete. For that love, he transformed his name to the type of the Cretan last names, and he used to sign his letters with that "Παύλος Φωράκης" (Pavlos Forakis) (MAKRIS, 2008).

3. Epilogue

Speleology is its people, who work, usually voluntarily and out of purely personal or scientific interest, to promote the research of the caves and to reveal the unknowns. The older ones continue to 'teach' the younger ones, with their example and methodology for the research and study of karst formations (PLATAKIS, 1973). Going very shortly through the work of Paul Faure, regarding the caves of Crete, we find that the methods he used to locate the caves

are not much different from what we do today on the island: We traverse the island, we make friends with shepherds, farmers and other locals from whom we draw the most important information about the hitherto unknown caves, and we become recipients of the famous Cretan hospitality. We must not forget the contribution of each one, namely and personally.

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The Cailleverdière Cave at Blanot (Saône-et-Loire, France) and Benoît Dumolin, a precursor site for speleology, karstology and underground tourism (1739-1939)

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Abstract

The Cailleverdière Cave was explored in 1739 by Benoît Dumolin, the last doctor in medicine at the Abbey of Cluny. This multifaceted naturalist left written accounts of his explorations. He used ropes to access the deepest parts of the cave, thus becoming one of the pioneers of speleology. He reflected on the formation of the cavity and discarded theories current in the 18th century, instead suggesting the role of water in karstogenesis. He described in detail the cave's concretions and suggested once again the role of water in their formation. As later writings revealed, people regularly visited the cave from the end of the 18th century. Throughout the 19th century, many visitors marked their visits with graffiti and a succession of references appeared in studies and publications. Facilities were installed at the beginning of the 20th century and remained in place until the eve of WWII.

Résumé

Benoît Dumoulin à la grotte de la Cailleverdière (Saône-et-Loire, France), site pionnier de la spéléologie, de la karstologie et du tourisme souterrain (1739-1939). La grotte de la Cailleverdière à Blanot a été explorée en 1739 par Benoît Dumolin, dernier docteur de l'abbaye de Cluny. Ce scientifique aux multiples facettes laisse un écrit de son exploration. Pour aller au fond de la grotte, il utilise des cordes et devient ainsi un des précurseurs de la spéléologie. Il réfléchit à la formation de la cavité et écarte les théories en cours au XVIII^e siècle pour évoquer le rôle de l'eau dans la karstogenèse. Il donne également une description détaillée des concrétions et là encore évoque le rôle de l'eau dans leur formation. Dès la fin du XVIII^e siècle, la grotte fera l'objet de visites comme en témoignent de nouveaux écrits. Tout au long du XIX^e siècle de nombreux visiteurs y laissent des graffitis et les mentions écrites se succèdent dans les ouvrages. De véritables aménagements sont mis en place au début du XX^e siècle, ils perdureront jusqu'à la veille de la seconde guerre mondiale.

1. Introduction

The Cailleverdière Cave, or Blanot Chasm, is located in the Monts du Mâconnais in Southern Burgundy. With a depth of 57 m and around 700 m of galleries, it is one of the region's largest cave systems (Fig. 1). Discovered around 1700 according to B. Dumolin, no traces of humans or ancient animals have been found in it. It was explored on 3 occasions in 1739 by Benoît Dumolin, at that time

doctor at the Cluny Abbey. He recounted his explorations and thoughts in a manuscript entitled "Description historique et topographique de la ville, abbaye et banlieue de Cluny" (Historical and topographic description of the town, abbey and surroundings of Cluny) (DUMOLIN, 1749).

2. Benoît Dumolin, a pioneer of speleology

Benoît Dumolin begins his account with general information about his explorations. He says that he took knotted ropes with him. The use of ropes in caves was not common at this

time. The account of the exploration of the Antiparos Caves in 1673 (Cyclades, Greece) by the Marquis de Nointel

mentions the use of a rope ladder but not of a single rope (SHAW, 1992).

He mentions next the other materials taken along to explore the cave:

- a branch shaped into the form of a ladder so that it could be used as one
- torches or candles for lighting
- wine



Figure 1: entrance chamber of the Caillevèrdière Cave at Blanot which holds the record of being the deepest cave in the Mâconnais (photo Michel Renda).

Dr Dumolin continues his description by evoking the dangers involved in exploring the cave. He tells of an abbot who was a member of his team who took fright in the middle of the explorations:

“The horror which this place inspires is dreadful, everything helps terrify even the most audacious person. So great was the effect on this young abbot who had accompanied us in this cave that he abandoned us midway through and climbed back out vowing to never again come near to such a place if God would show him enough mercy to let him get back out safe and sound.”

In the 18th century, naturalists regularly visited cave, and Benoît Dumolin gave us, in his manuscript, certainly one of the oldest descriptions in the history of speleology of a descent into the depths of a chasm: *“Towards the bottom of this cave on the left, a section of ground, considerably raised, leads to a fissure in the rock which reigns from top to bottom. From this spot we threw into the gap some stones that we could hear rolling for a while, and which we then realised fell into water giving off a sound which rose back up to us as muted echoes from the bottom of the cave. Our lights were of limited use here, all the more so because the fissure in the rock had a twisted course and the light from our candles did not reach far, so it was impossible for us to see to the bottom. However, after having lowered our ropes, a daring and enterprising member of our team, trusting his luck, descended into the cave below us. We lowered down a lit candle attached to a cord, and soon I followed in its path. Projecting from the rockface where we were descending, was a kind of cul-de-lampe or corbel on which our ropes pressed causing us to swing from right to left, and as we dropped down no points of support were encountered other than those providing us with our swinging rope.”*

The doctor concluded his account by saying that he engraved his name at the bottom of the cave and that their explorations were cut short by lack of equipment. According to the descriptions given, most of the cave accessible at the time had been explored.

3. Benoît Dumolin, a pioneer of karstology

Benoît Dumolin writes about how concretions may have formed. He refers to the very ancient theories put forward by Avicenna at the beginning of the 11th century on the formation of speleothems. In Europa, the first precise description of concretions was probably given in 1535 by Berthold Buchner (Shaw, 1992) in relation to the Breitenwinner Caves in Bavaria. Dumolin has certainly given us one of the earliest descriptions of straw stalactites. He compares them to the stem of a goose feather. He understood that their formation is linked to water and the succession of drops at their extremity. He talks about the time needed for them to form and claims that it would be long. He then talks about columns and says that several centuries would be needed for them to form.

The doctor concludes his text by offering us his opinion on how the cave was formed. He briefly mentions the Deluge theory in order to immediately dismiss it. In 1740, Buffon believed that the caves of Arcy-sur-Cure were the work of man. In 1762, Rousseau thinks that the caves of Môtiers (Switzerland) are the result of a terrible explosion. In 1739, Dumolin suggests that water is responsible for the cave's

formation. For him the process started with water detaching then taking away “a portion of the land”. That led to the formation of a void sufficiently large for parts of the vault to collapse adding to the volume of the cavity. He also reflected on the potential role of ambient humidity in cave formation. Throughout his account we can see that he has a very modern approach to understanding karstification.

“This stream is obviously sufficient to explain the formation of the cave. It is located in the deepest part of the cave. Probably the first current of water that flowed there, augmented by heavy rain or by springs that will have imperceptibly found a way into its bed, will have successively detached and taken away a portion of the land which forms and limits the size of this natural aqueduct. With the stream having the same erosive effects on land left exposed by earlier removals, it is clear that with more or less time, after more or less amounts of the same land having been removed, an entire mass will have been lost, causing parts of rocks or whole rocks, which depended on it as a base and support, to tumble pell-mell into the bottom of the cave. For the same reason, the first falls will have caused other rocks which they once abutted, to also fall into the same ruins.

Consequently, the largest cave openings can be easily explained by the amounts of land removed from the voids which they previously filled. The smallest openings can be found among the masses of rocks which make up mountain sides which have only lost that portion of earth filling the

spaces between them; it is here where successive periods of drying have also greatly contributed to these losses. The falls, the ruins, the continual fragments, all have their cause in the water which penetrates them, the vapours of humid air which wet their surface.”

4. The Cailleverdière Cave: a precursor site for underground tourism

From the time of its discovery, the cave attracted the curious, as Dumolin mentions:

“The story of this discovery attracted people’s attention; they came there from everywhere, from three, four, five and six leagues around... the pilgrimages there were frequent, and the processions which go to Mecca to mark their veneration of the great prophet are, I think, less numerous; only the pleasure of seeing, simple curiosity and not eagerness to learn attracted so many visitors.”

The first written information about “organised” visits to the cave dates to 1803 (Bernard, 1913) and relate to visits initiated by Émilien-Gilbert-Philibert Bruys des Gardes, a former royal official who settled in Blanot at the time of the French Revolution.



Figure 2: graffiti left by the son of Prefect Roujoux when he visited the cave in 1803.

“On 5 October 1803, Monsieur Roujoux, the Prefect of Saône-et-Loire, having arrived the day before as my guest at Nouville, I descended into the cave with his son, with Monsieur Rivaud, a civil engineer, Messrs Commerçon from Cours-Jacob, and my little Emilien aged ten years, having for our guides Pierre Biat, my guard, and Jean Michon de Founière.” The prefect’s son marked his visit with some graffiti (Fig. 2).

Bruys des Gardes was a regular visitor to the cave and in 1804 he acted as a guide for Philibert Bouché de la Bertilière who mentioned the visit in his monumental manuscript on Cluny (BERTILIERE, ND) and who also left graffiti in the cave. Of the more than 1,500 graffiti done on 300 different dates that we have been able to find in the cave, about 6 % date from the period 1800-1809.

Sometimes visitors came from far away. At a public meeting of the Société d’Emulation de la Ville de Cambrai on 12 May 1808, Mr Préfontaine, the Inspector of Direct Taxes, provided a description of the cave following his visit (PREFONTAINE, 1808).

However, at the beginning of the 19th century, visits were not very common because of difficulties in accessing Blanot, as evident in this extract from the Saône-et-Loire yearbook of 1826: *“They are not well-known: the commune of Blanot is embedded in its land and the minor roads that lead there are not very good. But if they are not visited by travellers from other countries because of their distance from main roads and large towns, they are fully the equal of the caves of the great Pyrenees in natural beauty.”*

5. The development of tourism from the middle of the 19th century to the beginning of the Great War

During the second half of the 19th century there were numerous references to the cave: Géographie Départementale de la France (1847); geography textbook of the department (1863); Grand Dictionnaire Larousse (1867); the first inventory of the caves of France by Lucante (1882)... The first visual representation of the cave’s entrance (Fig. 3) also dates to this period. And the number of visitors grew. The dates given by 44 % of the cave’s graffiti lie between 1870 and 1899.



Figure 3: watercolour by M.-L. Gautheron, niece of Major Barat who followed Napoleon from the camp at Boulogne to Waterloo (Municipal Library of Nevers).

The cave’s proprietor, the municipality, granted the concession to the cave to the Blanot innkeeper. The village

temporarily took the name Blanot-les-Grottes. It became common for family groups to visit the caves, often in their best clothes, lighting their way with candles (Fig. 4). Before the 1914-18 war, tourist guides published by the Tournus Tourist Office and the Mâcon division of the Burgundy Automobile Club indicated that visits to the cave were organised. But Blanot remained difficult to access as indicated in the text of this post card from around 1910 (Fig. 5).

The Great War ended tourism at the site and it was not resumed until the 1950s



Figure 5: text of a post card relating a visit to the caves around 1910.

Figure 4: visit to the Blanot Cave between 1900 and 1910. With the candles they used for lighting, they pose in front of the cave's most beautiful concretions.

6. Conclusion

The detailed accounts left by Benoît Dumolin of his explorations and his reflections on the formation of the cave and its concretions are real precursors of speleology and karstology. From the time of its discovery the cave attracted visitors and visits were organised by its owners between

1803 and 1810. By the end of the 19th century, visiting the cave had become a popular leisure activity, but tourist use of the site was brought to an end by the onset of the Great War.

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The absence of signatures from the XVIIIth century in two caves of the south border of the Massif Central (France) The cases of Faux-monneyeurs Cave (Millau, Aveyron) and Protestants Cave (Saint-Hippolyte-du-Fort, Gard)

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Abstract

The visit of two caves, located in the Causses and the Cévennes (France), has shown an absence of graffiti and signatures of the 18th century in both caves. Indeed, later signatures from the 19th century attest to a resumption of frequentation after a hiatus of more than one hundred years. This hiatus extends from 1650 to 1925, for the Faux-monneyeurs Cave (Aveyron), and from 1687 to 1887, for the Protestants Cave (Gard). This is an enigmatic gap in frequented caves, in addition quite remote. However, they may share a common history. Before interpreting the absence of 18th century signatures in both caves, we must first recall the tradition of signatures on the cave walls. Finally, the respective histories of both regions, in which these caves open, make it possible to propose a hypothesis in connection with marking events of the history of France. The absence of signatures from the 18th century coincides with the French Wars of Religion and could explain by the flight of the Huguenots out of the Kingdom of France.

Résumé

Absence de signatures du 18^e siècle dans deux grottes du sud du Massif central (France) : les grottes des Faux-monneyeurs (Aveyron) et des Protestants (Saint-Hippolyte-du-Fort, Gard). La visite de ces deux grottes des Causses et des Cévennes a révélé une absence de toute signature et graffiti du 18^e siècle, alors que les signatures réapparaissent à la fin du 19^e siècle après une longue interruption de 1650 à 1925 aux Faux-monneyeurs et de 1687 à 1887 aux protestants. Comment expliquer ce hiatus dans ces deux cavités éloignées l'une de l'autre ? une hypothèse est proposée dans cet article : cette longue période sans signature fait suite aux guerres de religion dans ces régions et à l'exil des Huguenots hors du royaume de France.

1. Introduction



Figure 1: Situation map of the two caves in France.

A visit to the Faux-monneyeurs Cave (Millau, Aveyron, Fig. 1) revealed the presence of signatures attesting ancient standing frequentation.

However, the absence of signatures between 1650 and 1925 remained unexplained. Various hypotheses have been formulated, some linked to the natural closure of the cave, others to historical facts or climatic disasters. However, there was nothing to allow the investigation to go any further until the visit of another cave with old signatures presenting the same gap as that of the Faux-monneyeurs.

In the Protestants Cave (Saint-Hippolyte-du-Fort, Gard), another gap, between 1687 and 1887 can be noticed. The signatures of the 19th century attest to a resumption of human frequentation after two centuries of absence.

An investigation was to be conducted to try to explain this hiatus of several centuries in relatively distant caves, but which perhaps share a common history.

After having exposed the characteristics of each cavity, we will propose a hypothesis to the absence of signatures in the 18th century in these two caves of the Cévennes and the Grands Causses.

2. The tradition of signatures

The underground sites have been decorated, erased and overwriting, for long periods without regulation having been imposed on the authors. Today, graffiti left by cave visitors is no longer accepted (BIGOT, 2011). However, the tradition of signatures, often accompanied a date, is a form of appropriation of the cave, the message of which translates as: « I was there, this day ».

Whatever our opinions, the tradition of signatures and graffiti in caves is a chance, because it provides information on the dates of the incursions and the ancient frequentation of the caves.

The signatures of the Faux-monneyeurs Cave (Aveyron) and Protestants Cave (Gard) may provide new information on the history of underground exploration.

3. The Faux-monneyeurs Cave in Millau

a) Another story of the cave

The Faux-monneyeurs Cave (Fig. 2) is located under the Pouncho d'Agast, in a ledge of the Cause Noire. The narrow entrance overlooks the Dourbie valley. The cave is defended by a severe and narrow chicane which filters visitors.

Admittedly, the cave is known for its history written by Louis BALSAN. In 1931, he wrote: « bronze or copper plates cut out, (...) coins imitated from those of the country of Dombes or Comtat Venaissin ».

It seems that this cave served as a workshop for counterfeiters between 1655 and 1657.

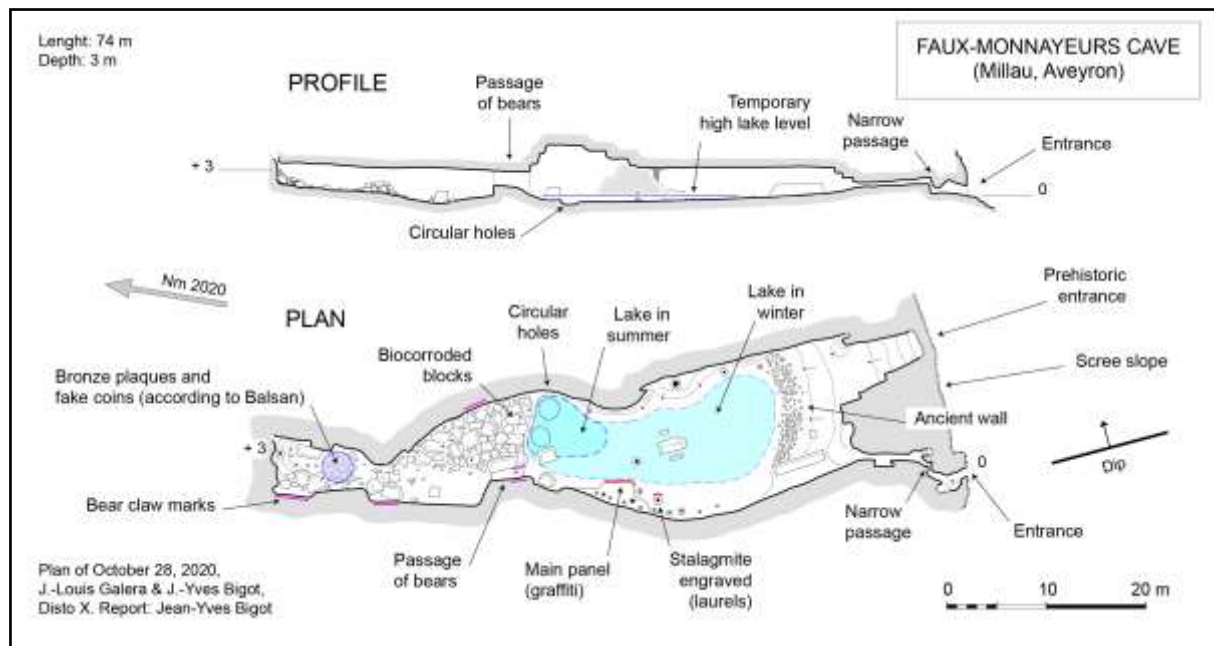


Figure 2: Survey of the Faux-monneyeurs Cave.

When he saw the panel of old signatures, BALSAN associated the names of the signatories with those of the counterfeiters. The aforementioned characters have been able to allow themselves this imprudence because their hiding place, behind a corridor easy to conceal and of painful access (it is necessary to crawl on more ten meters), should be inviolable » (BALSAN, 1931). However, one can very well write another story, completely different, on the basis of the traces recognized in the cave.

b) Graffiti and signatures

There are many graffiti on a large panel corresponding to a corroded stalagmite massif. Some graffiti are old and date from the 17th century. We note the name of Jacques Brunet who signed in 1635 twice, both on a stalagmite and on the large panel. This large, light-colored panel is heavily weathered and is an ideal support for engraving. It is an ancient biocorroded stalagmite exposing the calcite laminations. The biocorrosion is attributed to the bats which have occupied the cave for a very long time. As the cave is still frequented, visitors continued to affix their names to the lower part of the panel, quite difficult to read. Only the upper part, inaccessible to most visitors, is well preserved. We note the engraved names of P. Vaquier without date, of

G. Cure in 1640 and F. Lagrifoul in 1618. The quality of the writing and the decoration, inspired by bookplates or coats of arms, indicates that signatories are lettered (Fig. 3). Manifestly, the cave was very well known and frequented in the first half of the 17th century.

Figure 3: Upper part of the main panel preserved from posterior overloads and vandalism. At the top left, the initials NG seem to be surmounted by a crown of arms indicating the noble quality of a person who remains to be identified. Top right, « F. Lagrifoul 1618 ».



In 1931, Louis BALSAN discovered a counterfeiters' workshop and associated the names found in the cave with the counterfeit money activity. Nothing is less certain, because BALSAN himself recognizes that « no name, however, corresponds to the ten convicted of the trials of February 1664 » (BALSAN, 1931).

Indeed, the history of frequentation of caves, in particular through the works of Trevor R. SHAW « History of cave science, the exploration and study of limestone caves, to 1900 » (1992), does not validate Louis BALSAN's thesis. Because the 17th century signatures of the Faux-monneyeurs Cave attest to the frequentation of curious people, scholars and notables who came to the cave to admire the wonders of nature.

We can see in these signatures the growing interest in the nascent natural sciences where caves are real objects of

study. In the 17th century, the fashion was more for cabinets of curiosities. In addition, the tradition of signatures (BIGOT, 2011) makes it possible to attest to an important frequentation during a century marked by the birth of modern science with the Italian astronomer Galileo.

A priori, the visitors who wrote their names on the walls of the cave seem sheltered from need and have no connection with the episode of counterfeiters recounted by Louis BALSAN.

d) A gap in the dated signatures

The absence of signatures dated from the second half of the 17th century to the end of the 18th century remains an unexplained fact. It exists a hiatus in the tradition of visits. We find again signatures in the 19th century, with in particular that of Léo Montet of Millau on the 2nd September 1925.

In general, the tradition of signing in caves continues for several centuries and attests to a certain durability of visits. But in Millau, that's not the case at all; we note the dates of 1618, 1635, 1640, 1649 and 1650. Perhaps we should look in the history of the city of Millau, the reasons for the abandonment of the underground site by the notables. Indeed, the city experienced strong economic growth in the 16th century and became a Protestant stronghold. Calvinism settled in Rouergue and more particularly in the town of Millau which, in 1573, organized the Protestant States General. For a century, Protestants dominated the city politically and economically. In the second half of the 17th century, the Wars of Religion put an end to this domination and disorganized the tanning activity and the glove industry in Millau. Of course, the revocation of the Edict of Nantes in 1685 forced the Protestants to exile, but emigration to the countries of the Refuge continued between 1560 and 1760. Depending of the intensity of the persecutions, the Huguenots left France more or less early. Thus, the persecutions and the flight of the Protestant elites could justify the interruption of the visits in the Faux-monneyeurs Cave of Millau.

4. The Protestants Cave in Saint-Hippolyte

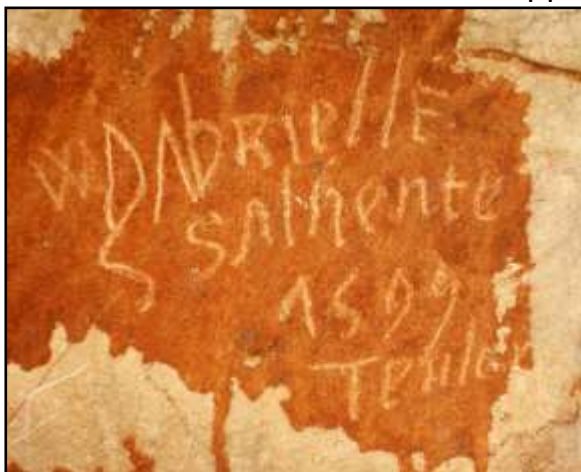


Figure 4: Signature of 1599.

Sometimes called the Camisards or Cengle Cave, its entrance overlooks the village of Saint-Hippolyte. The cave owes its name to the walls erected under the eastern wall of the Cengle Rock, an impregnable haunt of Protestants or Camisards.

The cave appears in a speleological inventory (ASC, 2002) and also in an older article by Jean-Jacques PITTARD (1962). At the bottom of the cave, we are surprised to note the ancient age of the signatures covering the walls which overhang the sump, in particular that of Teulon dated 1599 (Fig. 4). Other signatures from the 17th century validate a coherent whole attesting the ancient frequentation of the cave.

The most ancient signature is: W Gabrielle (de) Salnente 1599 Teulon. The letter W is the Italian abbreviation of

evviva, equivalent in French to « vive! », « long life (to somebody)! ».

Among the graffiti in the Protestants Cave, the following dates should be noted: 1607; 1629 Lablaquière, and also those of Auguste Jeanjean 1887 and Verdier Marius 1887 dit Biblur.

Other ancient signatures are reported in *Les Cahiers du Haut-Vidourle* n° 30: Diane de Trémollet (1686), Védél (1686), Ginoulhac (1687) and Roland (1686).

We note, as well, the absence of signatures throughout the 18th century; the fact is identical in the Faux-monnayeurs Cave in Millau which shows signatures from the 17th and the 19th century, but not from the 18th century.

The precocity of the frequentation of the caves in the Cévennes could be explained by the presence of a ruling and

educated class. In the 17th century, the silkworm industry in Saint-Hippolyte was in Protestant hands but represented only a few percent of the value produced locally. Indeed, a major part of the plain of Saint-Hippolyte was then in cereals and the city a center of wool and leather production. The lack of signatures during the Enlightenment could correspond to the revocation of the Edict of Nantes (1685) by Louis XIV and the flight of Protestants to the countries of the Great Refuge.

The protestants or huguenots are educated people who love to explore the strange sites around them. These lettered curious were from the upper class and many of them were Huguenots. This would explain the hiatus of frequentation and the absence of signatures in the 18th century.

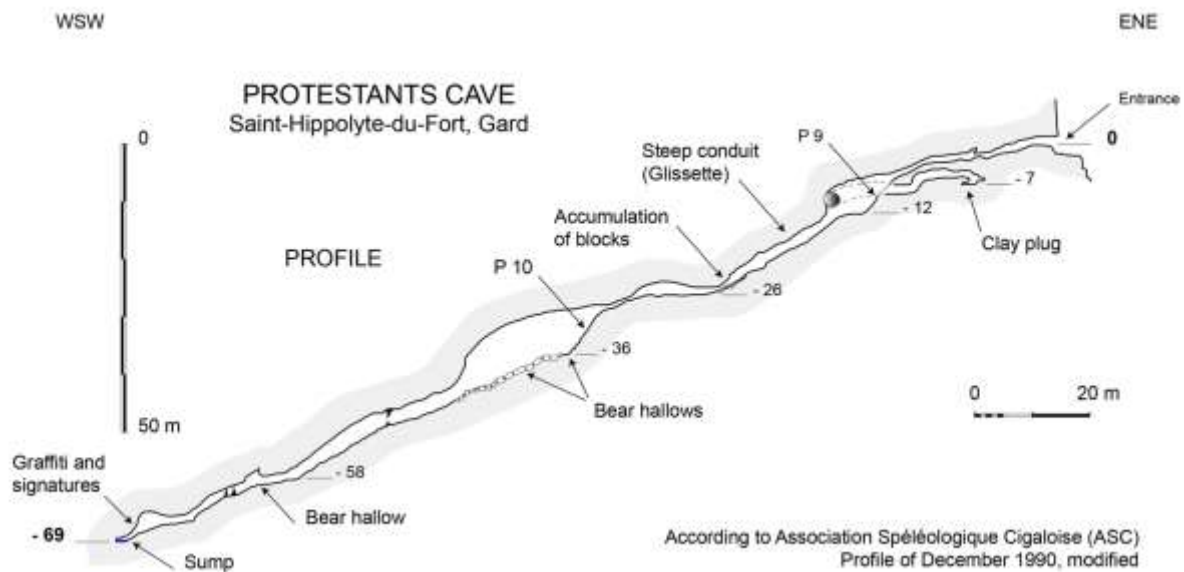


Figure 5: Cross-section of the Protestants Cave, according to ASC 1990 modified.

5. Conclusion

A single cavity without signatures would not have been enough to propose a credible hypothesis. The visit to the Protestants Cave, however, made it possible to reinforce an idea which had emerged from the first incursion into the Faux-monnayeurs Cave: the flight of Protestants to the countries of the Great Refuge. It is interesting to note that a

historical fact can be « read » on the cave walls. Other examples will probably complete the list of caves presenting an interruption in the tradition of signatures. You just have to open your eyes and read into the old graffiti in a different way.

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Cave inspired Music database Website

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1. Introduction

Closely associated with my lifelong passion for caves, early on I also developed an abiding interest in the cultural side of caves, that is, caves in the fine arts and letters, especially music – cave-inspired music and music performed and recorded in caves.



My first effort at diffusing my research on commercially recorded cave music was in 1966 when I published a short discography and then a year later a synchronized audio-visual program, "Caves on Phonograph Records," which consisted of 11 cave music selections on a reel-to-reel tape combined with 134 color slides, that was later circulated by the National Speleological Society in the United States.

In 2005, at the UIS Congress in Kalamos, Greece, I presented a paper on my progress working on an international discography of recorded cave-inspired music. At that time, I planned to publish with a DVD, but including audio samples of the music would have required paying the copyright fees. So, it was decided that the best solution was to create a website for my extensive annotated database where I could have free links to sites that have the music.

This website, caveinspiredmusic.com, includes all categories of music ranging from classical and world through jazz to rock, plus music recorded in caves, cave documentary and fictional spoken word recordings, bat sound recordings, and cave and bat picture covers (both real and imaginary). It covers from the first known cave-inspired music recording in 1905 up to 2005, where sheer amount of this music became overwhelming. Opera music is not included because even though some scenes might take place in or outside a cave, the lyric content of these operas seldom mentions caves and then only very briefly. Passing in review the 27 sections of this website several of the most interesting entries will be highlighted and discussed.

2. Cave Music



Starting with classical music, Felix Mendelssohn's masterpiece, *Fingal's Cave Overture*, inspired by the celebrated columnar basalt marine cave on the isle of Staffa in Scotland, five parts present all the known recordings of this overture covering almost 100 years of recording history from acoustically recorded 78rpm and 80rpm records to electrically (microphone) recorded 78s then on to micro-groove analog 33rpm and 45rpm records, and then right on through to compact disc digital records of today.

As with all entries throughout this discography, each entry starts with the country and date of the original release, the entry title, and genre, then includes all the necessary information concerning the composer, performing artists, production company, running time, album title, most known commercial releases, and detailed notes about the composition or entry itself plus other pertinent facts followed by a bibliography including links to website sources and audio samples of that specific recording. A special effort was always

made to include a photo of the composer or recordings artist(s) that was nearly contemporary with the date of the recording, not photos taken later in life.

Under contemporary art music a new word was coined, speleolithophonic, for a special genre of lithophonic music performed by tapping (with great care) on cave formations. Here François Bayle's, *Jeïta*, stands out as a true masterpiece of cave-inspired music. The issue of speleothem percussion is a very controversial subject among cavers. In the interests of cave conservation, the caving community around the world condemns touching all speleothems. It is unthinkable that someone would tap on a stalactite for fear that it would break. However, it must be understood that all the recordings of speleolithophonic music listed here were made in show caves, primarily in France and Italy. Obviously, it is in the interest of these show cave owners that no damage be done to their cave formations. In nearly all cases (excluding Luray Caverns), as best could be discerned, great consideration was taken by the musicians in the cave to take the proper measures and in no way damage the speleothems they used.

For film music all the entries were separated and assigned to the various standard film genres, ranging from action to western films. In addition to the complete audio samples of the cues, links were provided when possible to video clips of the cave scenes in question. Also included were video games music, library or background music, and documentary cave film music. Under world music, 37 countries, from Argentina to Vietnam, are featured. Scotland in the United Kingdom and Spain predominate with the most amount of cave-inspired music. In addition, there are the recorded caving ballads from Canada,

Great Britain, and the United States. Whenever possible the full lyrics for the songs are given.

American country music has been broken down into old time, bluegrass, and country. The tragedy of the trapped Kentucky caver, Floyd Collins, inspired six different old time ballads spanning the months following his death in February 1925 right up to 1929. The most successful country cave song, *Miller's Cave*, was written by Jack Clement in 1959 and has been recorded by over 36 different performers.

Jazz music has been split into mainstream and modern with the appropriate genres under each ranging from ragtime to avant-garde and fusion. The great majority of jazz pieces were not inspired by real caves, but rather by jazz clubs and venues that are often located in cellars and frequently given names like "cave," "cavern," or "grotto."

New Age music is defined by the relaxed feeling it produces rather than the instruments and genre used in its creation, which may be acoustic, electronic, or a mixture of both. It primarily finds its inspiration in nature and often involves improvising. Many of these compositions were inspired by real caves that the musicians had visited themselves in their quest for renewal with nature. Several of these caves can be identified and they are found to stretch over the seven continents, including Antarctica, although Europe and the United States predominate.

Popular and easy listening music is commercial music written and performed for the mass market the world over. Contrary to world music it does not have ethnic or traditional influences or, if it does, they are very slight and watered down. Everything here has been grouped by country of release with children's songs following at the end of entries for each country. Children's songs in English are listed separately.



By far the largest number of entries are in the Rock music section with well over 500 entries covering the entire history of

rock arranged by genre starting with rhythm 'n' blues through soul and punk to hip-hop, but not beyond 2005. There is a very long tradition of prehistoric and modern caveman songs, which started with early rock 'n' roll and has carried on through into the 21st century. The image is nearly always the crude and somewhat vulgar male (and sometimes, female) person who treats other people in a primitive manner. The lyrics have evolved considerably over the years, starting in the fifties with the then typical bit of the club-carrying man conquering the woman by dragging her away by the hair, on through the seventies soul music where the man strutted around acting tough, and into the nineties where he gets nasty in other ways. Subsections have been created for all the different versions of *Alley Oop* and several very famous rock pieces that were recorded many times by the original artist and by others: *Journey to the Centre of the Earth* by Rick Wakeman (Progressive Rock); *Release the Bats* by The Birthday Party (Gothic); *In the Days of the Caveman* by Crash Test Dummies (Folk Rock); and *Caveman* by The Cramps (Punk).

The final section is reserved for electronica music which in most cases consists entirely of various noises produced by computers, machinery, noise generators, samples, and the like. Two additional sections were added for the sake of completeness. Marginal Cave Music where the songs may have the word "cave" in the title, but they only mention caves once in the lyrics or where the cave has very little importance in the overall message of the song. As for bat songs, the word "bat" only appears once somewhere in the lyrics or the mammal bat is only vaguely suggested. The section Not Cave & Bat Music clearly lists songs that have the word "cave" in the title, but do not mention caves in the lyrics and were in no way inspired by caves. Here also the word "bat" may appear in the title, but the song or musical piece was not inspired by the mammal bat.

3. Recorded in Caves

Several natural caves around the world have been major venues for concerts. Recordings of these concerts, or special performances in caves, or bat sounds have been listed for 25 different countries. However, careful audition makes it almost certain that at least twelve recordings listed here were made in a studio and not in caves. Recordings in artificial caves or man-made cave venues can range from jazz cellars to any venue whether below ground level or on the surface that was given a

name that includes the word "cave," "cavern," or "grotto." Among the best known are The Cavern in Liverpool and the Bohemian Caverns in Washington D.C. Also included are non-English speaking venues with names including the words "cueva," "gruta," "grotta," etc.

4. Spoken Word

All of the spoken word recordings have been split up into five different sections. Starting with Documentary records, France has the greatest number of scientific and educational spoken word recordings regarding caves, which is altogether fitting as France along with Austria was where serious studies of caves first began in the 19th Century. There are also a fair number of documentary discs mostly released by show caves as a way of promoting their cave. As for Bat and Bird Sounds it is altogether fitting that they come under Spoken Word since the sounds they make are their own spoken language. Bats, of course, are the mascot mammal for cavers worldwide. They don't have to be cave-dwelling bats to qualify for inclusion here, they just

have to be themselves, one of the most beneficial mammals on the planet. There are some amazing audio guides to bat identification providing the sounds of different bats, which can be used to distinguish them in the field.

Fictional cave and bat-inspired spoken word has been divided into Adult and Children's Fiction. For the former the grand classics of literature have a special place: Homer's *The Odyssey* and Jules Verne's *Journey to the Center of the Earth*. Poetry in English, French, German, and Italian is presented first, followed by prose in English, which has been broken down into categories: adventure, drama, fantasy, prehistory, science

fiction, etc. Then there is French and German prose and a short non-fiction section for philosophy namely, Plato's *Allegory of the Cave*.



Children's Fiction also features the grand classics in spoken versions specially adapted for children including *The Odyssey*, *Ali Baba and the Forty Thieves*, Daniel Defoe's *Robinson Crusoe*, Jacob and Wilhelm Grimm's *The Pied Piper of Hamelin*, and Mark Twain's *The Adventures of Tom Sawyer*. Here again, the other additional literary works are split up into categories and within each the various works are presented under the spoken language of the recording. For the sake of completeness, a further section was added for Marginal Cave Fiction & Not Cave Fiction. The former includes fiction that only has limited cave inspiration or only mention caves very briefly and the latter consists of fiction that has no cave or bat inspiration. Some these latter entries may have the word "cave" in the title, but they do not mention caves in the text and they were in no way inspired by caves.

5. Picture Covers

The aesthetic pleasure of beautiful album covers is one of the great attractions in record buying. Those old LP covers could be eye-stoppers; painted, illustrated, and designed by great artists and photographers, they swept you off your feet and demanded that you buy the album. Often reproducing famous paintings or great photographs some were worthy of being framed and hung on the wall. With the coming of CDs and their much-reduced size this quality has been lost.

Pictures were on the front and back covers of the record jacket and sometimes on the record sleeve inside the cover. The record formats range from 78rpm boxed sets to 33rpm LP albums to 45rpm EPs (extended play) and on to CDs. A gatefold LP can have a booklet stapled inside and most CDs have a booklet inside the cover of the jewel case. A vinyl record or a CD can have a picture embossed or printed right on the disc itself. However, many of the records, LPs, 45s, or CDs, listed here do not contain any cave or bat-inspired music.



The picture covers of real natural caves have been grouped under the country where the caves are located, ranging from Algeria to Venezuela. These can be either photos or illustrations showing cave entrances or interiors, cave paintings or engravings, natural bridges or sea arches, or even spectacular karst landscapes.

Picture discs on LPs and CDs where the cave photo or illustration is imbedded in the disc itself are known for 12 countries from Australia to the United States. A separate section was created for all those cover illustrations and photos of caves that could

not be identified or located. And finally picture covers showing artificial caves or mine passages intended as caves were grouped apart. Artificial caves are defined here as man-made structures built to resemble a real cave.

The imaginary cave picture covers have all been organized in the same way as adult and children's cave fiction, that is, by category: adventure, fantasy, science fiction, etc. Covers of fine arts paintings were given a separate section and the famous classics of cave fiction were also grouped according to titles or author. Three special sections were established for various classic tales, children's tales, and stylized cave covers. Some very fascinating covers are found in this section under the Jules Verne tales and the Roger Dean art featuring fantastic karst landscapes.

The bat picture covers have been separated into those clearly showing real bats, insectivorous and fruit bats, and those showing only stylized bats. Within each section the bat covers have been grouped by continent according to the countries where the discs were released. For most of the real bat covers, with the exception of the fruit bat covers, the bats shown actually live on the continent where they are listed.

Unfortunately, but predictably, many bat picture covers portray the bat as an ugly horror monster ready to attack. This is especially the case with gothic, punk, and heavy metal rock releases where the bat is labeled a "Bloodsucker" or is depicted with a mouth full of extra-long teeth. No bat costumes or people and mythical creatures with bat wings tacked on (devils and dragons) will be considered here. Only what was obviously intended to depict an actual bat or bat-like flying mammal are included.

Finally, there are those covers showing prehistoric cavepeople, actual modern people dressed up as prehistoric cavemen or cavewomen, that is to say, their conception of what prehistoric people looked like: leopard skins or other animal skins draped any old way, large wooden clubs for the men and bone necklaces for the women. Also, there are many illustrated drawings of cavemen and cavewomen dressed in similar costumes. Regrettably, the caveman is often shown as a club-toting, ugly character who conquers women by hitting them over the head and dragging them off by their hair.

6. Group Names, Record Labels, & Album Titles Only

Cave-Inspired Group Names and Bat-Inspired Group Names are organized alphabetically according to keywords in the group

names. For a group name to qualify for inclusion here their name must clearly refer to caves or bats (the mammal). Several

The Hellenic Speleological Society (1950-2020) Marking 70 years of speleology in Greece

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Abstract

The Hellenic Speleological Society was founded in 1950 by the legendary couple Anna and Ioannis Petrochilos and other devotees of speleology in Greece who surveyed and explored thousands of caves and potholes in Greece in the early years using heavy, outdated, bulky equipment of the time. In its seventy year history the Hellenic Speleological Society which is comprised mainly of university professors and scientists from many fields and armed with a plethora of well-trained speleologists has contributed scientifically, educationally and locally to the research, study and mapping of over 12,000 caves and potholes throughout Greece and has assisted with the setting up of many show caves around the country thus contributing to the local economy. It is also a founding member of the European Speleological Federation (F.S.E) and a member of the International Union of Speleology (U.I.S) and the Balkan Speleological Union (B.S.U) and has participated actively in almost all European and International congresses up to the present. In 2005 it organized and held the "14th International Congress of Speleology" in Athens, Greece which was attended by more than 500 participants from 51 countries.

Résumé

La Société hellénique de spéléologie (1950 - 2020) - Marquer 70 ans de spéléologie en Grèce. La Société hellénique de spéléologie a été fondée en 1950 par le couple légendaire Anna et Ioannis Petrochilos et d'autres passionnés de spéléologie en Grèce qui ont étudié et exploré des milliers de grottes et de gouffres en Grèce dans les premières années en utilisant un équipement lourd, obsolète et encombrant de l'époque. Au cours de ses soixante-dix ans d'existence, la Société hellénique de spéléologie, composée principalement de professeurs d'université et de scientifiques de divers domaines et armée d'une pléthore de spéléologues bien formés, a contribué scientifiquement, pédagogiquement et localement à la recherche, à l'étude et à la cartographie de plus de 12 000 grottes et gouffres dans toute la Grèce et a aidé à la création de nombreuses grottes touristiques dans le pays, contribuant ainsi à l'économie locale. Elle est également un membre fondateur de la Fédération spéléologique européenne (F.S.E) et un membre de l'Union internationale de spéléologie (U.I.S) et de l'Union spéléologique des Balkans (B.S.U) et a participé activement à presque tous les congrès européens et internationaux jusqu'à présent. En 2005, elle a organisé et tenu le "14e congrès international de spéléologie" à Athènes, en Grèce, auquel ont assisté plus de 500 participants de 51 pays.

1. Speleology in Greece

Introduction

Plenty of caves in Greece are associated with ancient Greek culture, mythology and Modern Greek history. According to mythology Zeus was born in a cave - the "Diktaion Andro" on the island of Crete. Many other gods or demigods were also worshipped inside caves like "Hermes" on Mount Ziria and the gate to the underworld ("Hades") was meant to be a cave in Cape Tenaro in the southern Peloponnese. The legends and traditions that were created around caves were remarkable, placing within them fantastic creatures like the Cyclops or the Minotaur.

Even during the first Christian years Jesus was worshipped in caves and many churches or monasteries were built inside them.

The first explorers to deal scientifically with Greek caves were the German naturalist Fendler (1841) on the island of Kythnos for mining purposes and Martel E.-A., Sideridis N., Karres I. and Valiche G., who conducted hydrogeology research in the sinkholes of Tripolis. Results of this research were published in Spelunca "Les katavothres de Grece" in

March 1911. Greek archaeologists Skias A. and Arvanitopoulos S. conducted excavations in caves in 1900 and 1910 respectively. The first foreigners that came to visit Greek caves were Marquis de Nointel (1673 – Antiparos cave), Tournefort (1675 – caves & islands of the Aegean sea), Marquis de Samper (1775) and Lord Byron (1810 – Keratea & Nympholyptos caves in Attica). Many other foreign and Greek explorers continued exploring the Greek countryside and until the end of 1920 various groups (both mountaineering & speleology, like "PAN" a nature-loving and hiking club) began to emerge showing particular interest in caves. A speleology team was officially founded within EOS (Greek Mountaineering Club) of Athens in 1936.

The Beginning

In November 1950, the Hellenic Speleological Society (HSS) was founded by Ioannis and Anna Petrochilos, I. Kapsabelis, G. Montesanto, A. Harolidis & other various devotees of speleology. The HSS is the first purely speleological association of Greece that was organized entirely as a

scientific organization with seminars, exploration, mapping, a cave archive, bulletins and finally tourist development of caves around Greece.

The time had come to set up and establish a purely speleological association as Speleology at that time was only partly practiced by mountaineering and nature-minded clubs.

2. Seventy years of research and study by the Hellenic Speleological Society

The founders

Ioannis Petrochilos (1901-1960) (Fig.1) was a physicist, geologist and speleologist. He was a professor at the Evangelical School of Nea Smyrni (High School) and later director of hydrogeology at the Institute of Geology and Subsoil Research (today's IGME). He was a pioneer in the field of Greek speleology as he explored together with his wife Anna more than 500 caves mainly in Greece but also several abroad.



Figure 1: Ioannis & Anna Petrochilos

In 1949 I. Petrochilos represented "Pan" (a Greek nature-loving and hiking club) at the international speleological conference in Valence, France.

He wrote many original scientific studies of speleological and hydrogeological interest which have gained international recognition. Unfortunately, his untimely death at the age of 59 left many aspects of his work unfulfilled.

Anna Petrocheilou (1919-2001) (Fig.2), wife of Ioannis Petrochilos was one of the first Greek women to engage in mountaineering, climbing and skiing, with great success as she is considered the first woman to have set foot on Mount Olympus during the winter of 1930, the Alps (1935) and the glaciers of the North Pole up to the 81st parallel.

She attended speleology classes for three years with her husband at Sorbonne University. She assumed the Presidency of the Hellenic Speleological Society for several years exploring and mapping over 1.000 caves, potholes and underground rivers throughout Greece and abroad. She has published hundreds of speleological studies of great scientific and tourist value in Greek and foreign journals and

encyclopedias as well as in the "Bulletin of the Hellenic Speleological Society", while her contribution to the proper tourist development of the most important Greek show caves was crucial. She was the first to find skulls of prehistoric people in the "Aleptripa" cave of Diros in Laconia, a tooth of a bear in the "Perama" cave of Ioannina, petroglyphs and animal fossils and other important findings in Greek caves.

She received many medals and distinctions from, among others, the Greek ministry of tourism, the Academy of Athens, the Speleological Society of Cuba, the Academy of Czechoslovakia, the International Union of Speleology (U.I.S) for her great work, numerous municipalities, organizations, clubs and trade unions at home and abroad. In January of 2001 she was honoured by president Konstantinos Stefanopoulos with the Gold Cross of the Phoenix Order one of the highest orders of merit in Greece.

Her work was so highly esteemed by foreign scientists that one of the numerous microorganisms in the caves has been named after the woman, who discovered it: "Dolichopodo Petrocheilozi".

The "grand old lady" of the mountains and the caves, Anna Petrocheilou, passed away on February 13th 2001 and was buried in Athens' First Cemetery. Even though she reached very high socially and scientifically, she was always a down-to-earth woman in close contact with her fellow human beings.

She once said: "I have spent most of my life below the ground, so when I die it will not make a great impression on me".

Activities of the HSS

The HSS after its founding in 1950 until 2020 has annually conducted a 3 month seminar course and workshops with theoretical and practical lessons for the formation of research teams and the training of new members in which specialized scientists like geologists, karstologists, archaeologists, biologists, and experienced speleologists have taught and offered their services.

D. Liagos was one of the first instructors who initiated cave training techniques during the 60's and 70's. Also G. Avagianos introduced single rope techniques in Greece in the mid 70's and he was also a cave diver.

In addition to the speleological courses, the HSS during these 70 years has also organized international and national conferences not only for the promotion of the HSS's projects but also to inform members of their international achievements.

Until today more than 10.000 caves have been registered in the HSS's National Cave Archive, of which many thousands have been mapped and explored from a scientific and touristic point of view selflessly by its members. The

contribution to cave mapping by Tsibanis E. and Ioannou I. during these years has been extremely vital.

The first attempt for the organization of the extensive Cave Archive was done by G. Grafios. He began with I. Petrochilos and continued on his own and finally created the core of the first National Cave Archive of Greece. This achievement was his purpose and his life's work (Ioannou I., 1990).

The HSS's research and opinion was decisive for cave development in Greece and a number of them have been classified as show caves contributing to the local economy. Anna's Petrocheilou's (Fig.2) contribution to the proper tourist development of the most important Greek Show Caves (Perama cave in Ioannina, the caves of Drograti and Melissani in Kefalonia, the "Koutouki" cave in Attica, and Diros in Lakonia) was crucial.

Another noteworthy colleague was N. Simeonidis (Professor of Geology and Paleontology) with his scientific research in numerous caves he assisted in the promotion of speleology. He also contributed to the extensive research of Alistrati cave (a show cave in Northern Greece) in 1977.

Last but not least Eleftherios Platakis a Physics teacher and speleologist and close associate of Anna and Ioannis Petrochilos, was the founding member of the HSS's Cretan department and author of many important articles and an invaluable archive on Cretan caves.

The HSS has published the yearly Bulletin of the HSS from its onset with research and studies of many scientists and includes almost all cave explorations during the last 70 years. An attempt is being made to restart yearly publication of the Bulletin again.

Until now, 22 bulletins have been published. The contribution of Dermitzakis M. and Papadopoulos G. in publishing the bulletins has been significant.



Figure 2: Anna Petrochilou in the field

Throughout these years the HSS has taken part in many international and national conferences. In 1953 Greece took part in the 1st International Speleological Congress in Paris (Merdenisianos K., 2007) and has organized lectures,

3. Scientific and Athletic Speleology Workshops of the HSS

Ioannis Petrochilos in December 1957 organized speleological "lessons" for the first time inside the "Lion Cave" in Attica for members of the HSS and the Greek mountaineering Association (EOS). Thus due to this event

screenings, visits and photography exhibitions. In the past the HSS has collaborated with foreign speleologists on international expeditions in many places around Greece (the Peloponnese, Epirus, Crete) and with many scientists for the resolution of cave issues, like water tracing with uranine on the island of Kefalonia (for the investigation of water course in the underground karst in 1963, by Zoti I. & Maurin V.)

Notably during the years 1980 – 2020 many expeditions took place throughout Greece. In the 80's and 90's 165 caves and potholes were discovered, explored and mapped by the local Cretan branch of the HSS mainly on Crete and some on the surrounding islands. The French caving club GRESPA took part in some potholes like Petradolakia (-452 m) in Heraklion Crete.

In the 90's and 2000's many expeditions were carried out by the HSS in the area of Seta in central Euboea and an expedition on the island of Lesvos. In the year 2006 an expedition was also undertaken in the area of Astraka, Epirus (Northern Greece) and two very important expeditions were conducted during the years 2008 - 2009 in the area of Psari in the northern part of the Lefka Ori (White Mountains) on Crete with 250 new potholes.

Finally there are two ongoing expeditions one in the Amari region of Rethimnon Crete which began in 2005 and is continuing with around 100 new caves and potholes and another on the island of Lesvos which began in 2013 and has yielded 50 new findings.

The HSS has been a member of the UIS since its inception and is also a founding member of the FSE in 1990. Theodorou G. (Professor of Paleontology and Stratigraphy) participated in the twelve-member General Assembly of Speleologists from the EEC countries which was held within the framework of the XVI Congresso Nazionale di Speleologia in the city of Udine, Italy, with the aim of signing the statutes of the Speleological Federation of the European Communities by the 12 representatives of the EU countries.

In addition the Society's members have contributed to scientific research with the discovery of traces of people and animals from the Late Paleolithic to the Neolithic era.

The HSS has collaborated with the Greek Tourism Organization for years having consulted selflessly for the development of show caves around Greece. In 1977 the department of Paleoanthropology and Speleology belonging to the Ministry of Culture was founded and until now is in charge of Greek caves. It is worth noting that all Greek caves are protected by strict laws as monuments of nature and the HSS since the very beginning (1950) has been promoting the protection and sustainability of caves.

Petrochilou A. was honoured in 1976 and the HSS itself in 1986 with the Award of the Academy of Athens for their selfless contribution to Greece.

speleological seminars were founded in Greece. In the years to come, the need for better training of its new numerous members resulted in the decision to operate a regular

annual seminar. The first workshop with theoretical and practical lessons took place in the spring of 1964. Experienced speleologists taught on the history of Greek Speleology, cave exploration techniques, shaft descending techniques, mapping, photography, underwater cave research and cave rescue.

The HSS includes among its active members university professors, specialized scientists of all branches of learning involved in the study of caves who conduct courses in Geology, Hydrogeology, Archeology, Paleontology,

Biospeleology, Stratigraphy, Sedimentology, CaveFlora/Fauna, Paleoanthropology and Anthropology, Legal information about caves, surface karst phenomena, Mineralogy & Petrology.

There are at least 10 practical courses and 20 theoretical/scientific courses during the annual three month seminar course.

The HSS also organizes Advanced Speleology Courses with rigging & self-rescue techniques and also courses about cave rescue techniques.



Figure 3: Different sessions within the training courses – SRT outdoors, SRT in a pothole, traverse inside a pothole, mapping Arhedimos cave, Attica.

4. Discussions & Conclusion

Throughout the whole history of the HSS (1950 – 2020) its members have worked selflessly to promote speleology in Greece respecting the vision of its founders. Their efforts, their work and their devotion are very difficult to be referred to in a single paper.

The HSS is a scientific, non-profit organization which promotes speleology in every possible way. The HSS promotes both scientific and athletic speleology. During all these years many people have passed through the HSS either as participants or as crucial members for the continuation of the HSS's vision and work. In the last decade the HSS has managed, thanks to the devotion of its Administrative Council and its members, to contribute to

the education of new speleologists, in the exploration of new caves and in the organization of many expeditions. The HSS welcomes the scientific presence of its members in all National and International Conferences.

In the summer of 2020 the HSS organized an expedition to Zagorochoria, Epirus, NW Greece, in a way to rekindle interest and mark the 70 years of its presence in Greece. In the expedition 22 speleologists took place from 3 different cities of Greece.

In the next decade the HSS would like to rekindle the spirit of cooperation among foreign and Greek speleologists and promote speleology with new modern ways of surveying and exploration.

Acknowledgments

We gratefully thank the HSS founders and previous members that have shared their passion of Speleology with us and all our colleagues that have helped us throughout the years.



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Commentaires de lecture sur l'exploration des grottes de La Balme (38) avant la Révolution Française

Bernard CHIROL

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Résumé

Fils du précurseur Marc-Théodore Bourrit (1739-1819) en matière de randonnées, de littérature et de peintures sur les Alpes, le pasteur Pierre Marc Isaac Bourrit (1762-1841) est un exemple de pionnier spéléologue dont l'audace, la sagacité se sont distinguées aux grottes de La Balme, merveille du Dauphiné visitée de longue date. Faisant fi des superstitions, des dangers objectifs, il montra, dès 1782, non seulement toutes les qualités sportives et la démarche scientifique caractérisant le spéléologue mais il nous laissa également un écrit publié en 1807. Ce haut fait de spéléologie, plus d'un siècle avant Martel montre l'évolution de la société face à l'appréhension du monde souterrain.

Abstract

Reading comments on the exploration of the caves of La Balme before the French Revolution. Son of the forerunner Marc-Théodore Bourrit (1739-1819) in hiking, literature and paintings on the Alps, the Pastor Pierre Marc Isaac Bourrit (1762-1841) is an example of a pioneer speleologist whose audacity and sagacity distinguished himself in the caves of La Balme, a long-visited wonder of the Dauphiné. Disregarding superstitions and objective dangers, he showed, as early as 1782, not only all the sporting qualities and the scientific approach characterizing the speleologist, but he also left us a written work published in 1807. This high fact of speleology, more than a century before Martel shows the evolution of the society facing the apprehension of the underground world.

1. Introduction

La grotte de La Balme, surnommée « Merveille du Dauphiné » est située à l'extrémité sud de la chaîne du Jura dans le département de l'Isère (38). Elle est intégrée dans la structure tabulaire de l'Isle Crémieu, essentiellement constituée de calcaires du Jurassique moyen. Une longue évolution géomorphologique tertiaire s'est achevée par un rabotage glaciaire ayant laissé ses stries sur le plateau de Larina (417 m). Une karstification ancienne, ravivée par les écoulements glaciaires donnent un caractère polyphasé au

creusement de ce réseau, intimement lié au niveau de base du Rhône, tout proche, à l'altitude de 200 m. Les populations préhistoriques ont amorcé l'occupation humaine du porche gigantesque dès le Moustérien (fouilles E. Chantre 1865). Ensuite, cette cavité fut dédiée au tourisme souterrain, après avoir défrayé la chronique autour de 1960 par ses plongées records à la mesure des techniques en cours, bien dépassées depuis.

2. Motivations

Habitant très près, à 5 mn de ces grottes, je n'en suis séparé que par une limite départementale entre l'Ain et l'Isère. Je ne me suis pas consacré à cette île Crémieu, qui fait l'objet depuis des décennies d'un inventaire spéléologique établi par le Groupe Ulysse Spéléo et les spéléologues du Rhône (69). Cet inventaire constituera la partie manquante à celui de toute la chaîne jurassienne que j'estime à environ 16 000 cavités, tout comme le nombre atteint en Rhône-Alpes Auvergne. J'ai visité cette grotte étant adolescent, en famille, on escaladait les échelles métalliques pour les réseaux supérieurs.

Une étude avait été faite dans une thèse d'ampleur, étudiant les karsts alpins (Audra, 1994). Cependant, bien qu'immanquable au vu de sa taille d'exutoire, ce réseau est

quelque peu négligé de par sa situation, détachée des zones karstiques prestigieuses du Vercors, de Chartreuse.

C'est l'histoire et sa nouvelle proximité qui me ramènent vers cette grotte. Très anciennement, après que les hommes ont commencé à l'utiliser comme abri puis comme lieu sacré lié à sa source, une chapelle y a été construite sous le porche dès 1310 (puis reconstruite). François 1^{er} s'y serait intéressé en envoyant notamment deux condamnés canoter le lac avant de les gracier selon l'historien François-Eudes de Mézeray (1610-1683) !

D'anciennes mentions sont connues pour ce site, Chorier par exemple dès 1661.

Un curé du village avec plusieurs amis a navigué sur le lac.

Ainsi Antoine Marin explora la grotte dans la première moitié du 17^{ème} siècle.

A cette époque, la spéléologie balbutiait à peine en Europe, Janez Valvasor, Baron spéléologue ne révéla le karst slovène que quelques dizaines d'années après.

Nul doute que bien des visites souterraines précoces nous ont échappé et l'on doit à la diffusion du Livre de connaître nos pionniers.

Le 18^{ème} siècle va être déterminant. Même non publié, le manuscrit de Nagel révèle à l'Empire austro-hongrois et plus tard au monde l'ampleur de la karstification et de ses phénomènes. Alors, bien des écrits montrent dans la littérature l'intérêt des hommes pour les grottes. Celles de La Balme n'y échappent pas. Le siècle des Lumières permet à des précurseurs de se distinguer. Non loin, dans le département de Saône-et-Loire, un médecin explore en 1739 les grottes de la Cailleverdière à Blanot et laisse un texte très intéressant, tourné vers la science (Barriquand et al. 2015). Une cinquantaine d'années plus tard, le héros de l'aventure partagée aujourd'hui va intervenir.

Figure 1 : L'entrée des grottes de la Balme dans l'Album du Dauphiné en 1836. Collection René Ginet



3. Présentation des acteurs

En cette fin de siècle révolutionnaire, Pierre Isaac Marc Bourrit (1762-1841) est président du Consistoire en tant que pasteur à Lyon. Il n'est rien moins que le fils aîné de Marc-Théodore Bourrit (1739-1819), auteur des « Descriptions des Alpes », grand chantre de la cathédrale Saint-Pierre de Genève, pensionnaire de sa Majesté l'Empereur et Roi, membre de l'Institut de Boulogne, etc. Son père est un peintre, précurseur de l'alpinisme, compagnon de Saussure. Une notice biographique existe sur cette célébrité, écrite en 1836 par son autre fils, Charles, également pasteur et bibliothécaire à Genève. À noter qu'ils ont une sœur, Jeanne, peintre.

Nous devons à Tournachon-Molin Libraire à Lyon la publication de l'ouvrage « Itinéraire de Lyon à La Balme avec une description détaillée de sa fameuse grotte » (Bourrit, 1807). Nous sommes reconnaissants envers ce libraire d'avoir trouvé la diffusion des informations sur ces grottes insuffisamment exactes, aussi bien celle des ouvrages académiques que celles des relations parues dans le *Journal de Lyon* par un des acteurs de ce récit, Mr de la Poype (1784).

La grotte de La Balme, Merveille du Dauphiné, est bien connue depuis des siècles. Elle est un lieu dédié à Notre-

Dame. Les Lyonnais en ont fait leur promenade d'été au 19^{ème} siècle. Le tourisme est développé pour les gens de la bonne société, qui utilisent les calèches afin de découvrir les beautés architecturales et celles plus bucoliques de la nature. Les grottes accueillent en Europe les touristes depuis le 16^{ème} siècle au moins et celle de La Balme n'est pas en reste avec la visite de François 1^{er} (et sa mère), fameux roi de France ami de Léonard de Vinci. Pierre Bourrit décide de faire cette excursion en 1782, au cours d'un séjour de trois semaines chez un noble local M. de la Poype, qui possède un château à Hières-sur-Amby. Cette maison forte fut brûlée à la Révolution. Un autre château existe à Trept. La description de l'itinéraire est déjà fort intéressante pour nous qui connaissons la région, ses paysages, les toponymes... La Poype a lui-même rapporté une nouvelle visite en barque le 18 septembre 1781. Son hôte Pierre Bourrit va lui, tenter d'en savoir plus, à la nage !

En revenant sur les lieux en 1807, Pierre s'émeut de l'empoisonnement de brochets par le chanvre roui dans un petit étang local. Cette note écologique montre les réactions de gens de la ville sur des pratiques rurales et un souci de la nature.

4. La relation analysée d'une exploration peu commune

Avec un ou plusieurs guides munis de flambeaux et bougies de table, on peut visiter cette grotte de La Balme.

Page 18, on a une remarque très intéressante « on n'est pas harcelé comme aux Glacières ou à la Perte du Rhône par une foule importune de gens qui s'offrent comme conducteurs ». On comprend là déjà une saturation qu'éprouvent les touristes sur des lieux trop fréquentés.

C'est aujourd'hui le cas en bien des endroits et redéfinit parfois le contenu des visites, le comportement des visiteurs et des locaux. Des précisions sont données sur la gestion par la commune : affermage et nomination de guides officiels ici Mr Laurent Clerc, tailleur d'habit par ailleurs. Bourrit mesure l'entrée à l'aide de 3 personnes. Un réflexe d'explorateur visant à topographier.

Ensuite, une intéressante comparaison est faite avec la grotte d'Antiparos (Grèce) dont la notoriété est certaine en Europe depuis les visites de Nointel en 1673 et de Lady Berkeley Craven en 1789. On comprend que Bourrit fait appel à ses souvenirs, puisqu'il écrit son récit en 1807, mais certainement aussi à ses notes, ce qui est scientifiquement intéressant. Autre référence intéressante p. 25-26, une citation en latin d'un poète du 16^{ème} siècle pour célébrer les gours ! Un autre commentaire écologique pour dénoncer la casse des concrétions comme le fit Lady Craven. Plus tard, on condamnera aussi les flambeaux dans certains sites souterrains aménagés aux USA, en Europe...

En p. 26-27 on note une tentative d'explication des formes et une autre sur l'origine des concrétions. En p. 31 par exemple, Pierre s'interroge sur les chenaux de voûtes ou les cloches de plafond et admet que l'alimentation de la rivière devait se faire par le fond, vers le lac. Il imagine l'évolution du concrétionnement en 25 ans. Confirmation est faite de l'utilisation régulière du guano prélevé dans les salles supérieures (p. 33). En p. 35, il décrit une progression en rampant dans la galerie du Capucin. Rappel d'un incident pour un Anglais blessé dans une étroiture à la Balme de Magland (74). Au 19^{ème}, le tourisme souterrain bat son plein !

On arrive enfin à la 3^{ème} lettre à son père où l'on attaque le vif du sujet : l'exploration de 1782. Pierre Bourrit s'équipe avec une ceinture de liège pour affronter les eaux du lac. Un domestique bon nageur renonce à le suivre. Notre héros sportif est aussi un scientifique : comme les pionniers du Mont Blanc, il emporte du matériel de mesures, une sonde, un thermomètre, une montre, une carte du lac, une planche avec 18 bougies. Le plus, c'est que Pierre exulte dans cette exploration, il marche, il nage, il contemple, il médite, c'est l'extase. Le virus est là ! Pierre Bourrit est un spéléologue du 18^{ème} siècle. Il a pris soin, conscient de la valeur de son geste, de graver «Le 27 août 1782, Bourrit, fils de l'auteur des « Descriptions des Alpes » est allé à la nage au bout de ce lac ».

Il a payé de sa personne, plusieurs jours alité avec de la fièvre ensuite. Il a mesuré les profondeurs, les dimensions du lac, des galeries, allant au maximum de ses possibilités pendant une heure de natation. De l'entrée jusqu'au bout du lac, il trouve 314,935 m. Sa curiosité l'a emporté sur l'avis des autochtones, sur la peur, le froid. Il montre l'évolution des pratiques en banalisant son acte puisqu' en 1807 on navigue en barque en ces lieux et « même les dames » le font !

5. Conclusion

Le travail de 64 pages de Pierre Bourrit n'est pas anodin. Cet homme de l'époque napoléonienne est un lettré, un scientifique tout en étant un touriste local. Mais quel touriste !

En fait, Bourrit est un spéléologue, un karstologue régional éphémère dont les visites à La Balme (38) marquent un jalon dans l'histoire de ces disciplines. Il serait intéressant de creuser la biographie de ce pasteur pour trouver peut-être d'autres surprises même si La Balme semble rester pour lui un moment de bravoure à 20 ans, mais aussi de science de façon plus durable ! Cet « Itinéraire de Lyon à la Balme »,

La 5^{ème} lettre est consacrée à des hypothèses sur la formation de la grotte, sa lithologie et aux températures.

Tout d'abord, une idée hardie qui envisagerait le Rhône comme moteur du creusement depuis sa perte bien en amont, c'est à dire depuis Bellegarde ? (p. 50).

Pierre Bourrit ne conteste pas la puissance des phénomènes hydrologiques mais ne pense pas que le Rhône seul et ses cours souterrains soit responsable du creusement de la Balme. Il compare les régimes hydrologiques et hydrogéologiques, il compare les sédiments et affirme les différences. Ensuite, il balaie les superstitions, les croyances en l'intervention de l'homme.

Non, pour lui, les pluies et le Rhône ont un impact sur l'alimentation du réseau. Ce qui est intéressant, c'est la prise de conscience du temps long par Bourrit à cette époque où la géologie est balbutiante (« anciennement » ; « autrefois »). Le polyphasage est envisagé à travers l'étagement effectif du réseau, avec une action phréatique inférieure et une action météorique et hydrogéologique supérieure et postérieure. Il emploie le mot « filtration » pour infiltration. Le lac le préoccupe et non seulement il imagine les mises en charges en s'appuyant sur des formes de creusement dans les voûtes mais il tient compte de la morphologie du plateau et suppose l'alimentation dans cet impluvium. La partie suivante est plus délicate (p. 54-55) avec une entrée en matière intéressante évoquant l'étagement des réseaux dans l'île Crémieu. Il imagine une transgression ayant épargné des grottes supérieures, ce qui est plausible. Il voit le creusement de ces grottes comme antérieur, ce qui convient aussi mais Bourrit semble relier la présence de nombreux fossiles du massif à cette transgression. Les calcaires biodétritiques sont mal remis dans la géochronologie sédimentaire locale et globale. La suite de la p. 55 s'oriente sur les températures et les gradients constatés avec l'enfoncement dans le réseau. Bourrit note cette température de 10 ° de l'air et de l'eau, tient compte de l'hygrométrie dans le ressenti et a bien perçu la constance thermométrique indépendante de l'extérieur en profondeur.

La 6^{ème} lettre à son père est consacrée au trajet de retour à Lyon, en utilisant les « penelles » équivalant aux gabarres de la Dordogne, relation très intéressante pour sentir les lieux qui ont bien changé. On comprend dans ce livret qui fut réédité plusieurs fois jusqu'après le milieu du 19^{ème} que Pierre Bourrit prenait dans cette visite coutumière à La Balme un plaisir immense.

même écrit 25 ans après son exploit, devance d'autres publications françaises décrivant les grottes ou tentant d'expliquer leur formation : celles de Parandier 1833, Virlet d'Aoust 1836, De Longchêne, Desnoyers, Delacroix dans les années 1840 et Fournet 1858.

À noter que d'autres auteurs depuis B. Palissy vers 1580 avaient tenté de comprendre les réseaux hydrogéologiques en France ou en Slovénie (Perrault 1674, Valvasor vers 1680, Astruc 1737).

Les grottes de La Balme en Isère restent un monument de notre patrimoine naturel et historique, d'un développement

supérieur à 5 km, le siphon situé au bout du lac fut considéré comme record après 1950, où les pionniers du Clan de la Verna s'exercèrent. La structure de l'île Crémieu et sa grotte phare de La Balme seront l'objet de publications, annoncées depuis longtemps avec la reprise de l'inventaire local, constituant une curiosité méconnue pour ce département prestigieux de l'Isère, riche d'une partie du Vercors et de la Chartreuse.



Figure 2 : une vue imaginaire des grottes en 1701

À noter qu'une synthèse avec topographie sur la grotte de la Balme existe depuis plus d'un siècle (Martel, 1899). Auparavant un magnifique album avec topo avait déjà été publié par Etienne Rey (1855).

Les reprises d'explorations en plongée à la Fontaine St-Joseph et à la Serve à Vernas (à l'origine du nom du Clan et de la salle pyrénéenne) montrent par la réussite du groupe Vulcain de Lyon que ce plateau a encore à nous apprendre.



Figure 3 : Navigation sur le lac de La Balme au début du XIX^{ème} siècle. Dessin de Victor Cassien (1836).

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MARTEL E.A. (1899) *La grotte de la Balme (Isère)*, Mémoires de la Société de Spéléologie (Paris), N° 19, avril, T. III, pp. 3-20.

REY E. (1855) *Album de la grotte de la Balme* (Lyon), 30 p.

Scientific research and academic qualification in speleology and related themes: historical aspects and scientific genealogy in Brazil (1945-2020)

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Abstract

The objective was to analyze the historical evolution of the production and academic qualification in Speleology and related subjects in Brazil, aiming at the creation of a Database, promoted by the History of Speleology Section (SHE/SBE). Scientometric aspects were highlighted by assessing trends over the last 75 years (1945-2020). A preliminary study was carried out on the formation flows in speleology, allowing to identify a scientific genealogy in the country. Only academic studies were considered, with data collected in the main electronic search engines and university libraries (BDTD/IBICT, CV-LATTES, SIBi-Dedalus/USP; among others). The previous catalogs, were updated by: a) Figueiredo et al. (2005) and b) Figueiredo et al. (2017). The results demonstrate a significant evolution in the production of academic speleological studies (masters, doctorates, undergraduate degrees): a) 1945-2005 (355) and b) 2006-2020 (657) (updated) totaling 1,012 documents. A notable increase was observed in university production and qualification contributing to the expansion of knowledge about Brazilian caves, especially in the area of Earth Sciences (ES) and Life Sciences (LS). This evolution stems from the creation of research laboratories, the need for professionals specialized in karst environments to comply with Brazilian environmental legislation and the consolidation of the performance of the national speleological community.

1. Introduction

The present study describes the activities for the production of a Database in Speleology and Related Themes (BD-ESPELEO) and it is part of the actions of the History of Brazilian Speleology Project (PROHEB), linked to the History of Speleology Section (SHE) of the Brazilian Speleological Society (SBE), being held since 1994. Several studies that were based on the bibliographic review of academic works and production of data catalog on Speleology and related subjects were used as a scientific basis (SÁNCHEZ, 1986; TRAJANO, 1992; FIGUEIREDO et al., 1997; FIGUEIREDO et al., 2005; FIGUEIREDO et al., 2017).

The investigation emphasizes scientometrics as a measure of scientific productivity, but also the topics covered and the issue of academic training (SPINAK, 1998; MACIAS-CHAPULA, 1998). Studies on scientific genealogy were considered, identifying the flows of academic formation. (DAVID and HAYDEN, 2012; MOREIRA et al., 2018).

The aim was to update the catalog on academic studies in Speleology and related topics, held in Brazil until 2020, demonstrating the role of the university in the training of qualified personnel, themes investigated, academic genealogy and the evolution of scientific production.

2. Materials and methods

The present survey was exploratory and descriptive, the period of analysis is from 1945 to 2020. Only the academic production of universities and research institutes was taken into account, not considering articles for congresses or journals. The catalog of academic works (Ph. D, Master's degree thesis and academic monographs) for the area of Speleology and related themes was produced through the search for data in the main libraries and electronic search tools from Brazilian universities. (USP; UFMG; UFBA, UFLA, among others). The data were complemented by national

scientific search mechanisms: Lattes Platform (CNPq), BDTD-IBICT, SCIELO, in addition to Google Scholar. Information was also obtained from national journals related to speleology and Annals of Speleology events (e.g.: CBE).

Despite the main focus being the studies carried out in caves, it is understood that speleological investigations would not be possible, nor recommended that they happen disconnected from aspects of their surroundings. Therefore, we chose to conduct a more comprehensive survey of themes related to Speleology, such as: Geology, Biology.

The documents were grouped into 3 major areas: a) **Life Sciences-LS**; b) **Earth Sciences-ES**; c) **Human Sciences-HS**. The classification of academic works was not done exclusively by the area of concentration of the research, but by the proximity or main thematic focus.

The following terms related to the theme were used in the search engines: **cave, grotto, karst, karstification, cave-dwelling, rock shelter, rock painting, karren, troglobes**, and more, or those linked to Brazilian regions and locations where caves are concentrated (speleological sites). The following parameters of analysis were used:

- a) **Historical aspects and temporal distribution:** by year,
- b) **academic level:** classified as a full professor, doctorate, master, specialization monographs, undergraduate works.

3. Results and discussions

3.1 Historical aspects and temporal distribution

Crodowaldo PAVAN's doctoral thesis (1945), carried out at the Biosciences Institute (USP) is considered a pioneer academic document in the speleological universe, is associated to studies on *blind catfish* from the caves of the Upper Ribeira Valley (SP) and the issues related to evolution. Among other historical documents, we have the research by SOUZA-CUNHA (1960) and CARTELLE-GUERRA (1979), in the area of paleontology. And those in the karst geomorphology by GUIMARÃES (1953) and DOLABELA (1958), both related to the Federal University of Minas Gerais (UFMG). The first geological studies associated with karst areas were produced at the Federal University of Bahia (UFBA) (e.g.: MARINHO, 1978) and at the University of São Paulo (USP) (e.g.: SILVA, 1984; GUERRA, 1986). In the area of humanities, archeology works appear (e.g.: MARANCA, 1979), and among the studies in the area of tourism and urbanism Lino (1976) deserves to be highlighted. The first academic works done by cavers were those by LINO (1976- undergraduate level and TRAJANO (1981-master's degree in Biology). It has been observed in the distribution over the decades that, starting in the 1990s, the number of scientific works at universities began to expand exponentially, due to the greater availability of supervising professors and the emergence of research programs and laboratories. Despite the fluctuations observed, Life Sciences is highlighted, mainly from the years 2010, due to the creation of new research groups. (Fig. 1).

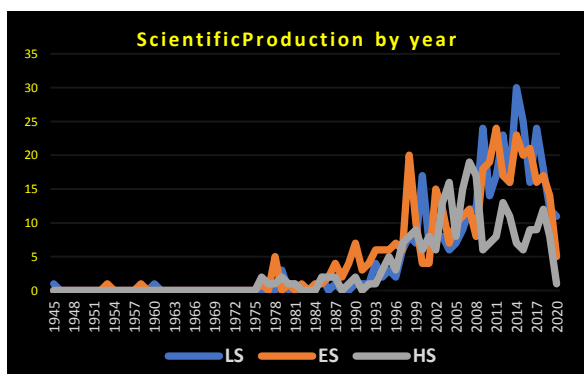


Figure 1: Graph of academic production in Speleology-Brazil (distribution by years, 1945-2020, and by areas)

- c) **areas of knowledge and themes:** (LS, ES, HS),
- d) **spatial distribution:** states, regions or other countries,
- e) **research institutions typology:** identifying the universities where the researches were developed.
- f) **main researchers/advisors:** registering the main advisors identified in the surveys, highlighting those who have contributed most to Speleology.

The data obtained were analyzed according to the simple frequency and relative frequency from spreadsheets and graphs generated in the EXCEL program. Since 2020, the catalog has involved a total of 1,012 academic studies.

3.2 Academic level

Regarding the academic level, there is an expressive number of works at master's degree (n= 395/39.0%), followed by doctoral studies (n = 159 /15.7%). Master's researches are highlighted by *Earth Sciences* (n= 168/16.6%). Graduation works do not correspond to most of the production (n= 230/ 22.7%), showing greater interest in the speleological issues when professional deepening. On the other hand, undergraduate participation continues to be justified by the early encouragement to investigate caves and karst, boosting academic continuity. The general trend in the three areas (LS, ES, HS) follows a relatively similar distribution, between doctorate, master's and undergraduate degrees, with a predominance of the master's level.

3.3 Areas of knowledge and themes

The academic production has a distribution according to the time scale. Until the end of the 1990s, the largest production was concentrated in the area of *Earth Sciences* (n= 73/7.2%) and there were similarities in the major areas of *Life Sciences* and *Human Sciences* (n= 36/3.5% and n= 43/4.2%, respectively). From the 2000s decade there was a greater balance among the areas, with approximately one hundred researches produced in each areas.

In the last decade, there has been an expressive growth of works in the areas of LS (n= 204/20.0%) and ES (n= 193/ 19.0%) and only the quantitative maintenance of works produced in HS (n= 93/9.2%).

3.4 Spatial distribution: states, regions and other countries

The Southeast region clearly appears as the one with the largest speleological production (71.0%). The state of São Paulo alone contributes 37.7% of all national production. This is due to the state being the cradle of speleological activities, the presence of old universities and extensive availability of professors-researchers related to the subject. This is an unusual fact, considering that the karst regions for scientific researches in São Paulo are relatively distant from the Metropolitan Region (RMSP), more than 300 km.

Others federative units of greater activity are: Minas Gerais, Bahia, Paraná, Rio de Janeiro, Ceará, Federal District and Rio Grande do Norte, explained by the compatibility of the existence of Higher Education Institutions (HEIs) that realize academic studies and the proximity of relevant areas sites for university researches. (Fig. 2).

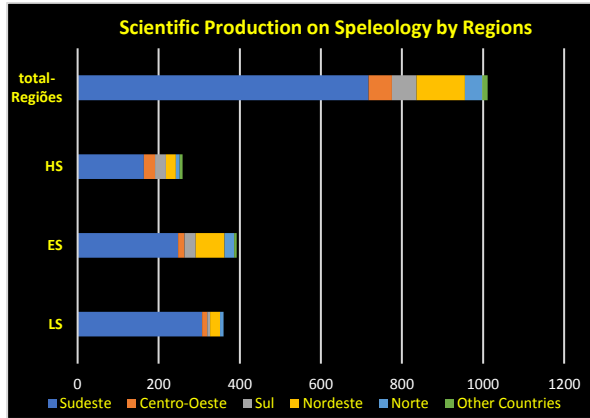


Figure 2: Speleological academic production (by Brazilian regions, other countries and by areas of knowledge)

Regarding the distribution of speleological academic production by region and areas of knowledge, it is evident that the Southeast region predominates in all major areas, however with greater emphasis on **LS**. Another highlight is due to the number of **ES** works produced in the Northeast and North regions of Brazil.

3.5 Research institutions typology

It can be observed that the Brazilian academic production in Speleology involves 111 Higher Education Institutions, being 35 federal, 18 state, 6 municipal/community/confessional and 39 private institutions. The contribution of public universities is higher (federal and state) (n= 53/48.6%) and private universities (n= 39/35.8%).

In the 1990s and 2000s the two main training centers for researchers on themes related to caves and karst were: the University of São Paulo (USP) and the Federal University of Minas Gerais (UFMG). It is observed that the production of these two institutions (n = 351) is notorious for the establishment of this line of research in the country. In the last decade, other institutions have become protagonists in academic production in Brazil. Among them, appear highlighted for their expressive contributions in the field of Subterranean Biology the *Center for Studies in Subterranean Biology* (CEBS) at UFLA and the *Laboratory of Subterranean Studies* (LES) at UFSCar. It should also be noted, the growing production of PUC-MG, UFBA, UFC, UFOP, UFRN, UFT among others, spreading training seeds for speleological research throughout the Brazilian territory. The Top 15 is in Fig. 3.

5. Conclusion

The database on research and researchers that develop speleological studies provided information for the constitution of a list, until 2020, on the dynamics of scientific production related to caves, karst landscapes and speleological sites and other associated themes, allowing the analysis of relevant scientometric dynamics.

By these means, it was possible to observe the academic paths taken, the role of universities, the general trends of scientific production, the existing gaps and the training process. On the other hand, the provisional nature of these

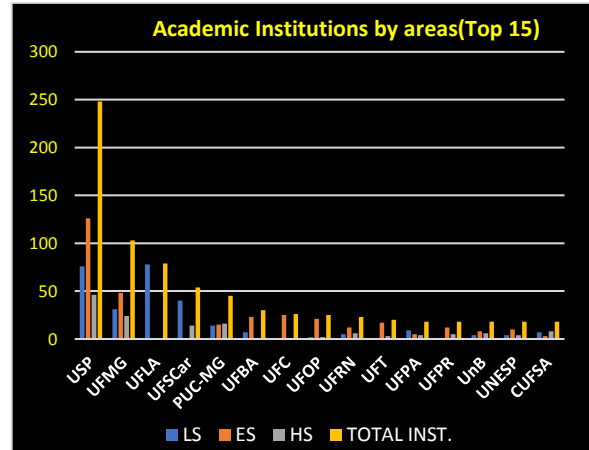


Figure 3: Top 15 of the main universities with academic production in Speleology in Brazil (by areas)

3.7 Main researchers and advisors

Scientific advisors are fundamental to advance training activities and to development of speleological scientific production, with the strengthening of research groups. Among the most active are Rodrigo Lopes FERREIRA and Maria Elina BICHUETTE, both from the **LS** area, responsible for the main research laboratories in subterranean biology in Brazil (CEBS-UFLA and LES-UFSCar). They alone account for 11.4% of all Brazilian production. Eleonora TRAJANO and Pedro GNASPINI-NETTO, both from USP, remained in the spotlight, but also Marconi SOUZA-SILVA (UFLA/UFSJ/UNILAVRAS) and Leonardo S. AVILLA (UNIRIO), the latter in the area of Paleontology.

In the **ES** area, Ivo KARMANN, Francisco W. CRUZ JR and Willian SALLUN FILHO stand out, all from USP, genealogically connected in three academic generations. In the Humanities or Interdisciplinary area, Luiz E. P. TRAVASSOS (PUC-MG), Heros A. S. LOBO (UFSCar), César U. V. VERÍSSIMO (UFC) and Fernando de MORAIS (UFT) also appear highlighted.

It is noteworthy that only these 13 researchers represented 361 speleological investigations and are equivalent to 35.7% of all analyzed production. The rest of the 651 academic documents are distributed among the other 398 advisors.

We recognize a high productivity in the area of Biosciences, demonstrating the great investment of *Life Sciences* in the process of training and research related to the theme and education of new researchers. Another aspect that may explain the significant increase in production in this area is the need for studies of subterranean biology for procedures for environmental licensing.

data is highlighted due to the limitations of the survey carried out. It is necessary to expand the study in a more collaborative and systematic way.

It is also required to create a descriptive catalog of academic works with expansion of procedures for searching and cataloging information online, analyzing productivity and trends in cave research and searching for resources to map the genealogy of the scientific training process and the educational role of university research institutes.

The study demonstrates that the CV-LATTES of the Ministry of Science and Technology (Brazil) remains an important and efficient source of information. This reinforces that the scientometric analysis methods allow a better understanding of the trajectory for the constitution of an interdisciplinary field of knowledge, such as Speleology. The results showed a marked academic evolution on the subject: a) 1945-2005 (355) and update b) 2005-2020 (657), with the first period covering 60 years and the second only

15 years. In this interval, there was a significant advance in the Brazilian academic production on caves and karst, especially in the area of Earth Sciences and Life Sciences. The present study demonstrated the importance of the university in the formation and qualification of researchers in their first investigative steps and their contribution to the scientific dissemination and deepening of studies and knowledge about speleological heritage.

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Bernard Gèze (1913-1996) : sa personnalité et son rôle dans la création de l'UIS

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Résumé

Bernard Gèze fut le premier président de l'UIS, poste qu'il occupa pendant deux mandats, de 1965 à 1973. Il joua surtout un rôle décisif d'abord dans l'organisation de la spéléologie française, puis dans la préparation du congrès de Postojna-Ljubljana et dans la création de l'UIS qui devait en résulter en 1965.

Bernard Gèze a laissé plusieurs écrits sur l'histoire de la spéléologie, qui permettent de bien comprendre la place qu'il occupa dans la spéléologie des années 1930 aux années 1970. Les archives de l'UIS conservées à Postojna jettent un éclairage complémentaire, lacunaire certes mais précieux sur les événements décisifs de 1965 et sur le rôle de Bernard Gèze dans les années qui ont suivi, jusqu'à la création de la commission d'histoire de la spéléologie de l'UIS en 1981 à Bowling Green.

Cette communication vient en appui à l'exposition en hommage à Bernard Gèze qui sera présentée pendant le Congrès de 2021 (en 2022).

Abstract

Bernard Gèze (1913-1996): who he was, and the role he played in the foundation of UIS. Bernard Gèze was the first president of UIS, elected in Ljubljana in 1965 and reelected in Stuttgart in 1969. His contribution was decisive first to the organization of French speleology, then to the preparations of the Ljubljana-Postojna congress and for the creation of UIS.

Bernard Gèze wrote several books and papers about the history of Speleology, so we can easily understand the key role he played in Speleology from the 1930's to the 1970's. Even if they are gaps, UIS archives kept in Postojna enlighten the crucial events of 1965. During two terms of office, and afterwards, Bernard Gèze stayed very active and in 1981, during the Congress of Bowling Green, he created the UIS commission for the History of Speleology.

This paper is published in support of the exhibition shown during 2021 ICS to pay tribute to Bernard Gèze (in 2022).

1. Introduction

Lorsque Bernard Gèze disparut le 8 décembre 1996, de nombreux hommages lui furent rendus qui retracèrent sa carrière scientifique très riche (BOU, 1998 ; DURAND-DELGA *et al.*, 1997), ce dont témoigne une bibliographie de plus de 300 titres (BOU *et al.*, 2010). Il ne s'agit donc pas ici de revenir sur ces aspects bien connus.

De 1945 à 1965, Bernard Gèze se consacra à de grands travaux d'organisation de la spéléologie française et

mondiale, deux entreprises qu'il conduisit en parallèle. Sa position académique, son implication dans la spéléologie depuis le début des années 1930, les réseaux qu'il avait construits avec de nombreux correspondants européens lui permirent d'aboutir en 1965 à la création de l'Union internationale de Spéléologie.

2. La période de formation

La précocité de B. Gèze est notoire. Le 11 mai 1930, il a fait la connaissance de Robert de Joly lors d'une exploration à la grotte de la Madeleine (montagne de la Gardiole, Hérault) qu'il a déjà visitée « bien des fois auparavant » (GÈZE, 1993). La même année, âgé de 17 ans seulement, il s'entremet auprès de son père, directeur adjoint des services agricoles de l'Hérault et fait en sorte que la Maison de l'Agriculture à Montpellier soit mise à disposition de R. de Joly pour la réunion fondatrice du Spéléo-Club de France. L'élan était donné ! Bernard Gèze est un tout jeune homme : Il a 10 ans de moins que Louis Balsan, 8 de moins que Pierre Chevalier, 7 de moins que Félix Trombe, autant de scientifiques grands spéléologues que B. Gèze côtoiera jusqu'aux années 1960. Et très vite il va occuper une place prépondérante dans la spéléologie méridionale.

D'après son propre témoignage, B. Gèze a rencontré E.-A. Martel dès son arrivée à Paris en novembre 1932, et il a ensuite régulièrement correspondu avec lui (GÈZE, 1993). Il ne fut donc pas directement un disciple de Martel, mais lorsque Casteret et Balsan disparurent en 1987 et 1988, il resta le dernier spéléologue vivant à avoir connu Martel.

Bernard Gèze n'a pas attaché son nom à un grand réseau comme Chevalier à la Dent de Crolles, ni à une seule région spéléologique comme Balsan aux Grands Causses, même s'il a participé à quelques belles explorations dans le Midi : aven d'Orgnac, grotte des Eaux-Chaudes, gouffres de Padirac et de Pont-de-Gerbaut, évent de Rognès... Contrairement à R. de Joly, ce n'était pas non plus un grand technicien. Et dans ses souvenirs, jamais il ne se présente comme un meneur dans les projets d'exploration, et se préfère dans le rôle du

disciple le plus proche, de l'équiper le plus disponible (GÈZE, 1974).

Diplômé de l'Institut national d'Agronomie, Bernard Gèze poursuit des études de géologie sur des sujets éclectiques qui ne se limitent pas au karst. Une mission au Cameroun occidental en 1939 l'amena à s'intéresser au volcanisme et

à soutenir à Toulouse une première thèse sur ce sujet en 1943. Six ans plus tard, il soutient à Paris sa thèse d'État sur la Montagne noire et les Cévennes méridionales, terrains qui lui étaient et qui lui resteront plus familiers.

3. La création de la Fédération française de Spéléologie (FFS)

La création de la FFS a déjà été racontée. Si B. Gèze n'a pas forcément joué un rôle de premier plan au congrès de Millau en 1963, son influence avait été décisive dans les années qui avaient précédé : « Gèze que l'on retrouve à tous les instants de l'histoire fédérale » (MARCHAND, 1983, p. 27). Très jeune, B. Gèze fut membre de la Société Spéléologique de France dont il avait lui-même proposé le nom en 1936. Après 1945, B. Gèze se trouve en position centrale dans toutes les instances de la spéléologie française dont il dressa lui-même le tableau dans ce contexte d'après-guerre (GÈZE, 1946) : il travaille au Bureau de Recherches Géologiques et Géophysiques (qui préfigure le BRGM) où il conduit l'inventaire des cavités ; il participe à la commission de spéléologie du CNRS. En 1946, il a fondé les Annales de spéléologie dont il fut secrétaire général puis directeur jusqu'en 1951. À ce titre, il intègre le conseil d'administration du Comité National de Spéléologie (CNS) dès sa création en mai 1948. Par ailleurs, en 1954, il est élu président de la Société géologique de France (SSF). Au début des années 1960, il participe aussi aux travaux de la commission des phénomènes karstiques du Comité national de Géographie, et s'implique dans le projet initié par Jean Corbel d'établir des signes conventionnels pour une

cartographie des karsts (lettre de P. Fénelon, 12 octobre 1962). Il est donc au centre de tout une nébuleuse d'organisations d'où naîtra en 1963 la FFS.

Dès le début de 1948, il avait compris le caractère trop étroit de la SSF, trop centré sur la personne de Robert de Joly, et *in fine* son incapacité à fédérer seule la spéléologie française (lettre citée in VAN GOLVERDINGE SCHUT, p. 328). En tant que président du CNS en 1960, il est désigné en novembre 1961 comme l'un des 10 membres de la commission mixte CNS/SSF qui doit préparer la fusion. Sa voix porte dans plusieurs articles importants qu'il écrit alors pour promouvoir l'unité de la spéléologie française.

En 1963, lors du Congrès fondateur, B. Gèze fait partie de la première fournée de dix membres d'honneur de la FFS, ce qui explique que, par la suite, s'il ne perdit jamais de vue l'évolution de la fédération, il n'occupa pas de poste dans l'organigramme fédéral. En 1988, lors du grand congrès organisé à Millau, il présida le symposium d'histoire de la spéléologie ; les lettres conservées par Éric de Valicourt, secrétaire dudit symposium, prouvent la forte implication de B. Gèze dans ce projet, jusques et y compris l'accompagnement d'excursions post-congrès et la correction des Actes.

4. 1965, l'Union Internationale de Spéléologie

En août 1949, Bernard Gèze participe à la réunion de Valence (France) qui réunit les représentants de sept pays (Angleterre, Cuba, Espagne, France, Grèce, Italie et Suisse), sachant que quatre autres avaient fait connaître leur intérêt (Bulgarie, Tchécoslovaquie, USA et Yougoslavie). Gèze est présent à Valence comme membre du Spéléo-Club de Paris, et il s'y exprime en tant que directeur des Annales de Spéléologie ; son exposé sur les publications et sur la documentation spéléologique est d'ailleurs assez technique et plutôt franco-français. Cette réunion, dont B. Gèze allait rédiger le rapport final (GÈZE, 1949), est considérée comme le point de départ du long processus qui mènera à la création de l'UIS, quinze ans plus tard. En effet, les participants se quittent en convenant du principe d'un congrès international à Paris dont la date reste à fixer, et de la création d'un comité permanent qui doit accompagner la structuration de la spéléologie internationale. G. T. Warwick, qui sera plus tard vice-président de B. Gèze à l'UIS, est nommé représentant de la Grande-Bretagne dans ce comité permanent.

Conformément aux décisions prises à Valence, le premier congrès international se tient donc à Paris en septembre 1953.

Figure 1 : Bernard Gèze à la tribune, au premier congrès international de Spéléologie, Paris, 1953.



LE SECRETAIRE GÉNÉRAL, BERNARD GÈZE.
EMBARQUANT L'ORGANISATION DES SÉANCES.

Philippe Rolland

Bernard Gèze en est le secrétaire général (figure 1) ; il dirige aussi la première section de travail « Hydrogéologie et morphologie karstique » (36 communications présentées) ; et après la fin du congrès, il conduit les deux excursions dans les Causses et dans les Pyrénées. Sous la houlette de Guy de Lavour, la commission spéciale soumet à la séance de clôture les nouveaux « statuts des Congrès internationaux de Spéléologie » qui sont approuvés à l'unanimité et qui préfigurent la future organisation de l'UIS.

Deux congrès suivent, en 1958 à Bari et en 1961 à Vienne, auxquels B. Gèze participa, ce qui lui permit d'approfondir les contacts avec les spéléologues du monde entier ; en juillet 1964, une dernière réunion préparatoire a lieu à Brno : « Gèze plaide pour la réunion de tous les spéléologues, tant de l'Est que de l'Ouest, dans une seule association internationale » (LABEGALINI, 2015, p. 417).

Le congrès de 1965 se déroula à Ljubljana et à Postojna entre le 9 et le 29 septembre 1965. Après une réunion préparatoire tenue le 13, c'est le 16 septembre que se déroula la séance plénière de fondation de l'UIS. La première circulaire émise après cette réunion rend compte de ces grandes décisions, parmi lesquelles la nomination d'un bureau provisoire présidé par Bernard Gèze (figure 2). Selon le témoignage d'Arrigo Cigna, la désignation de Bernard Gèze comme premier président de l'UIS s'était imposée d'emblée, la question ne s'est même pas posée, c'était une évidence pour tout le monde : « Gèze était formidable comme président-fondateur de l'UIS » (comm. orale, 11 juillet 2019).

À la fin de décembre 1965, B. Gèze adresse une longue lettre à ses « chers confrères en Spéléologie » dans laquelle il invite les spéléologues nationaux à s'organiser de façon à pouvoir rejoindre l'UIS. Et il termine en précisant : « Si nous avons réalisé une Union Internationale, c'est avant tout pour que la Spéléologie devienne de plus en plus prospère dans le monde entier et non pour nous noyer dans du papier ».

D'ailleurs, les archives de l'UIS conservées à l'Institut du Karst à Postojna sont assez lacunaires. Ni Bernard Gèze, ni ses héritiers n'ont versé les archives correspondant aux deux mandats présidentiels de 1965 à 1973. Pierre Marchet et Michel Bakalowicz ont cherché en vain à Moulis, et les deux fils de B. Gèze, contactés, n'ont rien conservé. On est obligé de combler les lacunes de cette documentation avec les archives beaucoup plus abondantes laissées par A. Cigna, son successeur à la présidence de 1973 à 1981, et par H. Trimmel, secrétaire général de l'UIS de 1969 à 1989 (!) puis président entre 1989 et 1993.

En 1969, Bernard Gèze fut réélu président de l'UIS à Stuttgart. Durant ses deux mandats, il travailla avec G. T. Warwick et S. Mikulec, puis Vladimir Panos comme vice-présidents ; avec Albert Anavy puis Hubert Trimmel comme secrétaires généraux (« qui assument aussi les fonctions de trésoriers » selon l'article 3a des statuts adoptés à Ljubljana). Entre 1969 et 1973, M. Audétat fut secrétaire adjoint. Les statuts précisait d'emblée que le président et les vice-présidents ne pouvaient faire plus de deux mandats d'affilée (article 3d).

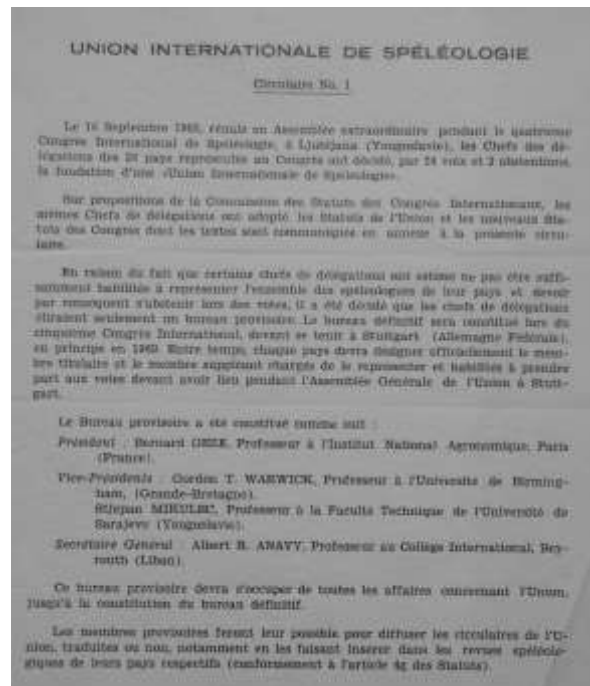


Figure 2 : Circulaire n° 1 de l'UIS, consécutive à la réunion du 16 septembre 1965 (Archives UIS, Postojna).

En 1973, B. Gèze prépare donc sa succession et, lors du congrès d'Olomouc, il propulse Arrigo Cigna à la présidence ; Vladimir Panos avait été pressenti pour occuper ce poste mais cette candidature fit les frais des luttes d'influence entre pays de l'Est et de l'Ouest. Dans une lettre à Hubert Trimmel, le 17 septembre 1973 donc après la tenue du congrès, B. Gèze regrette les ennuis faits à V. Panos par son administration de tutelle et finit sa lettre par « Vive la liberté ! ».

Mais à Olomouc, alors qu'il s'apprêtait à terminer son mandat, B. Gèze fut inopinément nommé président d'honneur sur proposition du Suédois Leander Tell, par 22 voix pour, 1 voix contre et 2 abstentions. L. Tell regrettait que les statuts limitassent le nombre de mandats à deux. Ce poste de président d'honneur n'était pas prévu dans les statuts de l'UIS si bien que le 18 octobre 1975, A. Cigna écrivait à H. Trimmel pour créer officiellement la « position de président d'honneur », ce qui fut fait lors du congrès de Sheffield en 1977. Pendant son premier mandat au moins, A. Cigna prit conseil auprès de B. Gèze (lettre du 10 avril 1975) et B. Gèze en retour le félicitait des succès obtenus, comme lors de la reconnaissance de l'UIS par l'UNESCO « que je n'avais pu obtenir autrefois » (lettre du 24 juin 1975).

En 1981, à Bowling Green, B. Gèze soutint la création d'une commission d'histoire de la Spéléologie à l'UIS, dont il fut élu président après que l'AG eut approuvé cette idée ; il occupa ce poste jusqu'à sa mort. Il continua à participer de loin en loin aux réunions de bureau de l'UIS, comme en avril 1984 à Malatin (Tchécoslovaquie) et à s'intéresser à son devenir : le 8 mai 1988 par exemple, il adresse à Hubert Trimmel une note assez critique sur l'évolution de l'UIS et sur la préparation du congrès de Budapest.

5. Conclusion

Les comptes rendus de réunions que nous avons pu consulter conservent peu de traces des prises de parole de Bernard Gèze. Il semble qu'il pesait surtout par ses courriers, par ses rapports écrits et par le minutieux travail de préparation auquel il se livrait avant les grandes échéances, plus que par ses interventions en séance.

Un trait de sa personnalité apparaît toutefois dans ses écrits : il pouvait avoir la dent dure. Dans la biographie qu'il a consacrée à Robert de Joly, il n'épargne pas l'abbé Glory ; et dans son article de 1988 consacré aux grands fondateurs de la spéléologie française, il n'épargne personne, sauf Armand Viré qui seul sort indemne de l'essorage (GÈZE, 1993). Plusieurs de ses courriers montrent aussi un certain pessimisme quand se profilent de grands événements qui lui donnent d'autant plus de souci qu'il pouvait douter de la fiabilité des responsables.

Car Bernard Gèze n'a pas ménagé sa peine dans son œuvre d'organisateur. Il faut bien avoir en tête la quasi-simultanéité entre la création de la FFS en 1963 et la création de l'UIS en 1965, et le chevauchement des réunions préparatoires pour ces deux échéances. Or, à la même époque, il présidait aussi la section de volcanologie du

CNFGG (de 1961 à 1967, après en avoir assuré le secrétariat de 1948 à 1953) et la section de paléovolcanologie de l'Association internationale de volcanologie (de 1957 à 1967) (DURAND-DELGA, 1997), ce qui en dit long sur son investissement dans les institutions scientifiques...

L'expérience acquise dans la création de la FFS fut certainement mise à profit dans la genèse de l'UIS, comme le montre la lettre adressée aux spéléologues en décembre 1965. Jeune spéléologue, venu à la géologie par le volcanisme autant que par le karst, professeur à l'Institut national agronomique, ce n'est donc pas un parcours linéaire qui mena Bernard Gèze à s'investir dans la diplomatie spéléologique et à jouer un rôle décisif dans la création de l'UIS.

L'œuvre scientifique et le travail d'organisation réalisés par Bernard Gèze seront évoqués lors du 18^{ème} Congrès international de spéléologie à travers une exposition. Arrigo Cigna, qui lui a succédé, nous a suggéré l'idée de cet hommage au président fondateur de l'UIS, 68 ans après le Congrès de Paris. Ce sera l'occasion de retracer cette page importante et de faire revivre cette figure majeure de l'histoire de la spéléologie

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Histoire de la spéléologie en Savoie

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Résumé

Les Pays de Savoie se caractérisent par des karsts d'altitude difficiles d'accès ; les cavités y sont froides et souvent verticales, aussi l'exploration spéléologique a-t-elle démarré assez tardivement. Avant la fin du 19^{ème} siècle, seules trois grottes étaient réellement décrites : les grottes des Échelles, de Bange et de Balme. Les incursions de Martel au « Pays des lapiaz » resteront très discrètes.

À partir des années 1930, Pierre Chevalier (1905-2001) va révéler l'immense potentiel spéléologique des massifs savoyards en multipliant les explorations. Après la guerre, la spéléologie s'organise progressivement, avec les forces vives locales, surtout à Annecy et à Chambéry, et la présence très active des Lyonnais et des Genevois. L'arrivée des Vulcains de Lyon sur le massif du Folly à la fin des années 1950 va écrire une grande page de la spéléologie savoyarde avec la découverte du gouffre Jean Bernard qui deviendra le plus profond du monde en juillet 1979 (-1358 m). Depuis, les explorations se poursuivent sous les massifs avec à ce jour trois -1000 et trois réseaux de plus de 50 km de développement.

Abstract

History of Speleology in Savoy. Karsts of Savoy are often mountainous, at high altitude, and hard to reach, without any road from the valley. Caves are really cold and vertical, therefore speleological exploration began quite late. Before the end of 19th century, only three caves were actually described : caves of the Échelles (Chartreuse), Bange (Bauges) and Balme (Arve valley). E.-A. Martel was above all interested in the great lapiaz, much more than in caves.

From the 1930's, many new explorations led by Pierre Chevalier (1905-2001) revealed the fantastic speleological possibilities of Savoy. After 1945, speleology progressively got organized with very active clubs in Annecy and in Chambéry, but also from Lyon and Geneva. In 1959, the famous club Les Vulcains started to explore the Jean Bernard system, the deepest in the world in 1979 (-1358 m). Since then, explorations are going on with three shafts more than 1000 meters deep and three more than 50 km long cave systems.

1. Introduction

Comparé au Dauphiné ou à la Franche-Comté voisine, les cavernes de Savoie restèrent longtemps assez méconnues, et aucune ne contribua vraiment à la gloire du duché... Ce n'est guère qu'au 18^e siècle que trois d'entre elles commencent à émerger dans les récits de voyage ou dans les ouvrages savants : la grotte de Balme fut sans doute la plus visitée, placée sur la route de Chamonix, et le grand Horace-Bénédict de Saussure lui-même la décrivit dans ses fameux *Voyages dans les Alpes* ; il y effectua plusieurs observations et émit des hypothèses sur le creusement de la grotte et sur la formation d'un plancher stalagmitique

(GAUCHON, 2011). La grotte des Échelles en Chartreuse (CHOPPY et *al.*, 2003) et la grotte de Banges dans les Bauges (GAUCHON, 2014) sont fréquentées par les curistes qui séjournent à Aix-les-Bains au 19^e siècle, mais les descriptions sont souvent convenues, encombrées de légendes, et n'apportent pas grand-chose à la connaissance de la Savoie souterraine... La proximité de Genève, grand foyer culturel, vaut aux cavernes du Salève une reconnaissance précoce et la découverte dès 1833 des premiers vestiges de l'art préhistorique (PITTARD, 1979, p. 29).

2. Les pays des lapiaz

Les karsts de Savoie sont haut perchés, culminant à près de 3 000 mètres dans le Haut-Faucigny ; les cavernes y sont froides, parcourues par des courants d'air souvent glaciaux et les premières tentatives d'exploration spéléologique n'allèrent jamais très loin sous terre : en juillet 1897, Martel monte ainsi sur le désert de Platé, mais ses équipiers et lui découvrent cette spéléologie d'altitude à laquelle ils ne sont pas préparés : Martel s'est embarrassé d'un bateau démontable qu'il a transporté sur ces lapiaz d'altitude et qui « n'a servi à rien » ; l'expédition « fut pénible à cause du mauvais temps » et on ne put explorer le gouffre des Verts que jusqu'à 47 mètres de profondeur (MARTEL, 1928, p.

213). Revenu sur le Parmelan en 1902, Martel explora aussi les secteurs d'entrée de la glacière d'Aviernoz.

Henri Douxami, Émile Chaix ou Édouard-Alfred Martel s'intéressèrent donc surtout aux formes de surface, commencèrent à topographier les lapiaz les plus spectaculaires (CHAIX, 1895) mais l'exploration spéléologique elle-même ne progressa guère : sur une quarantaine de pages, Chaix n'en consacre que quatre aux « puits circulaires » pour conclure qu'ils « demanderaient une exploration ». Seul Joseph Fonné consacra en 1903 un très riche numéro de *Spelunca* au réseau des Échelles dont il reconnut les principales grottes.

3. L'élan de la fin des années 1930

L'étincelle décisive allait donc venir de Pierre Chevalier, alpiniste émérite tard venu à la spéléologie et convaincu du potentiel des karsts savoyards resté quasi-inentamé. En pleine possession de ses moyens, avec ses compagnons du Spéléo Club de Lyon et des soutiens locaux décisifs en Haute-Savoie, il va vite donner toute sa mesure, en enchaînant entre 1935 et 1938 une impressionnante série d'explorations depuis l'Avant-pays savoyard et le nord de la Chartreuse jusqu'au Haut-Faucigny (CHEVALIER, s.d.) : il visite et topographie des grottes appelées à devenir des classiques comme la Doria (Fig. 1) et atteint, avec des moyens techniques limités, -195 au gouffre Chevalier (mont du Chat) ou -179 dans la tanne à la Graille (montagne de Sous-Dine).

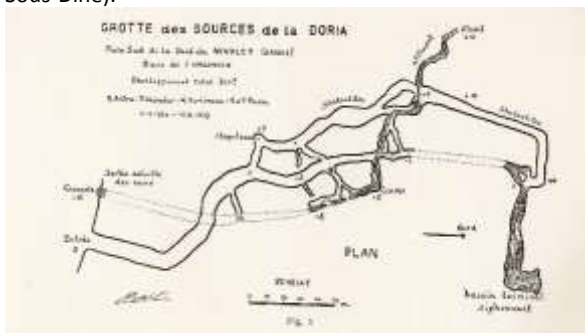


Figure 1 : Plan de la grotte de la Doria (Saint-Jean d'Arvey, Bauges méridionales) in CHEVALIER s.d.

4. L'épopée des tannes

En Savoie et dans quelques contrées voisines, on appelle parfois « tannes » les cavités naturelles qui s'enfoncent dans les profondeurs du sol... Dans les Bauges, la grande dalle urgonienne du Margeriaz culmine à 1845 mètres et plonge vers le nord-est en direction de la puissante source du Pissieu (alt. 670 m.). Là encore, P. Chevalier vint en éclaircur dès 1937 dans la tanne des Rafous, mais c'est en 1958 que les explorations commencent sérieusement dans la tanne Georges Cher. Elles se poursuivront tout au long des années 1960-70, dans d'interminables méandres hauts, étroits, sinueux, glissants qui useront plusieurs équipes de spéléos et qui feront la terrible réputation des tannes que d'aucuns considéraient à l'époque comme les trous les plus difficiles du monde : leur exploration fut d'ailleurs scandée d'épisodes tragiques, comme lors de la crue de septembre

Si, dans un premier temps, il semble se désintéresser de la Doria, « nous n'avons fait qu'une très courte visite à cette importante résurgence des eaux engouffrées sur le Parmelan » (idem, p. 25), P. Chevalier va ensuite s'acharner sur cette cavité majeure et s'adjoindre l'aide de jeunes spéléos locaux : la rivière souterraine et les cascades opposent de sérieux obstacles aux explorateurs, mais le 5 février 1949, cinq éclaircurs du Clan de la Diosaz atteignent le terminus de la grotte au siphon Chevalier (PAVESI, s.d.). Bien plus tard, les spéléologues grenoblois du CAF réinvestirent le réseau, reprirent les escalades dans les amonts jusqu'à + 300, et explorèrent sur le plateau plusieurs orifices (Tordu, Bel espoir, Trois Bêtas, Météores) qui allaient constituer un grand réseau et permettre de grandes traversées jusqu'à la grotte de la Doria.

Ce n'est qu'à la fin des années 1950 que la spéléologie savoyarde se structure réellement, avec la création du Spéléo-Club de Savoie (Chambéry) en 1959 et du Spéléo-Club d'Annecy en 1964. À partir de 1971, le SCS publiera la revue *Grottes de Savoie* (n° 19 paru en 2016), tandis que le n° 1 de *Spéléalpes*, revue du comité départemental de la Haute-Savoie paraît en 1977 (n° 24 paru en 2009). Ces deux revues constituent des mines d'information sur les milliers de cavités explorées dans tous les massifs karstiques de Savoie : en Chablais, en Faucigny, dans les Préalpes et dans les chaînons méridionaux du Jura, mais aussi dans toute une série de lentilles calcaires ou d'affleurement de gypse des Alpes internes, en Vanoise, dans le Beaufortain ou jusque sur les cimes frontalières au-dessus du Mont-Cenis.

1965 où deux membres du Spéléo-club de Savoie perdirent la vie.

La tanne des Enfers (-447), la tanne des Squelettes (-473) ou la tanne aux Cochons (-650) sont ainsi reconnues sur plusieurs kilomètres de long. En 1983, la jonction entre la tanne froide et la tanne aux Cochons permet d'atteindre une profondeur de -817 (CDS SAVOIE, 1993).

Entre 1996 et 2006, la jonction entre les tannes des Squelettes, des Biolles, des Crolleurs donne naissance au grand réseau de la Combe des Biolles, long de 26 kilomètres (BOURGEOIS, 2008).

Depuis lors, les efforts déployés sur plusieurs décennies ont abouti en 2010 à la jonction entre la tanne Chavanu et la tanne Verrat, pour une profondeur de -662 m et un développement de 9,4 km (exploration Ursus, BOUGNOL, 2014).

5. Quand le gouffre le plus profond du monde était en Haute-Savoie

Le 14 juillet 1959, les Vulcains de Lyon font leur première incursion sur le massif du Folly, au-dessus de Samoëns ; à l'été 1963, ils commencent l'exploration du gouffre Jean-Bernard (Fig. 2) dans lequel ils atteindront en 1979 la profondeur de -1358 m, ravissant à la Pierre Saint-Martin le record du monde (RIAS, 1981). Pendant presque 20 ans, le Jean-Bernard restera le gouffre le plus profond, les -1602 m ayant été atteints en 1989 (LIPS et OHL, 1991) et aujourd'hui

-1626 m ; mais ironie du sort, en janvier 1998, c'est un gouffre voisin situé à 1 km de là, le gouffre Mirolda, exploré par les Ursus de Lyon, qui coiffe le Jean Bernard de quelques mètres avec une cote à -1610 m. Certes, ce record ne tiendra que quelques mois, mais le Mirolda, ou réseau Lucien Bouclier, le récupèrera entre août 2003 et juillet 2004, même si la cote annoncée de -1733 suscita quelques interrogations.

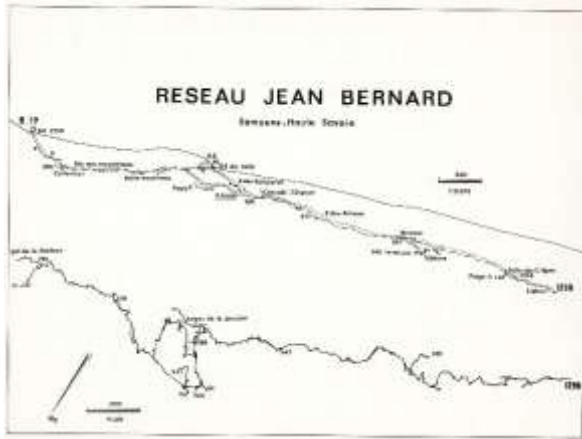


Figure 2 : Première topographie du gouffre Jean Bernard parue dans *Spelunca*, 1976, n° 1. À l'époque, il s'agit du deuxième gouffre le plus profond au monde.

Dans la cour des grands, un troisième gouffre haut-savoyard mérite d'être cité : en 1995 en effet, les spéléos du SC Anancy et du SIS de Sophia Antipolis atteignaient -1095 m dans la tanne des Praz d'Zeures (TO 75), sur le versant nord de la Tournette. La Haute-Savoie devenait alors le seul département français aux trois -1000 mais il n'y a pas de raisons pour que le Folly, le Criou et la Tournette aient le monopole de ces grands trous, et bien d'autres massifs peuvent receler des -1000 encore inexplorés. Au total, ce ne sont pas moins de 240 gouffres de plus de 100 mètres de profondeur qui avaient été explorés en Haute-Savoie en 2000 (BIGOT, 2004).

Quant au département de la Savoie, il émerge sur la liste des plus grands réseaux, avec trois ensembles dépassant les 50 km en tout ou en partie savoyards : réseaux de l'Alpe et du Granier en Chartreuse, et réseau de Bange-Prépoulain dans les Bauges.

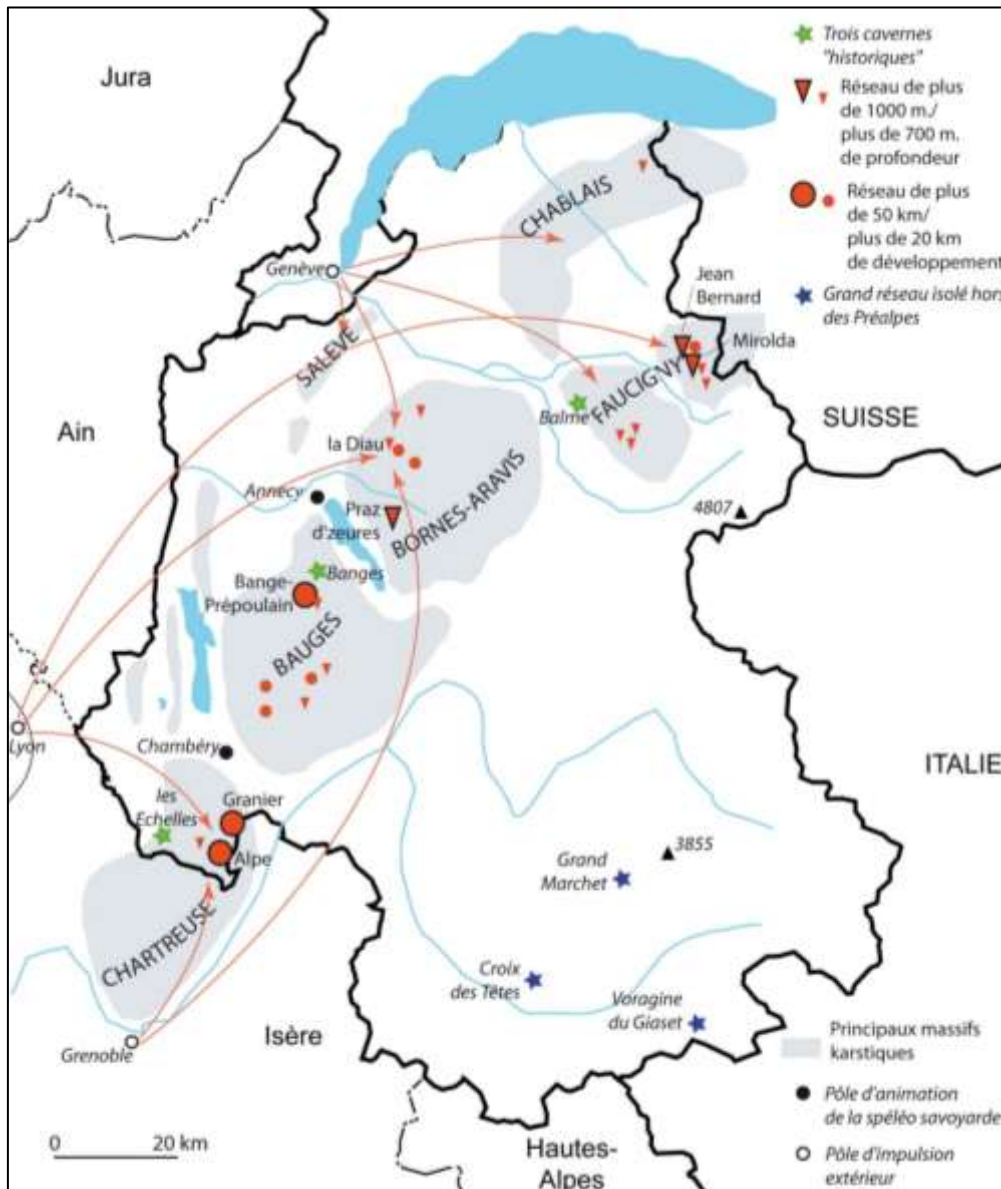


Figure 3 : Les faits saillants de la spéléologie dans les Pays de Savoie : massifs karstiques et grands réseaux.

6. Conclusion provisoire...

...Conclusion provisoire, car ces grandes heures de la spéléologie savoyarde ne se conjuguent pas seulement au passé, et les explorations se poursuivent avec de beaux résultats : dans les Bauges, de part et d'autre du Chéran, les plongées et les escalades derrière siphons dans les grottes de Bange et de Prérrouge ont permis de découvrir des réseaux perchés plus de 100 mètres au-dessus des émergences. Dans le même temps, sur le bassin d'alimentation de la Doria, la reprise systématique de la topographie a permis de faire passer le développement du réseau Garde-Cavale de 29 km à 48,5 km !

Du côté de Flaine, le réseau des Zorzières est découvert en 2006 et, en quelques années, atteint la profondeur de -886

m et 9,6 km de développement (exploration Spéléo-Club du Mont-Blanc).

La spéléologie savoyarde ne s'est pas signalée, dans son histoire, par de grandes innovations techniques. Elle s'est plutôt appuyée sur la motivation sans faille dont les spéléologues ont dû faire preuve pour explorer des cavités souvent étroites et arrosées, parfois horriblement boueuses, et pour en dresser systématiquement des topographies de bonne qualité.

Un peu partout en Savoie, les spéléologues d'ici et d'ailleurs continuent à chercher, à creuser, à topographier et gageons que de belles découvertes viendront encore récompenser leur obstination.

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Félix Ruiz de Arcaute, forjador de cadenas

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Resumen

Félix Ruiz de Arcaute van der Stucken (Amberes 1927 - Arette 1971) conoció el mundo subterráneo en Grenoble a fines de la década de 1940; se trasladó después al País Vasco, donde fue uno de los principales promotores de la espeleología local. A partir de 1960, exploró el macizo de Larra (Piedra de San Martín) en colaboración con numerosos grupos europeos. A lo largo de toda su vida, defendió que bajo tierra los personalismos no tienen cabida, y que toda exploración e investigación es fruto del trabajo en equipo. Siendo notoria su trayectoria, fuera de alguna frase emblemática los espeleólogos actuales (e incluso muchos de sus contemporáneos) ignoran gran parte de su vida. Fruto de una investigación biográfica en curso, en este artículo exponemos algunos aspectos poco conocidos de Arcaute, y tratamos de explicar por qué, cincuenta años después de su muerte, sigue siendo un espeleólogo referencial a nivel europeo.

Abstract

Félix Ruiz de Arcaute, forger of chains. Félix Ruiz de Arcaute van der Stucken (Antwerp 1927 - Arette 1971) got to know the subterranean world in Grenoble in the late 1940s; he later moved to the Basque Country, where he was one of the main promoters of local speleology. Starting in 1960, he explored the Larra massif (Pierre Saint Martin) in collaboration with numerous European groups. Throughout his life, he defended that in the underworld there is no place for personalities, and that all exploration and research is the result of teamwork. His career being notorious, outside of some emblematic phrase, current speleologists (and even many of his contemporaries) ignore much of his life. As a result of an ongoing biographical investigation, in this article we expose some little-known aspects of Arcaute, and we try to explain why, fifty years after his death, he continues to be a leading speleologist at European level.

1. “El belga” de Tolosa

La familia Ruiz de Arcaute estaba vinculada con la industria papelerera de Tolosa (Guipúzcoa) desde antaño. No obstante, Vicente, el padre de Félix, no siguió la tradición familiar e hizo la carrera militar; aunque una enfermedad le obligó a retirarse del servicio y pasar su convalecencia en las montañas suizas. Allí conocería a la belga Senta van der Stucken, quien se convertiría en su esposa. Se trasladaron a Bélgica en torno a 1923, y Vicente se hizo cargo de la fábrica de harina que poseía la familia Van der Stucken en el puerto de Amberes. Allí nacieron sus dos hijos: Miguel (1925) y Félix (1927).

Félix tuvo una infancia acomodada: tenían una casa en Biarritz (Labourd) y otra en Villars (Suiza), donde nació su afición a la montaña. Fue un joven rebelde, emprendedor y con espíritu libre: fue expulsado de varios centros, hasta que recaló en el Nid d'Aiglons (Heide – Kalmthout), escuela belga basada en los principios y la lengua de la República Francesa cuyo ambiente libre y sus compañeros -de diversa extracción social y geográfica- le dejaron una profunda impronta. Cuando los nazis ocuparon Bélgica, Félix tenía 14 años; las experiencias de esa época -supervivencia, desapariciones forzadas, sabotajes- acentuaron su capacidad de liderazgo y sus ansias de libertad.

El futuro de Félix estaba encaminado a llevar las riendas del negocio familiar: la fábrica de papel “La Esperanza” de Tolosa. Para ello, fue enviado a Grenoble, principal centro europeo de formación en ingeniería del papel. Fue estando allí cuando tuvo su primer contacto con la espeleología, nada menos que en la red subterránea del Dent de Crolles;

allá quedó cautivado por la sensación de penetrar en territorios jamás explorados.

Arcaute viajó por primera vez a España en 1949, pero no para quedarse en Tolosa sino para realizar un ineludible trámite previo: el servicio militar. Realizó éste entre los años 1951 y 1953 en la localidad de Estella (Navarra), con libertad para moverse por la provincia y en la vecina Guipúzcoa.



Figura 1: Félix Ruiz de Arcaute en 1946. Fuente : archivo Ruiz de Arcaute Irazusta

La sociedad que encontró recién salía de los años de escasez y pobreza tras la Guerra Civil Española; Félix aterrizó en ella como un extraterrestre: culto, rico, disciplinado, deportista... y sin desenvolverse aún en castellano (idioma que conocía por su padre, pero sin llegar a dominarlo). Ya en invierno del 50-51 se inscribía en la Sociedad de Ciencias Aranzadi, donde se incorporó a la exploración del sistema subterráneo de Gesaltza (Oñate) y a la confección del Catálogo Espeleológico de Guipúzcoa, que le permitiría conocer otras zonas de la provincia. Además, en Navarra

contactó con la sección de espeleología del Instituto Príncipe de Viana (IPV) y transmitió su pasión a algunos compañeros reclutas, con los que puso las bases del Grupo de Espeleología de Estella (SANTESTEBAN 2006). Por otra parte, mantuvo la relación con sus amigos de Grenoble: en 1953 colaboró en el rodaje del film “La Rivière sans Étoiles”, y en las prospecciones en el macizo de Vercors, participando en el descubrimiento de la Gouffre Berger. Arcaute mantendría esta tendencia a colaborar con diversos grupos de espeleología durante toda su vida (EEE, 1980).

2. Forjando cadenas

Félix Ruiz de Arcaute participaría en la mayoría de las exploraciones importantes que tuvieron lugar en el País Vasco y alrededores.

Durante la dictadura, la frontera franco-española era difícil de franquear, pero las prerrogativas de Félix le permitían traspasarla; por eso, Arcaute jugó un papel clave a la hora de proveer a diferentes grupos de espeleología con materiales inalcanzables en España como escalas de aluminio, cuerdas de nylon, anclajes... En los años 50 participó en innumerables exploraciones como las de la sima Etxaleku, Aitzbeltz, Ormazarreta, Torca del Carlista, Mairuelegorreta... en el País Vasco, y también otras campañas importantes como las de Ojo Guareña (Burgos) o la propia Gouffre Berger (ERAÑA & ABENDAÑO, 2007). Entre 1954 y 1955, sus amigos de Grenoble habían seguido explorando esta sima hasta -985 metros, batiendo el récord mundial de profundidad de la Sima de la Piedra de San Martín. Por ello, para 1956 se planificó una campaña especial, la “Operación -1000”, convocando a grupos de espeleología de todo el mundo para que ayudaran en la empresa, y al mismo tiempo sirvieran de testigos que certificaran la superación por primera vez en la historia de los simbólicos 1000 metros de profundidad. Arcaute, por supuesto, no quiso faltar y acompañado de Isaac Santesteban (IPV) se desplazó en moto hasta el Vercors. Allí les tocó trabajar duramente en el equipo que instaló la sima hasta -900 m., preparándola para que el equipo de punta pudiera seguir la exploración. En esa campaña se alcanzaría la profundidad de -1122 m (MARTÍN, 2005).

En cuanto a las diferentes áreas de trabajo de la espeleología, puede decirse que Félix se especializó en la más clásica de ellas, cual es la exploración de punta. Por otra parte, también trabajó mucho la fotografía: muestra de ello es su vasta colección personal de imágenes, que dejan ver un notable dominio de las técnicas de iluminación, y el hecho de que en las I Jornadas Vasco-Navarras de Espeleología una de las conferencias que impartió Arcaute versara sobre fotografía subterránea. Estas jornadas, primer congreso espeleológico de la historia de España, fueron organizadas por Aranzadi precisamente a propuesta de Arcaute, para “estrechar los lazos entre espeleólogos, aumentar el prestigio de la espeleología e intercambiar datos y experiencias” y fueron también escenario de fogosas discusiones entre quienes entendían esta actividad como deporte (casi todos los espeleólogos españoles) y los que defendían su carácter de ciencia (la mayoría de grupos

vascos más el Edelweiss de Burgos). Félix se alineaba apasionadamente con estos últimos.

Todos los que conocieron a Arcaute coinciden en señalar que era alguien fuera de lo común, con una personalidad difícil: fuerte, emprendedor, crítico, intolerante, irascible, a veces «insoportable»; pero, al mismo tiempo, amistoso, solidario, sincero y generoso. Según sus amigos de cuevas, Arcaute era «una fuerza de la naturaleza (...) con una voz capaz de hacer caer las estalactitas» (MARRY, 1977). Siempre dispuesto a ayudar, era el líder natural del grupo, y como tal, siempre se preocupaba por la seguridad de sus integrantes, marchando el último en muchas ocasiones para vigilar la progresión de los demás. Muchos de sus compañeros recuerdan una frase suya: «en horizontal, democracia; en vertical, dictadura», que venía a significar que en las galerías horizontales cada uno podía hacer lo que quisiera, pero que en los pozos verticales era imprescindible un jefe que coordinara a todos.

Fuera de su vida subterránea, Arcaute se había casado en 1955 con la tolosana María Dolores Irazusta; con ella tuvo tres hijos: Elsa, Vicente y Pedro. Como gerente de la papelera, tenía una gran implicación con la fábrica; y personalmente, más que la parte administrativa, le gustaba más la productiva, es decir, andar entre las máquinas. La fábrica le acostumbró a manejar gente y recursos, lo que según sus compañeros espeleólogos acentuó su capacidad de liderazgo. Y por cierto, la técnica de exploración subterránea también le resultó útil alguna vez en el exterior, como en las grandes inundaciones de Tolosa en octubre de 1953: con un bote neumático, fue rappelando de farola en farola a lo largo de las calles inundadas, consiguiendo llegar desde su casa hasta la fábrica, a donde entró disciplinadamente a su hora habitual.

De todas formas, Félix no encajaba muy bien entre la gente «normal» de Tolosa: aparte de su extraña afición por las cuevas, leía mucho. Autores como Carl Gustav Jung, Teilhard de Chardin, Arthur Koestler... se contaban entre sus favoritos. También amaba la música, sobre todo la de Johann Sebastian Bach. A pesar de ser católico, no iba a misa (salvo cuando era cantada); ya que era bastante anticlerical y no le gustaba el dogma. De hecho, se sentía más próximo a la libre interpretación de la Biblia que defendían los protestantes. Arcaute era por tanto un hombre de una rica vida interior; y a pesar de que estimaba a sus paisanos, no encontraba su lugar en el ambiente de cuadrillas, sociedades gastronómicas y catas de sidra.

3. La inflexión de Larra

En 1960, el grupo del IPV organizó las V Jornadas Vasco-Navarras de Espeleología en Larra. En este enclave que ha sido llamado el “Himalaya de la Espeleología”, las fronteras políticas no corresponden con la hidrología, por lo que la colaboración internacional es imprescindible. Así, los espeleólogos contaron con la ayuda de la empresa Electricité de France (EDF) y los Ejércitos español y francés para montar una gran expedición; entre los diversos trabajos abordados en la misma se realizó una topografía de precisión de la Sima de la Piedra de San Martín que permitió perforar el túnel de La Verna. Entre los más de 100 espeleólogos que participaron en la operación se encontraban los de la Sociedad de Ciencias Aranzadi, capitaneados por Arcaute.

En esa época, la sección de Aranzadi vivía una crisis generacional: la mayoría de los espeleólogos de los años 50 habían ido dejándolo por motivos laborales o familiares; y a principios de los años 60, Félix se quedó solo en Guipúzcoa. Aun así, siguió en su línea de colaboraciones con los demás grupos y Larra se convirtió en una cita anual ineludible: todos los años, mientras la familia veraneaba en San Sebastián, Arcaute pasaba casi un mes entero en aquel “hotel de mil estrellas”.

De una forma natural, Félix adoptó el papel de enlace entre los diversos grupos de espeleología que confluían en este enclave. Su propio carácter internacional (belga, flamenco, español, vasco, de cultura francesa...) le llevó a defender que en Larra era necesario promover la colaboración por encima de nacionalidades, considerando que «*las palabras España y Francia son mortales para la Pierre Saint Martin*». En 1961, protagonizó con sus compañeros Juan San Martín y Antonio Arratibel una incursión memorable y genial, en la que, siguiendo las deducciones derivadas del análisis hidrogeológico de la sala de La Verna, previeron la existencia de la Galería Aranzadi en un lugar que no podían divisar con los sistemas de iluminación de la época, y tras realizar una escalada la localizaron en el lugar previsto. Tras acceder a ella, encontraron dos continuaciones principales: a una de ellas la denominaron María Dolores (en honor de la esposa

de Arcaute) y a la otra Martine; por esta última, poco tiempo después Félix y sus amigos batirían de nuevo el récord mundial de profundidad (QUEFFELEC, 1968).

No obstante, la gran dimensión de esta red subterránea ocasionaba algunos problemas: había varios grupos de espeleología explorando en diferentes sectores, no siempre bien coordinados, y a veces hostiles entre sí. Comprendiendo que esto perjudicaba a la eficiencia de las exploraciones, Arcaute trabajó para acercar a las partes en conflicto: sus gestiones fueron clave para coordinar a los grupos dirigidos por Corentin Queffelec, Max Cosyns y el IPV. Tras un largo proceso, en 1966, entre todos ellos conformaron la Association pour la Recherche Spéléologique Internationale á la Pierre-Saint-Martin (ARSIP); esto redundó en beneficio de la coordinación, y ese mismo año los espeleólogos localizaron en las Arres de Anie la sima Basabürü (topónimo mal traducido como Tête Sauvage), nueva entrada al sistema que en adelante fue clave para el desarrollo de las exploraciones.



Figura 2: Félix y su familia (Elsa, Vicente, María Dolores y Pedro) en la estación de esquí de Candanchú, en el invierno de 1970-71. Fuente : archivo Irazusta

4. La dimensión intelectual

Ya hemos mencionado que en Guipúzcoa Félix se encontraba fuera de lugar; pero en Larra halló gente de su misma cultura, con la que compartía muchas cosas. No coincidían en todo, por supuesto. Más bien al contrario: las discusiones sobre filosofía, teología, metafísica, política y demás eran tremendas, sobre todo con su íntimo amigo Queffelec. Pero Félix, amante de la polémica, se encontraba “en su salsa”. Por otra parte, siendo muy crítico con el régimen de Franco, no aceptaba las opiniones de extranjeros sobre política española; decía que «*éso ya lo discutiría con los suyos, pero no con los franceses*».

Debemos tener en cuenta que allá se juntaba gente de muy diferentes ideas; pero, siguiendo la tradición espeleológica, se evitaba tratar de temas conflictivos para centrarse en el interés común, que eran las cuevas. Aun así, Arcaute tenía una marcada línea ideológica (de derechas, antifascista y anticomunista) y pocos pelos en la lengua, por lo que cabe

pensar que en aquellas sobremesas no faltarían las pullas; habida cuenta que en la Francia de aquella época los movimientos de izquierda estaban en plena ebullición. Félix seguía con interés los acontecimientos políticos: la primavera de Praga, las protestas por Vietnam, el mayo de París y las masacres de México en 1968, el proceso de Burgos y el secuestro del cónsul alemán Beihl en 1970...

Como muchos intelectuales de la época, Arcaute creía que la humanidad se encontraba en un cambio de era; concretamente, en la transición de la Era de Piscis a la de Acuario. En su caso, esta idea provenía de sus lecturas de Jung, y en las cartas que intercambiaba con sus amigos franceses pueden leerse muchas páginas al respecto. Según esta teoría, se avecinaba el surgimiento de una nueva religión, nuevo mesías incluido. En torno a 1969, Félix dio forma a estas inquietudes escribiendo “Le Livre du Berger”, novela ambientada en la España del siglo XXII. En este

trabajo inédito, Arcaute presenta una curiosa síntesis de sus pensamientos haciendo una especie de parodia de la Biblia con la participación de fariseos católicos, un Poncio Pilatos norteamericano, guardias civiles en el huerto / parque de Getsemaní... El libro tiene incluso algún guiño espeleológico como el nombre del protagonista (Berger) y el seudónimo usado para firmar el libro, "Pierre Saint Martin". Félix, sin

duda, era consciente de que en esos años algo así era impublicable en España; por eso pasó el original a sus amigos de Larra, con la intención de publicarlo en Francia. Pero estos planes quedaron truncados por su muerte, y el manuscrito arrinconado.

5. La promesa de Arcaute

El hallazgo de la sima de Basabürü aceleró el ritmo de exploración del Sistema de la Piedra de San Martín. Además, las prospecciones en las Arres de Anie permitieron el hallazgo de muchas nuevas cavidades, entre ellas el segundo gran sistema de Larra a través de una sima que atrajo la atención del mundo espeleológico internacional, y a la que se dio el nombre del alcalde de Arette: Jean-Marie Lonné-Peyret.

Arcaute había prometido a su familia que 1971 sería su último año en Larra. Y es que para entonces tenía ya 43 años, edad hoy día bastante normal para un espeleólogo, pero en aquella época muy avanzada; baste tener en cuenta que la mayoría de sus compañeros de exploración tenían entre 18 y 25 años. Estos jóvenes admiraban a Félix por su experiencia y buen hacer, pero él tenía claro que su tiempo había pasado y que era el turno de la siguiente generación. Lo ilustraba con otra frase que sus amigos recuerdan frecuentemente: «los viejos, al cubo de la basura; y cerrando la tapa después, para que no huelan».

Ese verano, Arcaute realizó una dura campaña de 15 días en el sector de Leizerola con sus amigos del IPV: muchas simas,

tiempo pésimo, poco descanso. Seguidamente, se dirigió a la sima Lonné-Peyret con otro miembro de Aranzadi, pues se había comprometido con dos jóvenes de Grenoble a hacer una exploración en el sector río arriba. Allí tuvo un percance con la cuerda, quedando bloqueado bajo una cascada helada; a pesar de sus intentos de ayudarlo, los esfuerzos de sus compañeros fueron en vano y tras 20 minutos de lucha Félix se rindió, dejando la vida en su tan amado macizo de la Piedra de San Martín.

La muerte de Arcaute sacudió el panorama espeleológico internacional, donde tan profunda huella había dejado. Como consecuencia directa, se produjo un gran impulso del espeleosocorro en Europa, con los franceses a la cabeza, y se desarrollaron técnicas de rescate para poder resolver situaciones de ese tipo. Actualmente, una frase acuñada por Félix durante las exploraciones de la Piedra de San Martín («el eslabón no es nada: lo que importa es la cadena») sigue siendo usada entre espeleólogos de todo el mundo para representar la labor de equipo que es imprescindible para desarrollar su trabajo.

6. Conclusión

Es fácil trabajar con gente que piensa igual que nosotros; lo que realmente tiene mérito es hacerlo con gente con la que no estamos de acuerdo. De las muchas cosas que se podrían decir de Félix Ruiz de Arcaute, queremos destacar en esta ocasión la capacidad que tuvo para agrupar a diversos

equipos espeleológicos por encima de viejas rencillas y conflictos generacionales. Ejemplo que sin duda puede servir de inspiración para superar los conflictos que, también hoy día, no nos faltan en el mundo espeleológico.

Agradecimientos

A todas las personas que han compartido conmigo sus recuerdos y/o archivos sobre Félix, entre los que debo destacar a Isaac Santesteban, Adolfo Eraso, Eugenio Roa, José Luis Txintxurreta, Madeleine Cabidoche, Juan Mari Feliu, Rubén Gómez, Jose Mari Sáenz, Pierre Accoce, Michel Douat, Jacques Sautereau de Chaffe, Ernesto Nolte, Fermin Leizaola, Dominique Queffelec, Miguel Angel Martin Merino, Josu Granja y muy especialmente a Pedro y Elsa Ruiz de Arcaute Irazuzta.

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History and future activities of the European Speleological Federation FSE

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Abstract

In 2020 the European Speleological Federation FSE had its 30th anniversary. As a result of the COVID-19 pandemic this milestone will be celebrated at the 2022 International Congress of Speleology (ICS) with special attention to what has been achieved in the past 30 years and the plans for the future.

We will highlight the major achievements of the past 30 years and the importance of the FSE for its 31 member countries. An overview of the FSE Commissions and working groups will show the importance of the FSE for the European caving community. Moreover, the FSE established the immensely successful EuroSpeleo Projects, launched in 2005, greatly benefitting member countries and their caving clubs. Each year 10 to 15 projects are supported and bring together more than 300 cavers from more than 40 countries in join up pan-European activities both in and outside Europe.

We will also explain how to participate in and benefit from the EuroSpeleo Projects. We will bring forward the future plans of the FSE concerning the activities of the commissions, FSE communication channels and collaboration with other related organisations.

Résumé

Histoire et avenir de la Fédération européenne de Spéléologie (FSE). En 2020, la Fédération Spéléologique Européenne FSE a célébré son 30^e anniversaire. À cause de la pandémie de COVID-19, cette étape sera célébrée lors du Congrès de l'UIS 2022 avec une attention particulière à ce qui a été accompli au cours des 30 dernières années et aux futurs plans.

Nous soulignerons les réalisations majeures des 30 dernières années et l'importance du FSE pour ses 31 pays membres. Un aperçu des commissions et groupes de travail FSE montrera leur importance pour la communauté spéléologique européenne. De plus, la FSE soutient les projets dits EuroSpeleo Projects, lancés en 2005, comme l'avantage le plus évident pour les pays membres et ses clubs de spéléologie. Chaque année, 10 à 15 projets sont soutenus et rassemblent plus de 300 spéléologues de plus de 40 pays dans des activités paneuropéennes conjointes en Europe et hors d'Europe.

Nous expliquerons également comment participer et bénéficier des projets EuroSpeleo. Nous présenterons les futurs plans du FSE concernant les activités des commissions, les canaux de communication du FSE et la collaboration avec d'autres organisations apparentées.

1. Three decades of the European Speleological Federation FSE

The European Speleological Federation FSE is an international organisation of european member countries (also being member of the Council of Europe and the United Nations) and are represented by their national organisations. The FSE, formerly FSCE then FSUE, was founded in 1990 in Udine, Italy, promotes sport and scientific speleology.

In 1990 speleological organisations from Belgium, Denmark, France, Germany, Great Britain, Greece, The Netherlands, Ireland, Italy, Luxembourg, Portugal, Spain set the basis of the federation in a spirit of mutual collaboration and speleological development. The FSE encompasses speleology in all its forms.

The FSE is actually composed of 31 member countries, is governed by a board and sets up and organises all activities and structures necessary to reach its goals in order to promote speleology and cave and karst protection.



Figure 1: present logo of the FSE

2. The foundation of the FSE in 1990

The FSE, formerly FSCE (CE stands for European Community) then FSUE (UE stands for European Union), was founded in 1990; the first published info on the foundation of the European Speleological Federation is reported in an article that appeared in the 1990 ALP magazine (TAVAGNUTTI 2020) and by Arrigo Cigna in *Speleologia* (CIGNA 1990).

During the XVI National Congress of Speleology held in Udine (Italy) from 6 to 9 September, the Speleological Federation of the European Community was officially born. The 8th of September 1990, all countries present finally signed the constitution document “The Treaty of Udine” and the statutes of the “Fédération Spéléologique de la Communauté Européenne” FSCE.



Figure 2: Author: Claude Mouret (FR) 1990 Udine, IT. First Bureau: (from left to right) Gérard Duclaux (FR) vicepresident, Bernard Urbain (BE) secretary, Andy Eavis (GB) treasurer, Bernhard Krauthausen (DE) president

3. The first decade 1990-2000

Right from the start a number of possible projects were presented. The first running years had many startup talks, all had to be organized, statutes, internal regulations, subscription rates, designing letterheads, logo, stickers, projects, schedule and frequency of future meetings, official representations in Brussels at the EC Commission, etc. Some of the most important aspects of speleology for the FSCE were cave rescue, education and training, cave and karst protection, scientific research and cooperation among all European national organizations. After the FSCE had finally settled on a running process of meetings and tasks the European Community (EC) had been enlarged in 1995, and this brought new member countries like Austria, Sweden and Finland.

1995 also was a year of changes inside the FSCE. The General Assemblies changed from a biannual to an annual status. By that time, the discussions on a single European Caving Insurance were finalized. The discussions however took a while but the list of really interested countries however was too restricted to be effective. In the nineties, the support of major European events had been put into the hands of the FSCE. Following the “2nd European Speleological Congress”

in Helecine, BE in the year 1992 was the 3rd issue organised in Lisbon in 1999. The 1st was in Sofia, BG in the year 1980.



Fig 3: first issue of the EuroSpeleo Newsletter in 2000

Another major step in going public was the printed identity of the European Federation. The “EuroSpeleo Newsletter” was realized with the help of the French Speleological Federation in 2000. It was actually Number zero. It was printed in 2200 copies.

4. The second decade 2001-2010

In 2003, the name of Federation Spéléologique de l'Union Européenne (F.S.U.E.) was adopted by a vote of the General Assembly on the 8 June 2003 in Ollioules (France).

In the FSUE General Assembly on 23rd -25th of August 2005, in Kalamos, Greece, the first idea of specific commissions was discussed especially on cave conservation but only in 2007 the *European Cave Protection Commission* was constituted and published the FSE European Speleological Charta for Cave Protection. In 2008 the 1st *EuroSpeleo Protection Symposium* was held in the Vercors, France during the 4th EuroSpeleo Congress.

Since 2007 FSE promotes EuroSpeleo Projects, one of the most important federation initiatives, from exploration expeditions to scientific conferences, from training to didactic or artistic projects, with over a hundred european projects granted, and 10 to 15 new requests every year, the FSE EuroSpeleo Projects have shown their great interest to bring the European cavers together to develop creative and dynamic new speleological projects.

In 2008 finally the actual name was born as European Speleological Federation (F.S.E.) Fédération Spéléologique Européenne (F.S.E.) and became a non-profit organization based in Luxembourg-Ville in the Grand Duchy of Luxembourg. From this moment on all countries that belong to the Council of Europe can become a member of the F.S.E. The F.S.E is patronized by the International Union of Speleology UIS.

In 2008 a petition was brought to the European Parliament. This is a written declaration on the protection of caves as a cultural, natural and environmental heritage The declaration struggled to pass in the European Parliament although a general support from national caving organization was launched and supported by a specific campaign on the internet and cave media.

In 2010 the FSE launched the Petition to Stop Trade, Import and Export of Cave Contents, save the hole world - support cave protection in Europe.

5. The third decade 2011-2020

The first EuroSpeleo Protection Label (ESPL) was granted to Coliboaia Cave - Protecting a Unique Prehistoric Site by Asociata Speleologica Speowest Arad from Romania. The scope of the ESPL is to support active cave protection in the speleological associations and clubs, committees, national commissions, etc, and to share this knowledge throughout Europe.

Since October 2011 The European Speleological Federation is part of the European Environmental Bureau EEB, the largest network of environment protection NGOs in Europe and since 2015 the FSE is holding a seat in the Board of the EEB.

In 2012 the European Cave Rescue Commission (ECRC) was established in order to promote co-operation between the cave rescue organizations of each member country and to exchange information. Also in 2012 Speleo-TV was born as a project of the FSE, the main purpose of Speleo-TV is to offer the opportunity for all the cavers to connect and share their underground explorations and works with the speleological community in Europe and all over the world. Speleo-TV serves also as a directory for speleological films.

In October 2013 the FSE Facebook page was created and more than 6.000 people followed this page in December 2020.

In 2016 the 5th EuroSpeleo Congress was held in Dalesbridge, Yorkshire, UK organised by the British Caving

Association on behalf of the FSE. with over a thousand participants.

During the EuroSpeleo Forum in Austria the Contact Group on Show Caves that was established in 2014 organized in 2018 the 1st EuroSpeleo Show Cave Symposium.



Figure 4: Map showing the FSE member countries in 2019

5. Future activities of the FSE

In the coming period the FSE will mainly focus on the following:

- reflection on the conditions for applying for the EuroSpeleo Projects and try and make them as inclusive and transparent as possible.

- setting up initiatives for young cavers to be more involved in scientific aspects of speleology and (inter)national organizations
- keeping and enlarging the karst and cave protection agenda as a priority mission for the FSE

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- establishing better exchange of information and knowledge between European cave rescue organizations
- improving the communication channels of the FSE; webpage, social media, newsletter etc.
- strengthening the cooperation between national European and international caving organizations
- supporting the organization of EuroSpeleo forums, congresses and symposiums



Figure 5: Author: Taraneh Kaleghi (AT) 2019 Dolni Lozen, BG, Actual 2021 Bureau from left to right: Jean-Claude Thies (LU) president of the ECPC, Alena Gessert (SK) General Secretary, Antoniya Vlaykova (BG) president of the ECRC, Michel Isnard (FR) vice-president, Henk Goutier (NL) treasurer, Ernest Geyer (AT) vice-treasurer, Ged Campion (GB) president and Joerg Dreybrodt (DE) vice-secretary.

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60 years for cavers in Hungary History of Hungarian Cave Rescue Service

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Abstract

Hungarian Cave Rescue Service (HCRS) was established in 1961 after many years of occasional cavers activity without any official or institutional background. HCRS did more than hundreds of rescue operations and saved hundreds of lives during the past 60 years. During that time, a total of 271 people took part in the rescue work, all volunteers. Currently, about 100 people can be mobilized for rescues. The rescue operations not only saved the victims of cave accidents, but also the lives of people in trouble in other hard-to-reach places. The latter rescue operations accounted for more than half of HCRS's activities. In the last 10 years, the latter has also included the removal of paragliders landed in trees. HCRS has an extensive network of domestic and foreign contacts, and has been involved in international rescue operations on several occasions. HCRS has organized international cave rescue events on several occasions, among which the UIS Cave Rescue Commission Conferences in 1983, 1989 and 2007.

Contested memories and memorable continuities. Austrian Geographer Hugo Hassinger (1877–1952) and his legacy within speleology

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Abstract

Hugo Hassinger, professor of cultural geography at the University of Vienna is not only known for his own cave expeditions but also for facilitating negotiations on an institutional level. After 1945, he tried to re-establish the “Speleological Institute” at the University of Vienna (dissolved in 1938), founded the “Commission on Space Research and Reconstruction” at the Austrian Academy of Sciences, and became one of the three permanent members of the “Federal Cave Commission”. Recognized as an intermediary, he promoted the benefits of cave science to a wider public.

In recent years, however, Hassinger’s willingness to offer his assistance to National Socialist “resettlement” projects has sparked debate. To share more light on this discussion, this paper focuses specifically on his post-war impact on speleology. Did his personal investment in anthropogeographical ideologies and his rejection of post-war geopolitical landscapes play into his promotion of cave science? How did Hassinger’s influence shape the field’s internal structure?

A critical revisit of published and unpublished material in the libraries and archives of the Austrian Academy of Sciences, the Natural History Museum and the University of Vienna will offer new insights into the relationship between science and politics.

Résumé :

Hugo Hassinger, l’héritage spéléologique d’un géographe autrichien. Hugo Hassinger, professeur de géographie culturelle à l’Université de Vienne, est connu non seulement pour ses propres expéditions dans les grottes, mais aussi pour son engagement au niveau institutionnel. Après 1945, il essaie de rétablir « l’Institut de Spéléologie » à l’Université de Vienne (dissout en 1938), il fonde la « Commission des Recherches Spatiales et de la Reconstruction » à l’Académie Autrichienne des Sciences et devient l’un des trois membres permanents de la « Commission Fédérale des Grottes ». Reconnu comme intermédiaire, il fait la promotion de la spéléologie auprès d’un public plus large.

Récemment, cependant, sa bonne volonté d’offrir son aide aux projets des nationaux-socialistes a suscité un débat sur la figure savante et politique de Hassinger. Pour considérer cette discussion sous un angle nouveau, cette contribution se focalise spécifiquement sur son impact sur la spéléologie dans la période après-guerre. Son investissement personnel dans les idéologies anthropo-géographiques et son rejet des paysages géopolitiques d’après-guerre, ont-ils joué un rôle dans sa promotion de la spéléologie ? Comment l’influence de Hassinger a-t-elle façonné la structure interne du champ ?

Une revue critique des documents publiés et non-publiés dans les bibliothèques et les archives de l’Académie Autrichienne des Sciences, du Musée d’Histoire Naturelle et de l’Université de Vienne offrira ainsi de nouvelles perspectives sur la relation entre science et politique.

1. Hugo Hassinger as the “godfather” of Austrian post-war speleology

Hugo Hassinger (1877–1952) was the son of a Viennese bank clerk and a student of renowned geographers, geologists and historians such as Albrecht Penck, Eduard Suess and Oswald Redlich (MATTES 2019; SVATEK 2018, 2019; ZIPPEL 2017). As a young man in his mid-twenties, before graduating with a doctorate degree from the University of Vienna, he undertook several cave ventures. Best known are the expeditions (1900–02) into the Ötztal Cave System in Lower Austria led by him and Eugen Berr on behalf of the Austrian Alpine Club. Hassingers’ interests then shifted away from speleology to pursue employment as a schoolteacher, a position that he held for 17 years until the end of World

War One. In 1918, he accepted a call to the University of Basel (Switzerland), followed by a professorship at the University of Freiburg (Germany) in 1927. However, he was already 54 years old, when his academic career really took off in 1931 as he became successor to Eugen Oberhummer at the University of Vienna as well as co-founder of the “South-East German Research Association” and member of the Academy of Sciences in Vienna. In 1937, he became president of the Geographical Society in Vienna, which he remained for 14 years until 1951. He also led the University’s “Working Group for Space Research”.

Hassinger navigated and adapted to the regime changes in the 20th century with ease. As the duration of some of his positions indicate, Hassinger was able to offer his assistance and expertise to both National Socialists in 1938 and the new democratic republic in 1945 alike. The latter shift, however, often remains a mere closing remark or short outlook section in the more elaborate analysis of his previous collaboration with the Nazi Party. Examples, such as his feasibility study on “resettlement” for the South Tyrolean population or his membership in the “Commission for the Publication of Works on Race Theory and Human Hereditary Studies” at the Academy of Sciences, show his involvement in Nazi politics. Greater German spatial concepts and heedless application orientation remain staples throughout his career. Under any governmental rule, he was never shy to offer his services in science to political leaders. In his obituary and again in the biographical dictionary entry about Hassinger, Hans BOBEK (1952; 1969) emphasized his mentor’s eagerness to offer his “service to public interest” as an “often varied base chord” throughout his life. In a letter to Nazi diplomat Helmut Triska in 1942, Hassinger explained the need for application orientation in space research “so that science will not be late again when political actions take place” (FEICHTINGER *et al.* 2013). In the following, I would like to focus on Hassinger’s postwar career and investigate, how and why he renewed his investment in speleology. The Allies shut down the “South-East German Research Association” and the “Working Group for Space Research” immediately in 1945. Hassinger himself was not allowed to hold classes in the summer term of 1945. However, he soon managed to reinstate his teaching licence and founded new, yet strikingly similar working groups at the Austrian Academy of Sciences. First, the “Commission for Space Research and Reconstruction” in 1946. One year later, he tried to establish the “Austrian Research

Association for South-Eastern and Oriental Studies” which was shut down by the Allies in 1950.

Cave research soon also reappeared on Hassinger’s radar, especially on an administrative level. In Austria, cave research, besides being practiced in public associations, early on became institutionalized in the form of state facilities as well: e.g. the economy-oriented „Federal Cave Commission“ (1918) and the „Speleological Institute“ (1922) at the Ministry for Agriculture. In 1929, the latter became associated with the University and equipped with the world’s first chair for speleology. These prosperous beginnings, however, were short-lived. As Rudolf Saar, director of the Speleological Institute, noted in his keynote speech at “The Third International Congress of Speleology” in 1963 (TRIMMEL 1963), in postwar Austria the situation for cave scientists was bleak. Initially, only the “Federal Cave Commission” was reinstated in 1949 due to its economical focus. Besides Saar himself and Gustav Götzinger, director of the “Geological Survey of Austria”, Hassinger became the third permanent member of this institution. Together they advocated for the re-establishment of the “Speleological Institute” (BUNDESHÖHLENKOMMISSION 1949). Hassinger also founded and headed the “Emergency Society of Scientific Associations in Austria”, today known as the “Federation of Austrian Scientific Societies”.

At the age of 75, he unexpectedly died in a car crash. Hassinger was undeniably a strong scientific and administrative influence in areas such as ethno-cultural geography, applied science, cartography, and last but not least, speleology. In their obituary for Hassinger, the editors of the *Höhlenkundliche Mitteilungen* (HKM 1952) mourned the loss of a “friend and advocate, always favourable, kind and inwardly united” as well as a “godfather” of the post-war governmental organization of speleology in Austria.

2. Hassinger’s visions for speleology tainted by right-wing extremism

By virtue of his own cave expeditions, Hassinger made a name for himself in speleology. When, in 1948, Hubert Trimmel from the “Austrian Speleological Association” and Erik Arnberger (a student and employee of Hassinger) from the “Austrian Alpine Club” ventured into the Ötztal caves again, their markings of the ice level followed those left by Beer and Hassinger half a century ago (HARTMANN, 1984; HKM 1992). With speleologists, Hassinger shared the sentiment of nature as a source of renewal, framing caves as man’s historic places of retreat. In his obituary for the late geographer and speleologist Norbert Krebs in the Academy’s almanac (HASSINGER 1948), for instance, he noted that Krebs’ “nature-like character was never corrupted by the metropolis”. Such a characterization speaks to Hassinger’s general romanization of nature and skepticism about the effects of modernity. His appointment as one of the three permanent members of the “Federal Cave Commission” in 1947 formally reconnected Hassinger on an institutional level with his peers in cave research. To them, an influential ally with good political and academic connections and experience in the field was more than welcome.

In 1945, at a meeting of the Geographical Society (MRKOS 1984) and again in 1949, at the Federal Cave Commission, Hassinger gave seminal reports on the state of cave research in Austria. Not only did he show his insider knowledge about the community, research and organizational aspects, but he also managed to present himself as an apt spokesperson and advocate for the scientific community as a whole. In Austria, cave research was proudly established under the auspices of science. To Hassinger, scholarly leadership of speleological endeavors was always imperative, yet he also wanted to include the public more. He carefully curated relationships to bodies of government, higher education and research. His main arguments for the re-establishment of a “Speleological Institute” and respective honorary chair were application orientation and public relations. Cave research, much like Hassinger’s conceptualization of space research, is a highly interdisciplinary community effort. “Space” (in the meaning of landscapes), much like a cave, should not only be described scientifically as an end in itself but as a basis to plan and mold it according to public needs. The term *Gemeinschaftsarbeit* (communal labour) is strongly associated with Hassinger’s legacy. It refers to the idea of a hybrid space between the natural sciences and the

humanities, but also between science and the public. It should be noted, however, that space research was based on his teacher Penck's theory on German *Kulturboden* (cultural land) and *Volksboden* (ethnic land) and developed under the now infamous Nazi concept of *lebensraum*.

Hassinger actively promoted such continuities for cave research as well. In his two most famous publications of the post-war period, the *Wegweiser für Landes- und Volksforschung in Österreich* (Guide to regional and ethnographical studies in Austria, 1950) and *Österreichs Anteil an der Eroberung der Erde* (Austria's contribution to the conquest of the earth, 1950), he granted cave research a special place in both books. The *Wegweiser* (HASSINGER 1950a) was a reference guide to scientific resources on regional and ethnographical studies that were still available after the war. It was an unconcealed, deliberate attempt at "rescuing" scientific labour from denazification efforts, which Hassinger saw as a devastating purge, setting Austria back in international scientific competition. Regional speleological associations, museums and journals with their contact details in Upper Austria, Salzburg, Styria, Kapfenberg etc. were compiled right next to works on Nazi race studies. Instead of re-evaluating the validity of these scientific claims, such a guide was widely accredited with "rescuing" important work from getting lost or being forgotten.

Likewise, Hassinger included cave scientists in his monography on Austria's contribution to the conquest of the world (HASSINGER 1950b). Mixed in together with crude Nazi speech on social Darwinism, an alleged dichotomy of "nature people" and "civilization", theories of "blood heritage" and more, the history of cave expeditions is recounted and integrated in this overarching narrative of colonial conquest.

Many of Hassinger's publications were updated renditions of earlier works: the *Wegweiser* was based on an earlier version from 1942, the Atlas of Lower Austria (1951) was based on a previous atlas project together with Fritz Bodo from 1940, and his handbook on geography (1952) was a reissue from 1930. Not even the vocabulary changed. His widely appraised handbook still warned about the endangerment of the "white race" by "the colored",

especially the "yellow race", promoted deportation measurements, "despite the pain it would cause those affected", etc.

In this light, his often-repeated take away message of the need and even "duty" for cave researchers to serve political interests becomes tainted. Framed by his recurring lament over Austria's loss of territory since the collapse of the Habsburg Empire in 1918, he implies the capacity of speleology to legitimize control over land. After 1945, direct political occupation of former territory became so unlikely that it was increasingly redirected towards economic control. Vienna specifically, located between alpine and karst lands, should be the socio-economic junction of central Europe and take lead in curbing the "illness" of landscapes degenerating into karst and steppe (HASSINGER 1949). This idea was especially relevant in the interwar period when a special "Department for Cave Protection" was established at the "National Heritage Agency" in 1928 and re-established after the war. Even though Hassinger's function in the "Federal Cave Commission" was to represent the scientific aspects, while the economic ones were assigned to Göttinger, Hassinger repeatedly stressed that speleology should grow and bloom "for the honor of science and the use of the economy" (BUNDESHÖHLENKOMMISSION 1949). The second message Hassinger continuously emphasized, was the need for cave scientists to improve in terms of public relations. He suggested a journal, exhibitions and their affiliation with more established projects (ibid.). Indeed, only one year later, in 1950, the journal "Die Höhle" (the cave), which exists to this day, published its first issue. Hassinger tried to mobilize the speleological community for his own project of space research. He was himself an expert in negotiating resources and willingly offered his platform to help communicate the benefits of cave research to a wider public. For example, he put together a special exhibition on "Space Research in Austria" in the Museum of Austrian Culture and included a map of caves in Lower Austria towards the beginning of the exhibition (MÖK). This becomes even more significant with regard to Hassinger's idea of maps "not as mere scientific works but a practical, effective tool for political state governance and the function of economic entities" (HASSINGER 1951).

3. Concluding remarks on Hassinger's legacy in speleology

As Hassinger – unlike many others in his field – was never formally a Nazi Party member, which was the one decisive criterion for the Allied denazification authorities, he was able to continue his career unhampered. Given how thinned out the field was in the first three years after the end of World War Two, professional opportunities were even better than before. He used his standing as a leader in science to employ and promote former colleagues that were laid off due to their party membership (e.g. Egon Lendl or Walter Strzygowski) as well as to revive almost all of his shut down projects. His publications further illustrate these disconcerting continuities.

When honoring his legacy, Bobek and others repeatedly praised his efforts to "rescue" knowledge into the postwar period, masking the original contexts in which this knowledge was produced. Hassinger and his successors in

cultural geography, space research and speleology embody the unilateral preference of continuity in science over rupture. For instance, Elisabeth LICHTENBERGER (2009), professor of geography in Vienna from 1972 to 1995 and successor to Bobek at the Academy's "Commission on Space Research", acknowledged that race theory was always part of Hassinger's reasoning. However, she argued that these have to be understood as "*Zeitdokumente*" (contemporary documents) and claimed that Hassinger was unjustly denied the attention he deserved.

For cave science, in particular, Hassinger provided useful relationships to political leaders, experience and tools to successfully negotiate public support, an often-referenced guidebook to scientific resources and an encompassing history of cave science. However, the specific contexts in

which these are presented, and the intentions of the overarching narrative, are hard to overlook.

The keynote speech Saar held at the third international congress of speleology in 1963 (TRIMMEL 1963), shows that more than a decade after Hassinger's demise, his ideas for the future of speleology were still highly relevant and repeated almost verbatim: speleology was characterized as a "group effort", karst research should be an "applied science", and landscapes should not fall into karst and steppe but be exploited economically. Finally, Saar closes his presentation with the exact same words as Hassinger: The speleological movement should be developed "for the

honor of Austrian science and the use of the Austrian economy" (ibid.).

Should such continuities raise concern? As Johannes MATTES (2020) has recently pointed out, continuities in cave science were more meaningful than previously known. It may thus not be enough to hope that the post-1945 denazification efforts were sufficiently thorough. On the contrary, researchers like Hassinger who were not party members were not even on the authorities' radar. It is up to every researcher to critically revisit the foundations of their sources, the validity of their claims and the history of institutions and organizational structures they work within.

Acknowledgments

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Worldwide first evidence of underground radioactivity in Harz Mts. caves, Germany

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Abstract

The teachers and physicists Julius Elster (*1854 in Blankenburg/Harz, † 1920 in Bad Harzburg) and Hans Geitel (*1855 in Braunschweig, † 1923 in Wolfenbüttel), developed the photo cell. They also worked on atmospheric electricity – their theory of the electronic charging in thunder clouds through the friction of water droplets can still be found in physics textbooks. For use in describing the distribution of charges, Elster and Geitel developed the theoretical model of a spherical capacitor. They introduced a new era of research when they applied the theory of ions to the field of atmospheric electricity. For a long time they hypothesised that sunlight ionises air molecules before discovering that environmental radioactivity is causative. To prove this theory, they carried out underground measurements in the Baumann's and Iberg Dripstone Caves. So they provided evidence of a higher radioactivity inside the natural caves than in the air outside. Elster and Geitel were the first to view radioactivity as a phenomenon of atomic disintegration processes and to postulate a radioactive decay-chain of elements.

Résumé

Première preuve mondiale de radioactivité souterraine dans les grottes du Harz Mts., Allemagne. Les professeurs et physiciens Julius Elster (*1854 à Blankenburg/Harz, † 1920 à Bad Harzburg) et Hans Geitel (*1855 à Braunschweig, † 1923 à Wolfenbüttel), ont découvert la cellule photo. Elster et Geitel se sont également intéressés à l'électricité atmosphérique. Leur théorie de la charge électronique dans les nuages d'orage par le frottement des gouttelettes d'eau se trouve encore dans les manuels de physique. Pour décrire la répartition des charges, Elster et Geitel ont mis au point un modèle de condensateur sphérique. Ils ont introduit une nouvelle ère de recherche en appliquant la théorie des ions au domaine de l'électricité atmosphérique. Pendant longtemps, ils ont émis l'hypothèse que la lumière du soleil induisait la libération d'ions avant de découvrir que la radioactivité de l'environnement en était la cause. Pour prouver cette théorie, ils ont effectué des mesures souterraines dans les grottes de pierres tombales de Baumann et d'Iberg. Ils ont ainsi fourni la preuve d'une radioactivité plus élevée à l'intérieur des grottes naturelles que dans l'air extérieur. Elster et Geitel ont été les premiers à considérer la radioactivité comme un phénomène de processus de désintégration atomique et à postuler une chaîne de désintégration radioactive des éléments.

Kurzfassung

Weltweit erster Nachweis von unterirdischer Radioaktivität in den Höhlen des Harzes, Deutschland. Die Lehrer und Physiker Julius Elster (*1854 in Blankenburg/Harz, † 1920 in Bad Harzburg) und Hans Geitel (*1855 in Braunschweig, † 1923 in Wolfenbüttel), entwickelten die Fotozelle. Ein weiterer Arbeitsschwerpunkt von Elster und Geitel lag auf der atmosphärischen Elektrizität – ihre Theorie der elektronischen Aufladung in Gewitterwolken durch die Reibung von Wassertröpfchen findet sich noch heute in Physiklehrbüchern. Für die Beschreibung der Ladungsverteilung entwickelten Elster und Geitel die Modellvorstellung eines Kugelkondensators. Sie leiteten eine neue Ära der Forschung ein, als sie die Ionentheorie auf den Bereich der atmosphärischen Elektrizität anwendeten. Lange Zeit vertraten sie die Hypothese, dass Sonnenlicht Luftmoleküle ionisiert, bevor sie entdeckten, dass Umweltradioaktivität ursächlich ist. Um diese Theorie zu beweisen, führten sie unterirdische Messungen in der Baumannshöhle in Rübeland und der Iberger Tropfsteinhöhle bei Bad Grund durch. Sie erbrachten damit den Nachweis einer höheren Radioaktivität innerhalb der natürlichen Höhlen als in der Luft ausserhalb. Elster und Geitel waren die ersten, die Radioaktivität als ein Phänomen atomarer Zerfallsprozesse betrachteten und eine radioaktive Zerfallskette der Elemente postulierten.

Elster and Geitel and their underground work in the Harz Mountains

The teachers and physicists Julius Elster (*1854 Blankenburg/Harz, † 1920 Bad Harzburg) and Hans Geitel (*1855 Braunschweig, † 1923 Wolfenbüttel) were born in the Harz foreland and spent their working lives there. Both faced limited technical facilities, but provided important basic research in the field of radioactivity, atmospheric

electricity, photoelectric effects and gas discharge physics (FRICKE 1992, 2011, 2016, FRICKE & SCHLEGEL 2017).

Elster and Geitel published about 200 papers during their scientific career, 72 of which dealt with atmospheric phenomena. About three-quarters of all their publications named both as authors – they were team workers.

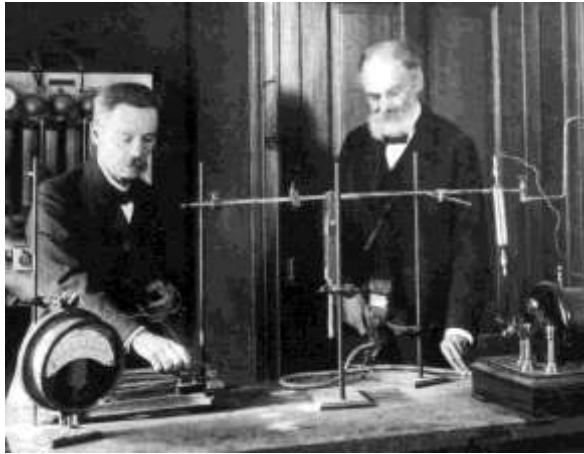


Figure 1: Julius Elster (l.) and Hans Geitel (r.), who grew up together in Blankenburg am Harz, worked together as teachers in Wolfenbüttel, made scientific contributions to atmospheric electricity, gas discharge physics, the photoelectric effect and radioactivity between 1880 and 1920. Photo private archive Fricke.

Elster's and Geitel's most important scientific achievement is the technical invention of the photo cell. With the knowledge that photoelectricity produced was proportional to light intensity, they provided basic data for modern photoelectric photometry. A major focus of Elster and Geitel was on atmospheric electricity – their theory of the electronic charging in thunder clouds through the friction of water droplets can still be found in physics textbooks. For use in describing the distribution of charges, Elster and Geitel developed the physical model of a spherical capacitor. They introduced a new era of research when they applied the theory of ions to the field of atmospheric electricity. For a long time they hypothesised that sunlight ionises air molecules before discovering that environmental radioactivity is causative.

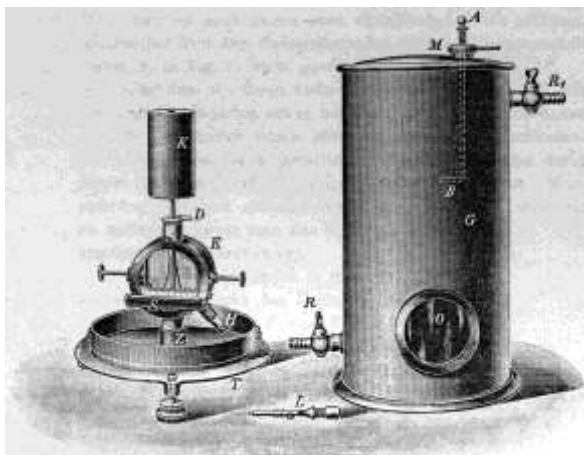


Figure 2 (above): Radiation measurement instrument for air, water and soil samples developed by the Braunschweig-based instrument manufacturing company Günther & Tegetmeyer in cooperation with Elster and Geitel. Photo private archive Fricke.

Figure 4 (right): The public entrance of the Baumanns Show Cave today. Photo: Siegfried Wielert.

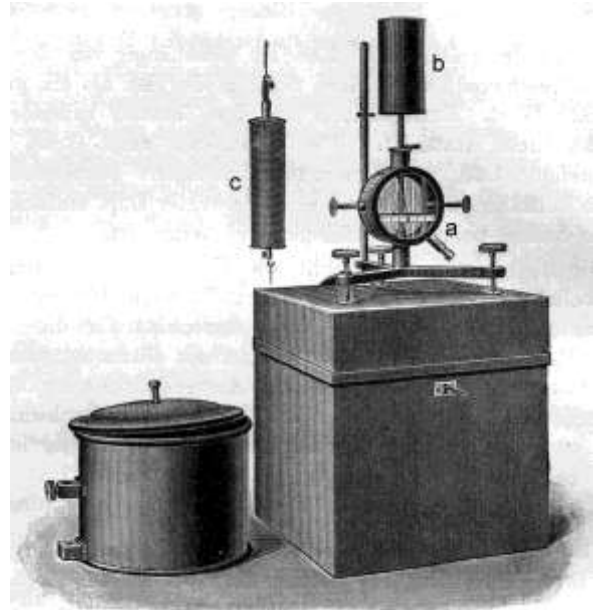


Figure 3: Air-electric dispersion apparatus (a: electrostatic balance for displaying the electric charge state, b: cylindrical electrode, c: Zamboni column for electrically charging the cylinder electrode) used by Elster and Geitel to determine the ionisation state of room air. Photo private archive Fricke.

To prove this theory, they carried out underground measurements in the Baumann's and Iberg Dripstone Caves in the Harz. Finally, they provided evidence of a higher radioactivity inside the natural caves than in the air outside. In 1907, the two scientists concentrated on the relationship of radioactivity and geothermal energy. Elster and Geitel were the first to interpret radioactivity as a phenomenon of atomic disintegration processes and to postulate a radioactive decay-chain of elements. They also analysed cathode rays and produced glass cells, in which the electrode had the form of a filament which could be heated electrically. With that, Elster and Geitel created hot-cathode tubes which are nowadays irreplaceable in electronics. In recognition of their scientific accomplishments they were honored repeatedly and even nominated seven times for the Nobel Prize for Physics (FRICKE & SCHLEGEL 2017).



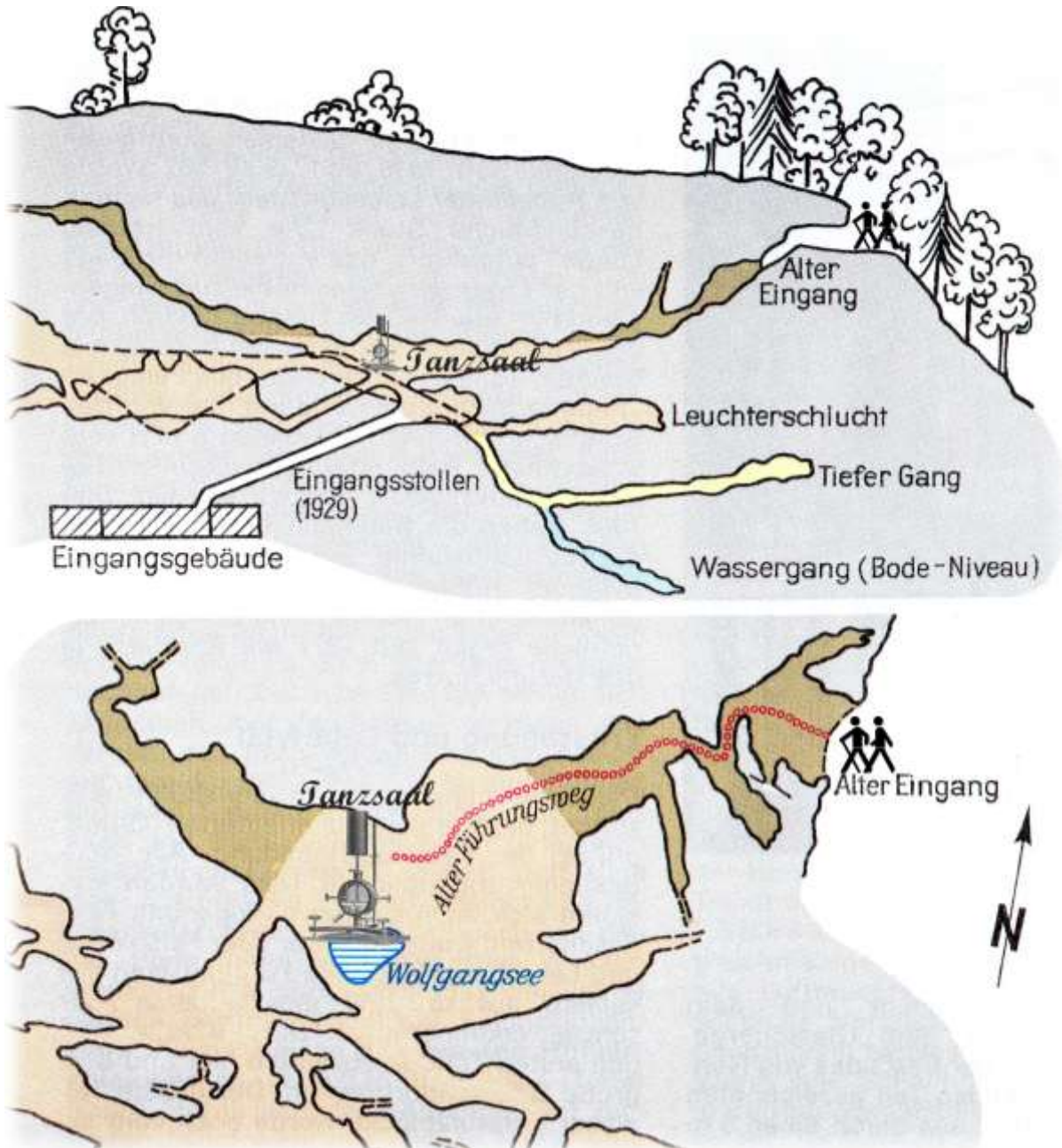


Figure 5: In this depiction of a section of the Baumannshöhle, the access path is marked, via which the Elster and Geitel reached the Tanzsaal (i.e. Dance Hall, later Goethesaal), which had not yet been rebuilt at that time – the lake and the new access were only built later. The modified drawing is taken from MUCKE, D. & HASE, W.: *Wanderatlas Rübeland und seine Tropfsteinhöhlen*, Tourist Verlag, Berlin 1990.



AUFNAHME VON F. ROSE, WERNIGERODE.

Eingang zur Baumannshöhle in Rübeland.

Figure 6: Historical entrance of the Baumannshöhle, via which the Elster and Geitel entered the cave. Photograph: F. Rose, Wernigerode, from HOFFMANN, H.: *Der Harz*, C.F. Amelangs Verlag, Leipzig 1899, p. 293.

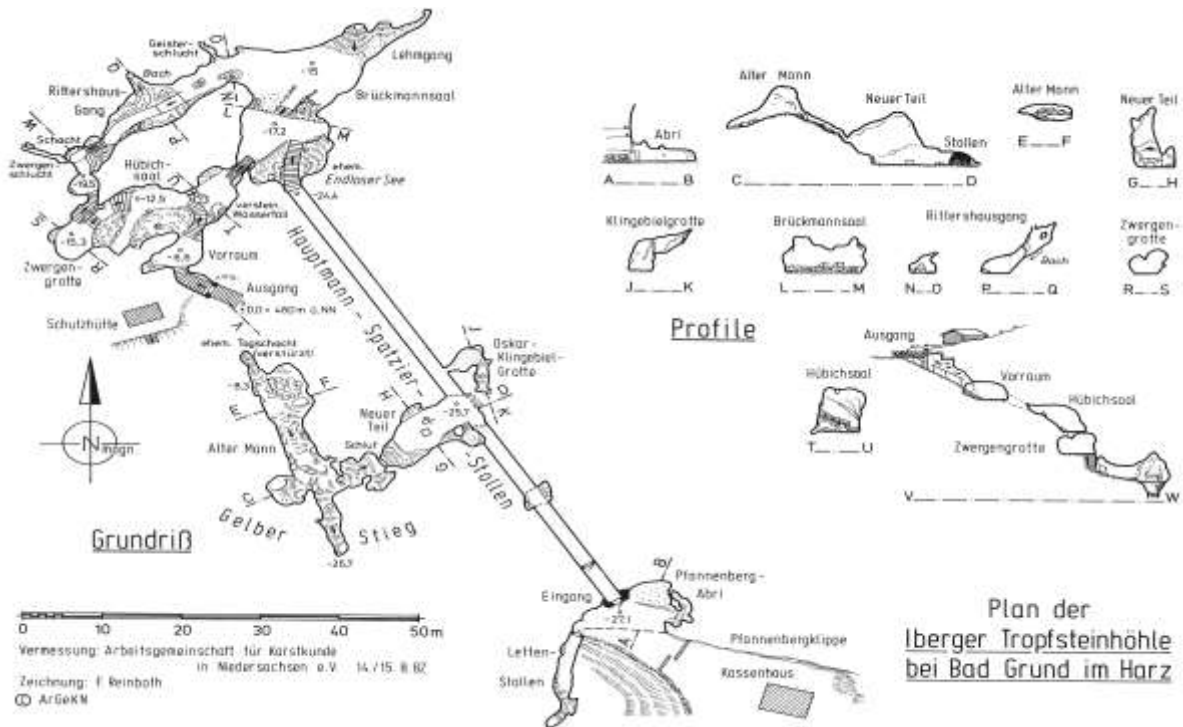


Figure 7: Old cave map of the Iberger Tropfsteinhöhle where Elster and Geitel carried out underground measurements. At their time, they used the northwestern rooms of the cave, probably the Brückmannsaal, as the gallery Hauptmann-Spatzier-Stollen with the adjacent cave findings was built years after their investigations. Map: Fritz Reinboth.

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Historical importance of GGeo group for the development of Brazilian karst research

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Abstract

GGeo - Grupo da Geo de Espeleologia (Speleology Group of the Geosciences Institute), founded in 1986 by Prof. Ivo Karmann, Paulo Boggiani and Geology Bachelor students at the University of São Paulo, developed an academic bias within an active learning space that introduced many students to cave and karst geology. Karmann, a pioneer in karst sciences in Brazil, was the advisor of several students, who became researchers in the area and started guiding a new generation of students, also introduced to speleology by the group. A science genealogy is presented in which GGeo is significantly present and took part in several Brazilian karst regions and knowledge fields. GGeo also developed its own research in São Paulo and Mato Grosso do Sul states, besides providing support to researchers not directly related to the group.

1. Introduction

The GGeo - Grupo da Geo de Espeleologia (Speleology Group of the Geosciences Institute), founded in 1986 by Prof. Ivo Karmann, Paulo Boggiani and undergraduate Geology students at the University of São Paulo developed, collectively or individually, a great number of cave and karst research projects. Through historical research and reading of academic curricula, this paper pursues the extent of

participation of this group in the development of studies of caves and karst within geoscience.

The paper also seeks to bring to light the important pedagogical and didactic role of the group, in the student and even teacher education of the former and current participants, through the discussion about the adopted learning methods.

2. Materials and methods

Several ways of obtaining the information presented from scientific papers, reports and thesis were used and are described below. In addition, bibliographic research was considered in order to raise the relevance of the educational and pedagogical character of the group.

Interviews and Historical Archive - Interviews have been conducted since 2015 with former members of GGeo to obtain information regarding the structure and nature of the group, as well as its technical, educational and academic production. Interviews were recorded in audio or video, and some were transcribed. Information collected on them and in historical archives as cave maps from the 80s or 90s were used mainly to consult and confirm the names and dates of activity of the former members of the group.

Academic Curriculum/Lattes - Lattes Platform, created by the National Council for Scientific and Technological

Development (CNPq), is an information system that integrates databases of academic curriculum, research groups and institutions all over Brazil. The curriculum of the main members of GGeo, maintained and updated by the researchers themselves, were consulted to gather the essential information of their published and in progress academic productions, as well as undergraduate and graduate studies advised by them.

Online Catalogs/Dedalus System - Dedalus database gathers the catalog of the libraries of University of São Paulo (USP) where Undergraduate Thesis (UT), MSc, PhD and post-PhD researchers hosted in University of São Paulo were consulted. The access to all sorts of graduate thesis is possible through the platform 'Teses USP', and although UTs are not available online, essential information is presented in the Dedalus system.

3. Results

The academic nature of the group began with Professor Ivo Karmann's PhD project (KARMANN, 1994). Late 1980s and early 1990s was marked by great activity by performing several cave mappings with detailed geological information; these projects were linked to the PhD research and consist of Karmann's first advising. Since 1989 Karmann has advised

19 URs and 6 UTs, those projects were occupied by 16 and 4 members of GGeo group, respectively.

On the other hand, the major scientific production is done by graduate programs. Karmann, supervised 7 MSc and 7 PhD projects from 1998 to 2020. These research were developed in several knowledge areas within geosciences

such as: Geomorphology, Cave Geology, Sedimentology, Stratigraphy, Hydrogeology, Hydrogeochemistry and Paleoclimatology and Geochronology.

Territorial extent covered is also noteworthy, since karst systems in Southeast Brazil (PETAR - São Paulo State and Sete Lagoas - Minas Gerais State), Southern (Botuverá - Santa Catarina), Northeast (Chapada Diamantina, Campo Formoso and São Desidério - Bahia and Bacia SE/AL - Sergipe) and Midwest (Serra da Bodoquena - Mato Grosso do Sul) were studied. Many of these graduate students currently carry out their own research activities and some stand out here, due to their activity as advisors for a new generation of graduated scientists in addition to developing highly relevant cave and karst research.

Francisco William Cruz Junior became a major reference in paleoclimatology working since 2010 as an advisor for undergraduate e graduate students in research involving mainly climate and environmental changes through the geological time registered in speleothems. Over the last ten years his research had covered all regions of Brazil. Although he did not directly participate in GGeo, some of his students did.

William Sallun Filho, according to a video interview report, says that GGeo played a vital role in his choice of path in geoscience. His work as an advisor started in 2010, and his research involves mostly cave geology, karst geomorphology and continental carbonates. His studies sit in the PETAR, Caverna do Diabo, Intervalles, Valinhos, Ipeúna and Serra da Bocaina (SP) and Serra da Bodoquena (MS). He plays an important role training new scientists as advisor of 11 URs related to karst science, 2 MSc and 1 PhD.

Ricardo Galeno Fraga de Araújo Pereira is a former member of GGeo, is currently professor from the Federal University of Bahia and develops research mainly in the area of environmental geology and geoconservation. Within cave geology was an advisor in one UT and one PhD.

Nicolás Misailidis Stríkis was a graduate student of Cruz Júnior and also followed the research in climatology and paleoclimatology in Fluminense Federal University and USP. So far has advised four MSc degrees.

Considering the locations studied in all types of research by members of the GGeo, it is possible to observe a significant part of the main cave occurrence areas in Brazil were contemplated (Figure 1).

The group acted as a support group for Karmann's PhD with several tasks in the Vale do Ribeira region and has also consolidated itself as a research assistance team with caves projects. Through time, the group has also developed some of its own research projects, which are described below.

In 1995, 17 GGeo members participated in a speleological expedition with other caving groups in Serra da Bodoquena,

developed and published a scientific report concerning the local cave geology (GGEO, 1996).

From 2010 research focused on cave geology and education (GODINHO *et al.* 2011; GODINHO *et al.* 2016) were published and, in 2015, GGeo resumed a project in Valinhos - SP, where caves sit in granitic lithology. It was the group's first speleology project in non-carbonatic rocks, which is still in progress. More than 30 caves were discovered and registered so far, and 3 cave maps were concluded (ÁVILA *et al.*, 2019).

Nowadays, several research projects that can be included in this chronology are in progress, some performed by GGeo members. Those are 3 URs, 5 MSc and 1 PhD, coordinated by Karmann, Cruz Junior, Sallun Filho, Pereira and Stríkis in paleoclimatology, hydrogeochemistry and cave geology fields. There may be more projects in progress related to caving that are not updated in the consulted databases. Moreover, we are studying the speleogenesis of granitic caves and its speleothems, aiming to contribute to this particular case regarding cave geology.

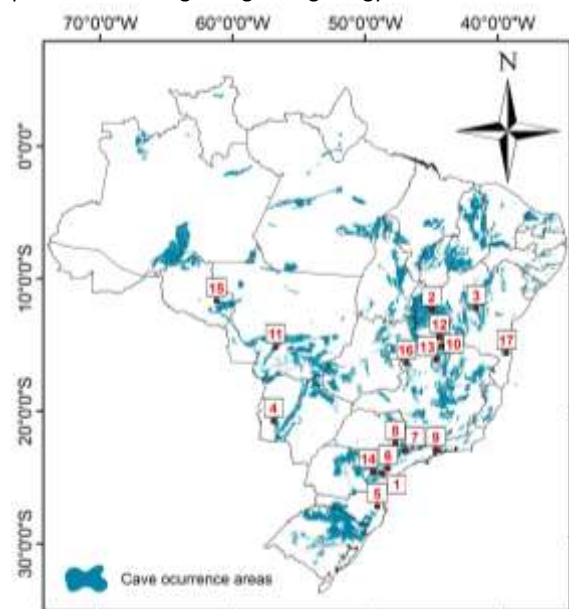


Figure 1: Location of points surveyed by GGeo members in Brazilian cave occurrence areas (CECAV, 2018). 1. PETAR and Serra do André Lopes / Caverna do Diabo - SP ; 2. São Desidério - BA; 3. Chapada Diamantina - BA; 4. Serra da Bodoquena - MS; 5. Botuverá - SC; 6. Intervalles - SP; 7. Valinhos - SP; 8. Ipeúna - SP; 9. Serra da Bocaina; 10. Peruaçu / Januária - MG; 11. Bauxi -MT; 12. Montalvânia -MG; 13. Luislândia - MG; 14. Gruta Malfazido (Doutor Ulysses - PR); 15. Pimenta Bueno - RO; 16. Unai - MG and 17. Mascote - BA.

4. Discussions

In 2015, Karmann reported in an interview that the creation of caving groups in universities encouraged the foundation of GGeo, corroborating with the creation of caving groups in the 4th historical period (1975 - 1984) of Brazilian caving (FIGUEIREDO, 2011). Professor Ivo Karmann is considered a pioneer, beginning its research

field in University of São Paulo and as starting point, we were able to define generations of researchers and form an academic research genealogy of cave and karst geology (Figure 2) that represents a significant fraction within the scientific development of this science in Brazil.

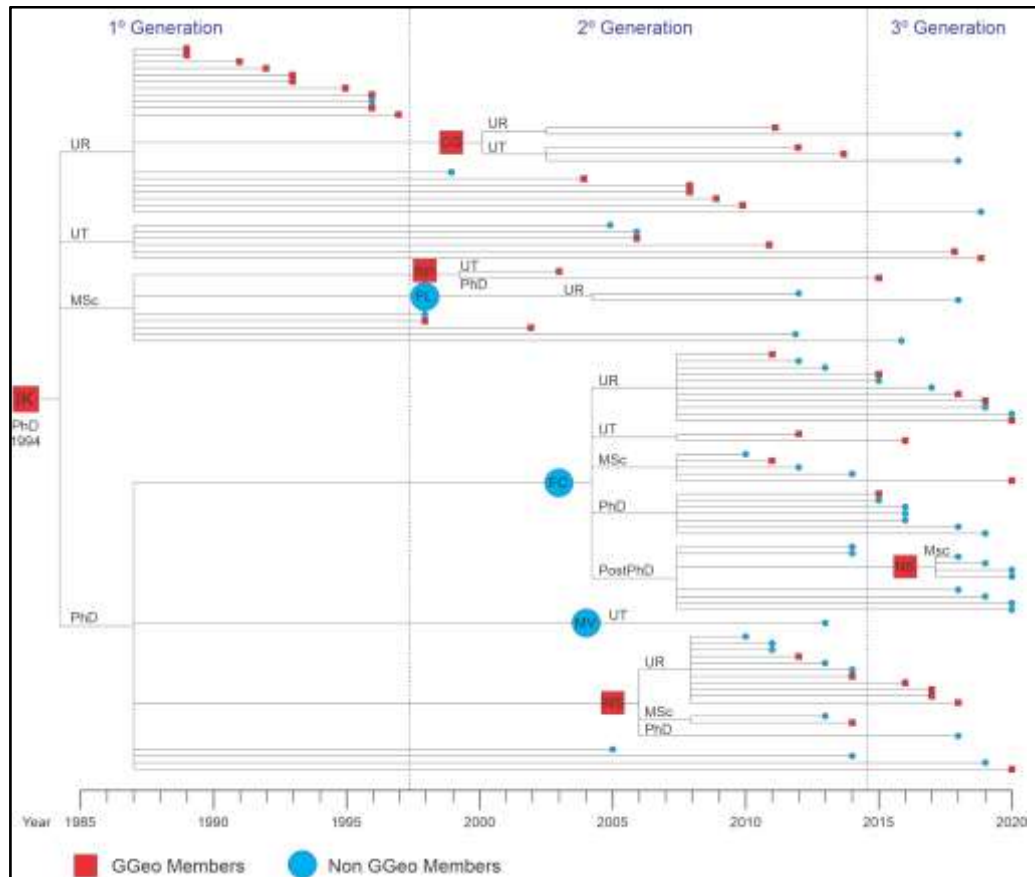


Figure 2: Genealogy of geoscience research projects. Shapes represent the conclusion of the projects; lines represent the advisor-student relationship. Initials within the shapes indicate the name of the researchers (IK - Ivo Karmann, CG - Carlos Grohmann, RP - Ricardo Pereira, FL - Fernando Laureano, FC - Francisco Willian Cruz Junior, MV - Murilo Valle, WS - William Sallun and NS - Nicolás Strikis). Acronyms in brackets indicate the kind of research project (UR - Undergraduate Research, UT - Undergraduate Thesis, MSc, PhD, PostPhD). Vertical lines represent, roughly, the division of generations of researchers.

In addition to the 36 undergraduate studies, including URs and UTs performed by GGeo members, in postgraduate studies Pereira, Ayub, Viana Junior, Sallun Filho, Godinho, Lenhare, Rodrigues and Strikis (CNPQ, 2020) chose to follow these lines of research after being introduced to the theme through the group. Of these, Sallun Filho, Pereira and Strikis later started guiding new students. Other projects guided by Prof. Ivo Karmann had, as students, non-GGeo members. These are Laureano, Cruz Filho, Valle and Cruz Junior, who also became a professor at the same University, mentoring new students.

Distribution of GGeo members is not homogeneous. In terms of education, the highest proportion of members is in undergraduate, putting GGeo as a gateway into caving. In terms of research field, the highest proportion occurs in Karmann's students, who focus in caves and karst geology while the lowest is in Cruz Junior students whose research is strictly in paleoclimatology.

The entire genealogy leads us to think about the importance of the group in the career of so many professionals. It becomes relevant to discuss the autonomy that the group offers on members, in the development of meaningful learning throughout their undergraduate and graduate degrees.

Being part of this collective enables students to develop projects and show interest in subjects freely. They are learned in addition to textbooks, not abandoning them, but gaining the possibility to glimpse practical concepts. In a democratic manner and through active methodologies (LIMA, 2017), the group allows the learning considering the prior knowledge, autonomy and reflection of the students, as it respects the democratization of the power of participation and allows everyone the power decision-making, in a horizontal way.

The group also allows members to think on their own action, as described by SCHON (1992), through reports, diaries and meetings. The exercise of reflection about action is an excellent instrument, once in contact with the practical situation that "not only are new acquired and built new theories, schemes and concepts, but the dialectical process of learning is learned" GÓMEZ (1992), in free translation.

Finally, it is worth remembering that the didactic contribution of field trips, through the investigative category used in them (COMPIANI & CARNEIRO, 1993), allows the student to be the center of the teaching/learning relationship, in which teaching is not directed by a figure like the teacher, scientific methods are accepted, but questioned when necessary, the teaching vision is formative

and the predominant logic is the one that binds science and apprentice logics. The entire dynamic process of

investigation and questioning establishes relevant cognitive relations for the formation of the geoscientist.

5. Conclusion

Since the foundation of GGeo group in 1986 and the implementation of a new line of research with Karmann's PhD (1994), a second-generation geoscientists within cave and karst studies emerged partially due to the learning incentive provided by the existence of GGeo group as a community and as a gateway to speleology and karst science. Scientists not related to GGeo also benefited from it as a support group for research and fieldwork and as their students in all sorts of research. The same process continues to happen through the years, changing in the participations of GGeo members by the years and by the subjects, since

the profile of scientists members of GGeo tend to deepen cave and karst geology, instead of paleoclimatology. Yet the group's influence is evident in terms of areas of knowledge, research lines and also territory.

Finally, it is observed that the academic genealogy presented represents the legacy of the research and advice of Professor Ivo Karmann and its support by GGeo, which was represented as a speleological group in assistance of scientific projects in progress or by the members themselves as protagonists.

Acknowledgments

We gratefully thank GGeo's former and current members, especially those who contributed directly to this research, with interviews and guidance.

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Buddhist and animist practices in caves of Myanmar (ex-Burma)

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Abstract

Information obtained by translation of popular Burmese magazines provided the author with useful information, coming in addition to his cave explorations in the country from 1994 to 1998. The paper presents practices related to Buddha, Nats (“37 official spirits” including Hindu gods), other Nats and miscellaneous spirits, of water, rocks, caves, etc. Buddhist monks, including confirmed monks, novices, missionaries and saints, use hundreds of caves mainly for prayer and meditation. Animist priests also come to caves, as well as so-called alchemists and healers of many kinds. Many natural cave features are part of cave organisation, constituting together with statues, pagodas, stone animals and others, a decorum where the inhabitants regularly come for praying or asking help for everyday life or afterlife.

Résumé

Pratiques bouddhistes et animistes dans les grottes du Myanmar (ex-Birmanie). De nombreuses informations contenues dans des revues en birman traitent de grottes et ont été traduites en anglais à la demande de l’auteur. Elles complètent ses observations faites durant son séjour permanent de 1994 à 1998. L’article présente les divers usages des grottes qu’il a pu noter, que ce soit pour le bouddhisme Theravada ou pour l’animisme qui cohabite. Il y a 37 Nats officiels et bien d’autres esprits. Une même grotte peut être fréquentée à la fois par des moines bouddhistes, des prêtres animistes, des ermites, des « alchimistes » férus de fabrication de médicaments traditionnels et des guérisseurs de toutes sortes.

De nombreuses particularités des grottes (formes, couleurs, recoins...) sont mises à profit pour installer le décorum religieux, avec des statues, des autels, des pagodes, des animaux en dur, des formes sacrées, etc. Les habitants viennent prier, se confier aux moines et leur demander leurs précieux conseils ou bien encore pour consulter les guérisseurs ou s’attirer les faveurs des Nats par intercession des chamanes.

1. Introduction

In Yangon (Rangoon), the author could buy several tens of issues of monthly popular magazines, such as “Astrology Magazine” (AM) or “Ganbiya” (literally “Fantasy”) and others. Despite their names, all show useful papers devoted to cave use and to healing. For instance, in AM n° 123, Oct. 1996, there are 8 papers totalling 33 pages on caves, out of 264 (12.5 %). In other issues one to five papers are commonly present.

This makes up a rather useful database, despite everything is written in Burmese. While he was living in Myanmar, over 1994 to 1998, the author requested translations by scholars. However, owing to the western-sized cost, only figure captions from 15 selected issues could be translated. Though, the author carefully inspected all the others.

Together with the experience gathered from his explorations, it was deemed sufficient to obtain an interesting view on religious cave use in Myanmar and a wide list of caves.

Covers of “Astrology Magazine” (Fig. 1) show caves, water, monks, representations of Buddha in various situations, queens or princesses, hidden treasures, wilderness, occultism, mythical animals, temples, bells, fantastic boats, Nats, etc.



Figure 1: examples of « Astrology Magazine » covers.

2. Buddha, Gods, Nats and spirits

In Myanmar, Theravada Buddhism, the original Buddhism transmitted in Pāli language, also called Small Vehicle, is largely prevalent. It was declared official religion by Anawrahta, the first king of whole Burma (1044-1077). Buddhism so became prevailing over all pre-existing religions including Indian ones and animism. Nevertheless, older practices remained part of people beliefs and worship. Anawrahta officially declared 37 Nats as Buddha subordinates, to be worshipped as such. A number of Nats are similar to Indian deities and their king, Deva Indra Sakka, corresponds to Indra, the head of Hindu pantheon. Nats may also be former kings, warriors, queens and other persons of importance.

Not all Nats are included in the 37 official ones. They may also be terrestrial spirits related to things like forests, caves, rivers, waterfalls, big trees, cardinal points and else or to natural phenomena as storms, earthquakes, moon, sun and others or to ancestors and once powerful dead persons. There are also ghosts, demons, spirits and goblins. Worshipping Nats is a must for any Burmese in order to obtain good life and good fate, also to make good business. Nats are related to every-day life, meanwhile Buddhism mainly concerns afterlife. In almost every Buddhist temple in Burma, Buddha images (statues) cohabit with statues of Nats. Offerings are plentiful, especially to the Nats.

Buddhist monks are highly venerated and a number of them are declared saint or venerable or bear other marks of deep respect and recognition. Master monks (sayadaws) are commonly assisted by novices.

3. The temple: at surface and under the ground

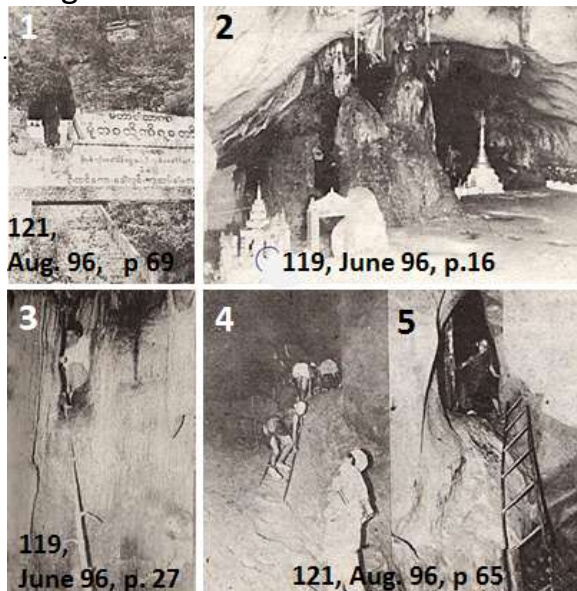


Figure 2: some accesses to caves. 1: Mun-Ta-Wa Cave near Taunggyi: entrance at top of stairs above spring and through an arch gate. 2: Maha Sadan Cave near Hpa-an. 3: Dee-Doat Cave near Patheingyi, near the road from Mandalay to Pyin-Oo-Lwin: bamboo pole. 4-5: Mun-Ta-Wa Cave, access to lower level: ladders and notches.

In the country, it is nearly impossible not to see a pagoda (zedi, known as stupa in some countries) from distance. Pagodas are commonly associated with temples and the latter usually have buildings at surface, associated whenever possible with cave(s), either natural or man-dug. Every place with some hole is eligible to become a place for worship. The cave can be a space between boulders but there are many limestone (or dolomite) caves in Myanmar. It is worth mentioning that some functions not present in a specific cave may exist in a building outside. Also, not all gods or Nats are present in a given cave. Nats names may change from a place to another.

Caves are preferential places for Buddhist monks, but they commonly shed priests for the Nats, that we can call shamans, hermits, healers or else. Shamans are intercessors between persons wishing to obtain some favour and selected Nat(s) among the 37 Nats or others.

4. Buddha images



Figure 3: Buddha images. 1: in a cave opening in a cliff. 2: Pindaya Cave, Shan State. 3: Near the entrance to Wè-Pyan Cave, Hpa-an area. 4: Buddha statues in four cardinal directions. 5: Shwe Kyauk gu (Golden Rock Cave), upper cave, near Lashio (Shan State). 6: Reclining Buddha in a walled cliff overhang.

Buddha images (Fig. 3) are present in every religious cave, either isolated or grouped. They may be located in specific selected places but also be aligned along cave walls or placed in cave niches. The three main postures are present: sitting (the most common), standing, or lying (Reclining Buddha) which symbolises Buddha's death before reaching nirvana. Buddha is usually represented with one gesture selected among more than a hundred, which all are meaningful. Buddha images are often offered by people as such or through donation of money.

5. Nats images

Nat images are common in caves (Fig. 4) and in associated buildings. Where there is no cave, they are shown in temple compounds. Their abode is mount Popa, a volcanic plug located to the East of Bagan (Pagan) in Central Burma. Many ceremonies in the country are dedicated to Nats and shamans are present to make the rites correctly followed.



Figure 4: Nats and spirits. 1: Sakra Cave in Sagaing area, Sakra statue, king of Nats of Indian origin. 2-3: Cave on the Kyauk Sin Gyi (Big Stone Elephant) on the Shwe-U-Min Range, Pindaya area, Shan State: Thura Tha Thi (Saraswati) goddess of education, flying on a Hintha (Himsa) bird, is of Indian origin. 4: Amarapura. Bo Bo Gyi (a great spirit) called Ma Thein Da Yar. 5: Near Shwe Cave, South of Mawlamyine (Moulmein): Bo Bo (spirit) guarding the hill with the cave. 6: Amarapura; Bo Daw (of Mandalay) with brother and sister.

6. Other attributes in Buddhist caves



Figure 5: Animals and pagodas in caves. 1: Bingyi Cave, North of Hpa-an. Entrance gate with naga snake. 2: Aung (Victory) Cave near Lake Inle. Stone elephant (carved stalagmite?). 3: Buddha protected by nagas. 4: Bingyi Cave: wandering Buddha with a dog. 5: pagoda on stalagmite.

Many animal representations (Fig. 5) are present in the caves. The most common is the naga, i.e., the cobra snake that protected Buddha. It is widely found associated with cave gates or outside stairs and inside, also associated with Buddha images. Lions and tigers are placed in a number of caves. Dogs are rare. Pythons are protected in some caves and even venerated; sometimes visitors are invited to caress them. Elephants, built with bricks or carved out of stone, including stalagmites, are frequently seen and may be the stand for a pagoda. The pagodas can also be erected on the cave ground or above a variety of supports. They are often white, yellow or gilded.

Water is often considered as sacred (Fig. 6), especially in rimstone pools. Water drippings are commonly collected in

dedicated basins which may be lined by nagas (sometimes called dragons). Some pools are dedicated to Nats and a turtle-like rock in them is highly appreciated. Caves with warm water are very attractive, for instance near Lake Inle or at Bingyi Cave north of Hpa-an. Generally speaking, all rock or speleothem shapes that show a specific personality are used, carved or integrated into a meaningful set of artefacts. For instance, a gong-like stone attracts attention. Tombs of monks and abbots are sometimes placed in caves, either in cone-shaped pagodas or in tombs with mythical shape. Commonly, monk ashes are mixed up with some clay and transformed into small play-like marbles preciously preserved by living monks.

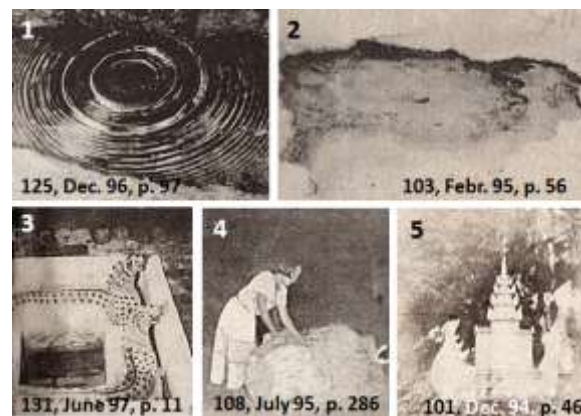


Figure 6: Specific items needing respect. 1: water drippings from cave ceiling. 2: in Waè-Pyan Mountain, the Lay Thar Cave (“ventilator”) shows a stone turtle (head to the left) in a “fairy” pond. 3: Sakra Cave in Sagaing area shows a pool for the Nats surrounded by two nagas. 4: Yethé Pyan Cave near Hpa-an. Stone mortar for grinding medicinal herbs. 5: in Bayint Nyi Cave (= King’s brother Cave), north of Hpa-an), the Hamsa bird shaped-tomb of a chief of Hamsa abbots, Bones are stored in the different tiers.

5. Buddhist monks



Figure 7: Buddhist monks. 1: seated at cave entrance. 2: praying with a rosary. 3: in Nan-Ka-Thu Cave in Hin Tha Ta Township, Ayeyarwady Division: U Hla Khaing, a saint. 4: at the entrance to Kawgon Cave near Hpa-an. 5: a missionary holding a Buddha image with the Labamuni gesture as a donor. 6: meditating monk with a yellow robe.

Buddhist monks (Fig. 7) are rather numerous in the country and highly supported by inhabitants. Every morning they go through the streets where people offer them their daily

food. There are several degrees of implication and duties in monkhood, with are for instance indicated by the yellow or brown robe colour. In addition, monks develop different degrees of wisdom and knowledge. Many are confirmed monks like sayadaws or even living saints. Others are senior or wandering monks and missionaries, propagating and deepening Buddha's teaching among population. Novices are taught by senior monks. Monk activity is prayer and meditation. They receive people and give advice when asked for. They are essential in Burmese everyday life.



Figure 8: Monks exploring caves. 1: with a candle. 2 and 3: Mon-Ta-Wa Cave, lower passage, progression and washing.

Familiar with the underground realm (Fig. 8), they explore any space between rocks, every corner of caves and use each place in the most appropriate way according to their beliefs and needs. Natural decorum is optimised in order to install the cave religious setting.

6. Shamans, alchemists and healers

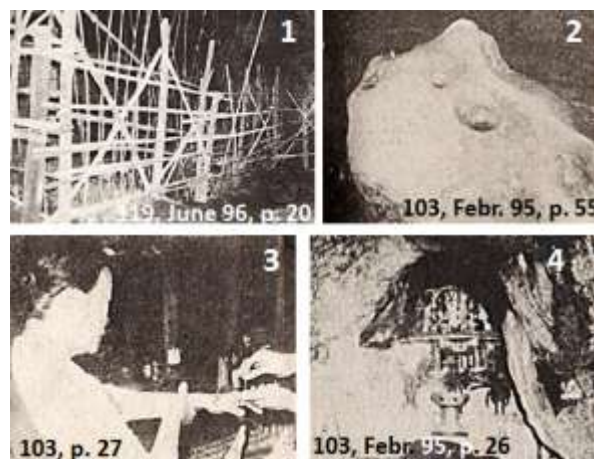


Figure 9: Medicine, alchemists and healers. 1: in Maha Sadan Cave near Hpa-an, wooden fence to protect extraction of soil with medical properties. 2: Wè-Pyan Cave near Hpa-an: medicine grinding stone. 3: in the same cave, a healer cures neuro patients with "a stick" of indigenous medicine. 4: in a cave near Ra Mae Thin, the place where the healer (occultist) makes medical treatment.

Shamans deal with Nats and other spirits. So-called alchemists go to caves or live in them or nearby and prepare quite a lot of local medicines made of mineral or organic products. The large Maha Sadan Cave (AM 119, p. 16-21)

(Fig. 9-1) is located to the south of Hpa-an and it is packed with numerous Buddha images and pagodas. Behind a long Reclining Buddha placed in the semi-dark part of the cave, a wooden fence protects the place from where medicinal matter is quarried: it is "ferric ammonium citrate", a product present in a variety of caves. A stone with holes is used for grinding the ingredients of the targeted medicine (Fig. 9-2). The prepared medicines show variety and are used in different ways. One of them (Fig. 9-3) is used to cure patients with neural problems: it consists of stinging hands, feet or other body parts with a stick coated with local medicine prepared on purpose. The alchemist is probably not always the healer.

Dedicated places may exist in caves (Fig. 9-4) with carpets, cushions, pots on rows...

7. Visitors



Figure 10: 1: Visitors and "shamans". 1: pilgrims praying Buddha in a cave. 2: "resolution" cave at Maw Yit, close to Dawei. Trying to perform problem solving. 3: sayadaw and pilgrims. 4: visitors or pilgrims in a Buddha cave. 5: probable shaman. 6: Kawgon Cave, near Hpa-an. Sayadaw, novice and pilgrims. Cave walls are covered with terracottas.

Buddhist people come to caves to pray Buddha, pay respect to the monks or to get advice from them. They may also come to meet with shamans or healers, who can be hermits at full time, or not, with the possibility for them of sharing time between the cave and an outside cabin.

8. Conclusion

This quick approach shows the variety of religious and other practices in Burmese caves. It was valuable to have original texts translated in order to obtain such data. In the caves, due to the common absence of a translator familiar enough with the practices and their reasons, it is usually impossible to obtain good explanations. Of course, room largely remains to deepen these matters.

Acknowledgments and bibliography

All photos presented in this paper originate from "Astrological Magazine" of Myanmar, after enhancement by computer. Provenance is indicated on each of them. No reference in another language than Burmese has been used. We deeply acknowledge our Burmese translators for their work and have respect for the unknown photographers.

Ancient religious use of caves in Khammouane, Laos

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Abstract

Laos has been for centuries a Buddhist land, after having been first a place of animism. In addition to surface temples, a number of caves have been used to practice religion. Animism is still present. Many Buddha images in the caves, mostly made of wood or bronze, were and are subject to prayers from monks and lay people. New statues replace old ones. However, the latter are kept in the temple or the cave and remain sacred, whatever their preservation or location. In a number of caves, old statues have been kept among younger ones. In some others, they have been gathered in discrete places. In a few cases, they were very numerous and rather precious. Most of cases were studied by the author and friends.

Résumé

Utilisations religieuses anciennes des grottes du Khammouane, Laos. Le Laos a été animiste très longtemps et cela perdure à quelque degré, mais il est passé par des influences hindouistes venues du sud avant de devenir largement une terre de bouddhisme Theravada vers les VIIIe-IXe siècles. De multiples grottes ont été utilisées par cette religion et il subsiste encore des statues anciennes dans des états de conservation variés, soit reléguées dans des recoins, soit parsemées parmi des plus récentes. Certaines ont fait l'objet de caches probables, ce qui pourrait être dû aux invasions thaïes, notamment au XIXe siècle. De très belles découvertes ont été faites depuis bientôt une vingtaine d'années. Nous présentons ici principalement nos résultats.

1. Introduction

Laos has been inhabited for a very long time and successive migrating peoples from South and from North settled besides already present ethnic groups. Each of these peoples brought their religious habits with them.

2. Prehistoric Man in caves of Laos

Homo sapiens skull and jaw from Tam Pa Ling, a cave at a 1170 m elevation in NE Laos, have been dated 44 to 63 000 years BP (DEMETER *et al*, 2015), but these remains were probably brought into the sloping cave by water or mud slide. There is so far no evidence of religious rites in Lao caves but this may be due to a lack of excavations.

In Xieng Khouang Province, Tham Ban Ang in Plain of Jars was a crematorium probably during Iron Age.

In Khammouane, several paintings are present at the ceiling of entrance part to Tham Nong Kha. They were mentioned in 2000 to the author, several days after he questioned villagers at Ban Vieng. The main painting is shown on Figure 1. There is probably a religious meaning, despite it is completely unknown. By similarity to Thailand rock paintings, they could date from around 1500 years BC.

Similar paintings exist on cliffs in Huashan (Guangxi, China) where they were dated from 0 to 1000 years BC (U-Th).

3. Animist practices in caves

Animist practices observed by the author in relation with Lao caves, mostly relate to spirits that are believed to live inside, as in water, mountains, trees and others. Usually, the animist priest, some kind of a shaman, kneels down at the

cave entrance, joins his hands and addresses prayers to the spirits. Offerings are associated in a variable quantity.



Figure 1: man representation on the cave roof of Tham Nong Kha, raising arms, feet apart and sex visible. To the bottom right, there is a probable dog. Photo C. Mouret.

Sometimes, the prayers are said in front of an altar in the forest not far from the village or in a house. In this case, offerings are commonly plentiful. On the edge of a karst lake at a three-hour walk from Ban Tat near Nhommalat (MOURET, 2019), a permanent simple wooden altar is located in front of a cave opening at the edge of the lake. The priest placed offerings on it and prayed prior to any exploration was allowed in the area. Earlier on the same day, a very large offering was made to the spirits in Ban Tat, with sacrificed pigs and chicken, and rice liquor.

In olden days, dead people were enclosed into coffins that were placed underneath cliff overhangs or in narrow caves. At Tham Long (Coffins Cave, Fig. 2), we observed, in 1996, approximately 1.2 to 2.5 m long coffins made of a piece of log sawn lengthwise and then hollowed. Pegs and/ or tiny

ropes probably made up of vine ensured the association of the coffin proper and the lid. Coffins were placed onto wooden bars supported by stilts. Such coffins are cultural remains from Protolaotians; nobody in nearby villages presently knows who they were and when they lived.



Figure 2: Animist coffins underneath a cliff overhang, Tham Long, Ban Mai. Photo J.F. Vacquié, 1996.

Animism is still well present in Khammouane, either as practices related to Nature spirits or as small shrines bearing offerings, erected to bring good luck and good life to people. The shrines can be very basic in the countryside or “sophisticated” as in Thailand (Fig. 3).



Figure 3: modern shrine to spirits in Tham En (Tham Nong Aen), now a touristic cave near Thakhek. Ph. C. Mouret, 2013.



Figure 4: The White Crystal Buddha discovered by animists. Photo in KHAMBONE THIRAPHOUTH, 2014, p. 49. See also p. 57.

In 1723, two animist hunters, belonging to Katang Mon-Khmer ethnic group, found in a cave in Saravane Province (South of Khammouane) the statue now called the White Crystal Buddha. They considered it as some kind of an animist god image, prone to bring them success and luck, and did not identify it as a Buddha image. They got used to pray it before going for hunting and were rather successful. Subsequently, it was identified by a Lao Buddhist and was brought into king’s of Champassak palace. In 1799, Thais conquered Champassak and in 1811, they confiscated the statue. It is now still exposed in Bangkok King’s Palace (KHAMBONE THIRAPHOUTH, 2014), though not shown to public. Strangely, a very similar statue is shown on the Internet as being in a temple in Chiang Mai: is it an error?

4. Hinduist practices

Writings in Sanskrit, the language used by Hindus and Mahayana Buddhists were mentioned to the author by M. Vannivong Soumpholphakdy (1997 & 2012).

One is close to a sand-choked vauclosian karst spring in the northern branch of the polje of Ban Phalem. The second is located around 850-900 m from the outlet of Nam (River) Heup, a left bank tributary of Nam Hin Boun. It is difficult to reach, as being in an upper level of the cave, not far from the upstream cave opening in the entirely closed polje of Ban Na, where a very ancient chedi (stupa) can be seen.

Little is known about Hindus in Laos, but Hinduism was primarily transmitted there through Cambodia by colons from India and Khmers. The kingdom of Funan (1st to 7th Century AD) was initiated in the lower Mekong valley and subsequently extended further upstream along the Mekong River area. Already flourishing during the 3rd Century, it became subject to a reinforcement of Indian influence during the 5th Century. Sanskrit writing was used by Khmer-Indian people and possibly by Austronesians (Malays). Ancient Khmer was used as well.

The kingdom of Chenla (end of 6th to early 9th Centuries) was covering the lower Mekong valley and the present-day Khorat Plateau in Thailand. People used Sanskrit as their most important language (besides ancient Khmer) and mainly practiced Hinduism, though Buddhism was present. The kingdom of Champa (end of 2nd to beginning of 13th Centuries) was primarily located in Annam. The religion included Hinduism mainly, and Mahayana Buddhism. The language was of the Malay type but writing was based on Sanskrit. So, Indianisation of the area occurred mainly from 2nd to 13th Centuries. During the latter, inscriptions in Sanskrit were rapidly replaced by others in Pāli, which is a characteristic of Theravada Buddhism.

Thakhek city name literally means the pier of the Indians (or physically similar people) and is therefore compatible with Indian influence.

5. Theravada Buddhist practices



Figure 5: ancient tall Buddha images and smaller ones at the back right. Tham Phanang, 2011.

Figure 6: the main Buddha image in Tham Pafa, seen from cave entrance (2017). Photos 5 and 6 by C. Mouret.

Caves are very commonly used by Theravada Buddhists (Fig. 5 & 6) in Laos, Thailand, Myanmar, Southernmost China and Sri Lanka mainly. The author has observed around 200 of such caves. Evidence of ancient use is provided by old wooden statues in a poor state of preservation, often moved against the walls or lying in cave floor dust. Nevertheless they always keep their sacredness.

Visible statues

In Khammouane, old statues are commonly placed behind younger ones, mainly along cave walls and in their normal vertical position. Quite a number of caves mapped by the author show such features: **Tham Phanang**, close to the lower course of Xé Bang Fai River, is a good example. The younger statues are ahead and the older ones along the cave wall (Fig. 5).

Tham Phaya In (Fig. 7), around 10 km East of Thakhek, is a cave where Buddha statues in darkness face a lake open to the sky. There also, recent statues are ahead of older ones



Figure 7: Tham Phaya In. Old Buddha statues, especially the horizontal one. Photo Jacques Rolin.

Tham Phachan, a gigantic cave situated some 25 km to the NE of Thakhek, is bearing a wide man-enlarged platform where people worship Buddha images. The platform is in the daylight at around 50 m inside the cave and it is largely dominating the cave stream. Old wooden statues there are also located along the cave wall (Fig. 8).



Figure 8: Left: the gigantic entrance to Tham Phachan (an easy U-turn by car is possible between the bank to the left and the stream). Right: on the ledge near half-height (visible on photo to the left), old Buddha images are present behind the modern ones. Photos Jean-François Vacquié.

Semi-visible sites with statues

By semi-visible, we mean that only a part of the statues is visible from outside, meanwhile older ones are concealed on high located ledges. Such **Cave 1** was observed in Nam Hin Boun valley (MOURET et al, 2014) (Fig. 9).



Figure 9: Cave 1; old wooden Buddha images. Note the several back to back images. Photo CM.



Figure 10: Cave 2; old Buddha images, including back to back images. Ph. C. Mouret

In **Cave 2** of the same region (Fig. 10), hidden statues are mostly placed on narrow ledges in darkness, along a cave wall in the back when entering. However, more Buddhist attributes are found outside. In a **cave near Ban Tat** in Nhommalat area, modern Buddhist attributes are very

visible, while older ones have been placed on a high ledge not so easy to reach, and in elevated small passages.



Figure 11: Cave near Ban Tat; statues on a dusty floor (left) and on ledge are still venerated (white threads). Ph. J. Rolin.

Hidden statues

By hidden statues, we mean Buddha statues encountered in caves by pure chance, by villagers or by cavers. Nobody in surrounding villages was aware of their existence.



Figure 12: Tham Pha Noi (Tham Phrabang).

Caves were used for hiding Buddha images under difficult times. The most typical example was perhaps the **Crystal Buddha** (9 cm large, 32 cm for the Buddha Himself), a 15th Century statue of Lanna style (Chiang Mai), which was hidden in a cave located 4 m high at the base of a cliff in Saravane Province of Laos before 1724, probably around 1564 AD (KHAMBONE THIRAPHOUTH, 2014). The statue was not far from the cave entrance, probably in daylight area, but not visible from outside.

Tham Pha Noi was discovered behind bushes in the forest by hunters (Mr Khounma and two friends) from Ban Thamy (following an animal track) on the 31st of December 2010. It is now a touristic cave called Tham Phrabang (it is more prestigious!). We mapped it and took photographs in April 2011 (Fig. 12-13). This cave is at ground level at the base of cliffs. The Buddha statues are located on a fossil stalagmitic floor, just above a narrow way from the southern, main, entrance. It is almost impossible to see them in the dark as they are in the back when entering. On the way back, one usually looks at the narrow way out. The statues are placed in such a way that they cannot be easily be spotted by unaware people. The opposite entrance is presently less obvious to reach from outside, but it cannot be excluded that it was the main entrance in the past.

The hunters were surprised to discover “114 Buddha images, a gourd, a pair of cymbals, two trays, two support trays for Buddha images, a lime box of the betel chewing set, three sharp bronze pieces, 2 large gongs, 2 medium gongs and two small gongs, a bowl [for a monk], three big bowls, 14 medium bowls and four small ones, (most of them are made of bronze), two big jars with handles, a small one [seemingly all made of bronze] and an earthen jar, a bronze kettle and a small dish” (list made by archaeologists cited by KPL, 2010; bracketed text from

indications by KHAMPHOUTH XAYASOMROTH, 2010).



Figure 13: the main Buddha images in Tham Pha Noi. 2011 photos and montage by C. Mouret. The location of trays and statues has changed since.

The 229 statues in Tham Pafa (Fig. 6 & 15), some of gold, and many other artefacts were placed in the larger part of the cave that is opening some 15 m high in a cliff overhang. The artefacts were incidentally discovered in 2004 by a villager named BounNong and it was drawn in detail by the author. The larger part develops at a lower elevation, just above an underlying cave lake largely open to the outside. A natural hole in cave floor opens into the ceiling of the lake

6. Conclusive discussion

Despite all hidden statues are not far from cave entrance, they are difficult to spot and were unknown by local people before their rediscovery. Their location, at height or in darker places less visible when entering the cave suggests that they were deliberately hidden. The presumed, though unproven, age of older statues, (since the 16th Century) does not mean that their hiding was no younger). Mid-16th to early 17th Centuries is the time span of hidden White Crystal Buddha. The fact that statues can be well organised, as in Tham Pha Fa, does not prove that they were not hidden. After their good placing in the cave, the priest may have been deported to Thailand, as were so many persons, for becoming Thai citizens. Due to Thai control over Laos during several decades after 1837, the priest may have never returned, so cave and statues were all forgotten. In general, old statues are placed either at the back of younger ones in visible places or in hard to see places when not reused. The styles vary and they are made of wood,

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(Fig. 14). Items were well organised along cave walls and rimstone dams (MOURET *et al*, 2005) (Fig. 15). They were dated by archaeologists from Lan Xang Period, i.e. before 1707, and more likely during the 16th Century, when Theravada Buddhism spread onto Khorat Plateau.

15 statues in Tham Pha Kouan Moo, around 20 km NE of Thakhek were recently mentioned by L. VÁLENAŠ (2019). They were found in an upper passage (+15 m) at around 40 m from the entrance.



Figure 14: Cross-section of Tham Pha Fa through the place where pilgrims seat. Figure 15: Tham Pha Fa: a local view of statues. Photo C. Mouret, 2011, with permission.

bronze which both may be gilded. Rarely are they made of gold and in this case always of small size. Overall, the statues can be from very small up to nearly 2 m. The smaller the more numerous. Statues in caves have been observed by the author in most of Khammouane and in Northern and Northeastern Laos.

It must be added that a cave in Khammouane, Tham Nam Thieng, was providing a monk with holy water in a multi-storey stalagmite bounded with lateral rimstone dams. The water was used for the annual swearing of allegiance to the king of Vientiane.

For concluding, religious use of caves in Laos and largely in Khammouane dates back to immemorial times and old animist practices are persistent besides Buddhism.

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A significant part of the History of speleology: war actions in caves and karst areas

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Abstract

Caves always offered shelter and protection to a variable degree. In war times, they were used as hide-outs, though they did not always offered actual safety, as logistic bases, also as escape ways. This has been valid from prehistoric times up to now. The variety of examples shown in this paper brings an additional insight into History of speleology.

Cases histories taken from several continents deal with several types of wars, local to worldwide, religious to military, tribal or nation-driven and even related to sea piracy. War activity in caves, such as teaching, manufacturing, political action or religious activity is reviewed. Casualties in caves may be numerous, because unexpected types of attacks can surprise refuged people: underground realm is safe... until the presence of persons inside is discovered by the enemy.

Cave exploration by local people, far before modern speleologists, for these reasons and others, led to discovering new passages, e.g., for hiding deeper or finding escape ways. As such, they make up a significant part of the History of speleology.

Résumé

Un aspect notable de l'histoire de la spéléologie : les actions de guerre dans les grottes. Les guerres ont mené les hommes à utiliser les grottes à des fins offensives ou défensives, avec des conduites actives à passives, selon les cas. Les exemples sont légion à travers le monde, depuis au moins la Protohistoire. L'article en donne un certain nombre, de types très différents. Ils comprennent des activités aussi diverses que l'usage militaire pur ou l'enseignement ou même l'industrie. Les morts dans les grottes ont souvent été massives, lorsqu'elles ne comportaient pas d'échappatoire facile. Les modes d'attaque peuvent être inattendus. Les grottes ne sont de vrais refuges... que lorsqu'elles ne sont pas attaquées.

L'exploration en temps de guerre de grottes par les gens du voisinage a conduit à la découverte de galeries nouvelles et à des sorties préalablement non connues, certes pas dans tous les cas. Ces travaux, réels bien qu'alors non formalisés sur le papier forment une part véritable de l'histoire de la spéléologie, dans son sens de découverte du monde souterrain.

1. Introduction

War is unfortunately a persistent Man activity and any means how to attack the enemy or to get protection against its actions have been used. Caves and karst areas have largely been involved (Fig. 1) and this paper depicts a number of examples in different parts of the world.

2. Caves used for attacks

Regarding attacks, caves have been used, whenever possible, either as means of penetration into enemy lines or as hide-outs from where forecasted fights could be planned or engaged. **A legendary invasion** (known by oral transmission) concerns Tham Heup in Khammouane (Laos), a nearly 1 km long through cave which partly follows an underground stream. Until very recently, this cave was by far the easiest way how to link Lower Nam Hin Boun and Mekong valleys lowlands and the gigantic polje of Ban Na, which is entirely closed by high cliffs and steep slopes. Ban Na, located in the latter is a lonely, ancient, almost sacred village. A wall across the main gallery of Tham Heup is said to be a remnant of a defence system against Thai military penetration from the valleys to the polje: Thai invasions into Laos occurred in 1778 in Vientiane, then in 1827 with deportation of many Lao people to Thailand, followed by almost 60 years of Thai presence in Laos. **In 1943 and 1944, freedom-fighters** ("maquisards") in Pays de Sault (Aude) used Grotte de Picaussel as a shelter from where they could start raids against enemies.



Figure 1: bomb crater at the entrance to Tham Phanang, Lower Xé Bang Fai valley, Laos. Photo C. Mouret.

On the 9th of August 1944, Nazis could not master Picaussel fighters and burnt to the ground a nearby village, by revenge. Many other caves in the country were used for a similar purpose. In Corrèze, Grotte de La Meynie in

Lamazière-Basse, Grotte des Maquisards and Trou du Curé in Saint-Merd-de-Lapleau, Grotte des Maquis in Marcillac-la-Croisille were bases for maquisards. All are located in granite or metamorphic rocks. Grotte des Maquisards in Puy d'Arnac is in carbonate.

Caves have played a role in Cuban Revolution. At the end of 1956, those of Fidel Castro's companions who survived their landing to the west of Santiago took refuge in caves of Sierra Maestra. According to Che Guevara's writings, with Camillo Cienfuegos, he waited there for Batista's soldiers, their enemies, then harassed and killed them.

In October 1962, during Cuba missiles crisis, Guevara installed his headquarters in cueva de Los Portales (Fig. 2), a cave with several entrances located in Pinar Del Rio Province, in the western part of Cuba. From there, with his officers, he prepared the fights against a possible American invasion which eventually did not occur.



Figure 2 (left): Cueva de Los Portales, Pinar Del Rio, Cuba, Che Guevara's base in 1962. Unknown author. Public domain. CC BY-SA 1.0.

Figure 3: Fortified cave at La Jaubernie in Coux, Ardèche, France. Courtesy of Gérard Chabert.

During Vietnam War, Colonel Vannivong Soumpholphakdy was in charge of defending Mekong valley *sensu lato*, in

3. Caves as hide-outs and air raid shelters

Caves have commonly been used by people to hide during troublesome times. Even political refugees took refuge in them. In Man history, hiding in caves likely started rather early, whenever people became threatened by other people. Caves were often fortified in order to enhance resistance against invaders. Long troubled periods were especially prone to that. In France, Roman invasion (up to 51 BC), "Barbarian" invasions (3rd to 6th Centuries AD mainly), Saracens (mainly 8th C.), Normans (mainly 9th C., up to 11th), jobless mercenaries and other brigands (11th to 15th C.), soldiers during Hundred Years War (14th-15th C.), Religion Wars (16th C.), European and worldwide wars, among others, were periods of hiding in caves.

Many caves in France, especially in the South, show defensive walled entrances (Fig. 3). They are usually located high in cliffs and difficult to reach, for instance along cliffs overlying rivers such as Lot or Vézère or in mountains such as Pyrénées. Access was often possible only through wooden constructions, placed along the cliffs, which could be removed whenever necessary. Along Vézère valley, lookout posts for watching possible arrivals of invaders (Normans) were organised in such a way that information could be almost instantly transmitted to posts located further along.

Obviously, fortified complexes can be found in many countries, as for example Spain, Slovenia, Morocco, Libya, Armenia, Georgia, Yemen, etc.

Khammouane. The area is located to the SW of a long and "narrow" karst area (290 x 40 km), a sharp-landscaped massif that behaves as a natural barrier between Mekong valley and the eastern part of Laos along Vietnam, with very few natural breaches. Colonel Vannivong was a very helping hand to local people and to refugees from the east. Besides that, he used caves at high elevation above Mekong plain level for observing what was happening at distance and also to shoot rockets with mortars. He valiantly defended the city of Thakhek, with great success. Crossing some parts of the karst on severely rugged surface was possible, though with huge difficulty. For instance, it took two days and two nights for some of his troops to cross a little less than 10 km of pathway through rugged karst. Another challenge was to prevent a crossing by enemies of Underground Nam Hin Boun (now called Tham Konglor, a 2-hour, 7.5 km long boat ride throughout the mountain). However, the risk of getting attacked in the cave precluded such a try. Because a crossing of the overlying karst was also possible, though more difficult and in 7 to 8 hours, M. Vannivong placed sentinels on top rocks in order to permanently secure the way. Should an attack have occurred, it would have been very difficult for assailants to escape in the karst. After the end of war in 1973 and almost 13 years spent in a gulag, from 1975 onward, M. Vannivong, thanks to his deep knowledge of Khammouane and Laos, became one out of three associates in still stammering tourism business. Starting in 1994, he co-organised with the author at least 24 expeditions over 23 years, until his death at the age of 75, taking care of logistics and organisation on the Lao side. He became almost instantly a very good friend of us.

During Vietnam War, American planes heavily bombed Laos. According to sources, **Vieng Sai area in Houa Phan Province, was bombed daily from 1964 to 1973**, almost every 8 to 10 minutes from 6 am to 7 pm. Then rockets were launched until 4 am. Peasants could work in their fields only between 4 and 6 am. This was probably one of the most heavily bombed areas in the world at any time. As living outside was almost impossible, around 500 caves shed some 23 000 people.

In the same area and the same time span (1964 to 1973), most spectacular was the presence of Pathet Lao communist leaders in caves and large bunkers dug out from small caves. These politicians used to stay there mainly to protect themselves and their organisation against American air raids. The area was very well organised and entrances to underground passages were carefully selected in narrow cliff gaps which could not be easily reached by bombs or rockets.

Many factories, craftsman workshops, schools, meeting halls (Fig. 4) and so on were organised in caves of the area and more generally in northern Laos's provinces. Tham Xang Caves in Plain of Jars were used by communist troops to shed a hospital and to store medicines and weaponry. Overall, bombing was rather intense on all northern and north-eastern communist-dominated Lao provinces and along Ho-Chi-Minh Trail, a long part of which was in Laos, parallel to the Vietnam border.



Figure 4: Pathet Lao meeting in a cave in Vieng Sai.

Unknown author. ARR.

In addition, American planes still loaded with bombs were not allowed to land in Thailand, when returning from Vietnam (to bases such as Ubon Ratchathani and Udorn Thani). Therefore, they used to drop all remaining bombs onto Laos which is on the way, so villagers used to hide underground. This is why we can still find a number of caves in Laos with remains of installations. Tham Dan Pong (Khammouane) is a two-level cave; the upper one opens at the inner tip of a cliff overhang and its entrance is well protected both by very large boulders fallen from atop and by a thick, 2 m high, wall. Impacts of bullet and of pieces of bombs or shells are present on cliffs and overhang. The 2 x 2 m wide gallery has its floor covered with small stones placed there on purpose. A 2 to 3 m deep drop leads down to the lower level, which has access to the outside through a low, though wide, opening subject to flooding at rainy season. This latter level is obviously rather uncomfortable, but it does provide people with water a large part of the year and can be a possible escape way.

DEGLER (1999) described a cave close to Ho-Chi-Minh Trail in Khammouane. It was accessible through a small pit with a ladder, all covered with greenery. The gallery was 1.5 to 2 m high and muddy near the pit. Many people were inside, despite limited space. They slept either directly on the floor or on mats made of bamboo. A fire was burning inside the gallery and smoke was escaping to the outside along the roof (at night only). In 1989, the author (CM) could observe heavy smoke following the roof from outside to inside of large Tingeb cave, Samar, Philippines and had to crawl on the floor back to the entrance. This means that if the quantity of smoke is not too much, it may just follow the ceiling without being a problem for people.

Perhaps, it is worth mentioning here karst caves partly invaded by Andaman Sea water and completely closed at high tide, where pirates on their boats used to hide.

4. Working in caves during a war

Many examples are available from a lot of countries. Camisards (Protestant refugees heavily chased by catholic King Louis the 14th's troops) were living in caves of Cévennes Mountains in Southern France, some of them being used as hospitals. Freedom-fighters (maquisards) also used caves as hospitals, as Grotte de la Luire, Vercors Plateau in 1944 (Fig. 5).

During WWII, a number of large caves were used to hide factories against bombing. In 1939, after a request from French Government, plane-maker Émile Dewoitine decided installing his machines in Grotte de Bédeilhac (Ariège). The cave floor was made regular but on the 22nd of June 1940, work had to be stopped because of armistice signature. In

1944, Nazis planned to install there their own plane repairing shop and continued cave preparation, including pouring concrete on the floor but they themselves had to leave suddenly, on the 15th of August. They had no other choice than abandoning the whole of their equipment.

Nazis used a number of caves for producing weapons. According to KNOLLE *et al* (2013), plane landing gears were manufactured in Heimkehle Cave, a gypsum cave in southern Harz, Germany. It had been prepared with concrete, walls of bricks and others. 650 persons worked there, with nearly 80 % of forced labour. In the same region, several 10, 000 people died while working for missile-making in Dora tunnels dug in Permian anhydrite. These authors mentioned a Nazi-made catalogue of caves of Germany and France suitable for underground activity.



Figure 5 (left): Maquis hospital in Grotte de la Luire, Vercors, France. Credit Mémorial de la Résistance de Vassieux.

Figure 6: A cave in Laos transformed into a school during Vietnam War. Unknown author. ARR.

In Normandy, Nazis organised a lot of work in Caumont underground quarries, in order to build a factory for oxygen making, to be used in V2 missiles. In July 1944, they had to leave and abandoned their unfinished work.

Near Beroun, in Czech Republic, a cave was partly filled up by Nazis with concrete mixed up with radioactive waste.

In Laos, during Vietnam War, cave use lasted more than a decade, as above stated. In 1998, near Vieng Sai, the author could see, from outside, caves still in function. Unfortunately, accessing them was not possible. In general, caves were transformed into schools (Fig. 6), hospitals (with Cuban doctors), factories, printing offices, banks, bread workshops and else. DECORNOY (1968) also mentioned medicine factories, blacksmith forges for making tools for agriculture or for cooking and spinning activity. He described an 80 m long gallery full of machines including spinning wheels and Chinese-made electric machines. Accounting people were working close to manual workers. Life at work was intimately associated with "everyday" life. During the day, workers were sleeping near their tools or machines, on a wet ground surrounded by mosquitoes. Night work was necessary to avoid smoke detection by planes. Everything necessary to life was available in the caves. Lighting was provided by kerosene lamps, even in schools.

Caves were selected as much as possible for their openings in narrow cracks. Passages could be at ground level or in cliffs. Caves for hidden activity were disseminated in many parts of Laos, especially in the north and northeast (Houa Phan, Luang Prabang, Xieng Khouang Provinces...).

Near Vieng Sai, a very large cave underneath a karst piton (Fig. 4), visited by the author in 1998, was designated for meetings and conferences, also to show propaganda movies (it was Cold War time).

5. Caves as escape ways

Caves used to escape enemy were probably previously known by local people. In Khammouane, Tham Nam Non was used once by chased people who entered it through the main sinkhole and got out of it at the resurgence. This is a more than 5 km long way and a sump is present at 3.5 km from the resurgence. The story, doubtful at first sight, has been confirmed by several persons and it is known that at the dry season, fishermen are keen on forcing the sump to go fishing with their rods in the upstream part. The story is plausible though it is not entirely proven, as we could meet with none of the persons who crossed the cave during Vietnam War. Lighting was obviously provided by long lasting torches, a Lao speciality at the time.

While being chased, people entering caves for escaping had to be sure to find their way out. Crossing through some caves that we explored in Khammouane saves kilometres and kilometres of walk and so provide a real advantage on chasers.

6. Caves as deadly traps

Hiding in caves may be tempting. However, caves are good hide-outs... until they are discovered! Then they become deadly traps if there is no way out, as examples show it.

In some caves in France, Protohistoric skeletons might originate from persons smoked inside.

In 1328, heretic Cathars attacked by Catholics were walled up in Lombrives Cave in Pyrénées Mountains.

From 1685 to 1704, catholic King Louis the 14th's troops attacked Protestant Camisards hidden in caves of Cévennes Mountains. Some cave entrances were completely walled up by these troops, without previously checking whether someone was inside or not. Protestants were closed in this way in Grotte de Carnoulès in Saint-Sébastien d'Aigrefeuille (Gard). In Grotte d'Arrénas (Euzet, Gard) wounded Camisards were massacred by king's troops and the entrance was blasted.

In 1943, freedom-fighters ("maquisards") were discovered by enemy in small Grotte des Maquisards in Corrèze and had no other choice than jumping down the cliff. On the 27th of July 1944, maquisards in Grotte de la Luire underground hospital (Fig. 5) in Vercors were attacked by enemies: many were executed or deported.

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In 1900, Americans captured Oraa Cariño, governor of Benguet Province in the Philippines, who had taken refuge in a cave now called Cariño Cave, in Talukip, Kabayan.

In Khammouane (Laos), during Vietnam War, communist troops took refuge in large Tham Xan, situated at short distance of the city of Thakhek. No back outlet exists in the cave and they were nearly all killed. This cave is located at the western outlet of a corridor through Khammouane Karst and it represented the last place before Thakhek be taken, which explains the heavy fighting.

Tham Phiu near Muang Kham in Xieng Khouang Province (Laos) is certainly a prominent case as, on the 24th of November 1968, **a rocket launched from an American plane killed 374 villagers** who had taken refuge in this cave opening in a cliff. The pilot was a Laotian who knew of the cave. Gallery walls were blasted by the shock and many huge blocks fell onto the ground. **Tham Pha Khouang**, near Nong Kiew along the Nam Ou River (further NW in Laos) was also bombed, with similar consequences.

Examples of bombed caves are plentiful. A large piece of bomb or shell was found in 1992, by the author, at the gigantic entrance to Tham En, Khammouane. See also the 20 m large bomb crater at Tham Phanang entrance (Fig. 1).

7. War graves in caves

Many caves have been used to hide murdered persons, old mine pits as well. In Dordogne, a man was put standing up, probably alive, in a narrow shallow pothole and then covered with stone rubble (one case). Even more impressive and sadder are facts published by A. Mihevc (2017), regarding Slovenia, where around 100 caves received some 12 000 people thrown into them.

8. Conclusion

Many facts and plenty of situations may and do occur in caves during wartime. This paper has shown some examples, but many more exist. They cover a wide time span, from Protohistory at least, up to Present time. There is a chronology to be set up, though we have shown here a variety of historical periods. This is contributing to the knowledge of human penetration into caves. Even though people had in these cases no scientific purpose (regarding suffix -logy), they contributed to the knowledge on caves.

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La place de la spéléologie dans les politiques sportives en France depuis les années 1980

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Résumé

La spéléologie se définit comme un sport et une science. Cette double appartenance n'est pas sans poser quelques questions dans un pays où l'État s'implique largement dans la définition et le financement des politiques sportives. La spécificité de la spéléologie ne lui permet pas de contribuer pleinement aux politiques sportives et réduit donc le soutien de l'État. Inversement, le ministère en charge des sports n'intègre pas les spécificités de chaque activité sportive et n'accompagne pas la fédération dans des pans entiers de son activité.

L'objet de cette communication est de porter une réflexion sur les synergies entre les politiques sportives de l'État et l'activité des clubs de la fédération depuis les années 1980. Simultanément, il s'agit de noter également les absences de collaboration dans les projets importants pour les spéléologues. Cette analyse aboutira à une réflexion sur l'identité de la spéléologie.

Les sources mobilisées sont issues du ministère des Sports et de la Fédération française de Spéléologie. Il s'agit notamment d'étudier les orientations prises par les élus de la fédération et les politiques successives des ministres des sports. Les résultats se centreront sur quelques sujets saillants révélateurs de la place de la spéléologie dans le monde sportif.

Abstract

The place of speleology in sports policies in France since the 1980s Caving is defined as a sport and a science. This dual membership is not without asking questions in a country where the State is heavily involved in the definition and financing of sports policies. The specificity of caving does not allow it to fully contribute to sports policies and therefore reduces State support. Conversely, the Ministry in charge of sports does not integrate the specificities of each sporting activity and does not support the federation in entire areas of its activity.

The object of this communication is to reflect on the synergies between the sports policies of the State and the activity of the clubs of the federation since the 1980s. At the same time, it is also a question of noting the absence of collaboration in important projects for speleologists. This analysis will lead to a reflection on the identity of speleology.

The sources used come from the Ministry of Sports and the French Federation of Speleology. This involves in particular studying the orientations taken by the elected representatives of the federation and the successive policies of the sports ministers. The results will focus on a few salient subjects revealing the place of caving in the world of sport.

1. Introduction

La spéléologie en France a une identité complexe. Depuis 1963, elle est organisée par la Fédération française de Spéléologie, une association rattachée au mouvement sportif (LETRONE, 2003). Simultanément, elle est reconnue comme une société savante par le Comité des Travaux Historiques et Scientifiques. Si cette identité plurielle est incarnée par les groupes de spéléologues (SCHUT, 2007), elle n'est pas sans poser des questions sur les dispositifs que la fédération peut ou doit mettre en œuvre pour développer et organiser l'activité. En effet, l'organisation du sport en France est basée depuis la Seconde Guerre mondiale sur une collaboration entre l'État et les fédérations. Un contrat permet aux organisations sportives d'obtenir des subventions en échange de leur contribution à la politique sportive. Il existe deux niveaux de reconnaissance : l'agrément et la délégation. La Fédération française de Spéléologie a obtenu ce second niveau qui lui confère deux privilèges : un monopole et la possibilité d'organiser le sport de haut niveau et décerner des titres nationaux.

Le monopole est en réalité une reconnaissance exclusive du ministère. Il n'interdit pas la formation d'une autre association concurrente mais il garantit à la Fédération

Française de Spéléologie d'être la seule soutenue et reconnue par l'État, ce qui limite considérablement le risque de subversion. Néanmoins, ce dispositif est également contraignant car la Fédération peut se trouver privée de son rôle pour l'organisation d'une activité qui lui échappe. La délégation de l'activité canyoning à la Fédération Française de la Montagne et Escalade en 1997 révèle ce type de situation, même si les échanges perdurent entre les fédérations (PERRIN & MOUNET, 2006).

En revanche, l'organisation de compétitions nationales n'a pas de sens pour la spéléologie, en dépit d'une expérimentation très ponctuelle dans les années 1980 (SCHUT, 2007) stimulée par les Jeux Pyrénéens de l'Aventure (SUCHET, 2015). La filière de haut niveau qui permet à de nombreuses fédérations d'obtenir un soutien humain et financier de l'État n'existe pas en spéléologie.

Dans ce contexte, une question revient fréquemment : la spéléologie a-t-elle sa place dans le mouvement sportif ? D'autres pays ont donné un rôle différent à leurs institutions, marquées par la production scientifique et la gestion des problématiques environnementales des grottes. L'objet de cette réflexion est de mettre en lumière les sujets

centraux pour la communauté spéléologique française ou pour les acteurs des politiques sportives et de révéler les intérêts et limites de cette situation. Simultanément, cette

lecture permet de réfléchir sur l'identité de l'activité en tenant compte de ses contraintes institutionnelles.

2. Matériel et méthode

Ce travail est basé sur une approche historique qui croise les documents et discours produits par les institutions. D'une part par la Fédération Française de Spéléologie à travers ses comptes rendus d'assemblées générales ou déclarations des présidents successifs publiées notamment dans la revue fédérale, *Spelunca*. D'autre part, la politique sportive est appréhendée par les discours, plans, programmes et

dispositifs législatifs. Ces différents corpus ont été croisés pour analyser les correspondances, écarts et contradictions sur une sélection de sujets choisis. L'analyse présentée ici ne prétend pas à une exhaustivité sur le sujet mais ouvre des réflexions à partir d'un corpus documentaire centré sur deux thématiques : la santé/les secours et l'accès/la protection des sites de pratiques.

3. Spéléologie et santé : un point de vue décalé

Les politiques sportives accordent une place importante à l'acquisition de la santé par la pratique d'activités physiques. FAVIER-AMBROSINI (2020) a montré l'émergence de cette problématique dès les années 1950 autour de la lutte contre les maladies cardio-vasculaires. Elle a pris une importance grandissante au tournant des années 2000 avec la lutte contre la sédentarité. La définition du Plan National Nutrition Santé (2000) puis du Plan Sport-Santé Bien-Être (2012) montre l'intrication des politiques sportives et sanitaires en faisant l'écho des recommandations de l'Office Mondial de la Santé qui préconise 20 minutes d'activité physique par jour. Cette dynamique conduira même à un bref regroupement des ministères : le ministère de la Santé

et des Sports en 2007. Les préoccupations de santé au sein du ministère des sports se décomposent en deux aspects : d'une part, il y a la santé de la population. Pour le grand public, l'objectif est d'inciter tous les citoyens à avoir une pratique régulière d'une activité physique pour bénéficier des effets favorables sur la santé. D'autre part, il y a la santé des sportifs et notamment des sportifs de haut niveau. Toutes les actions anti-dopage constituent le cheval de bataille du ministère qui s'engage à maintes reprises dans ce sens. En 1999, le Conseil de Prévention et de lutte contre le dopage est créé. Il devient en 2006, l'Agence Française de Lutte Anti-Dopage, une autorité publique indépendante.



Figure 1 : Affiche pour un stage du Spéléo Secours Français / Affiche de promotion de l'activité physique pour la santé.

Auprès des publics ciblés, le ministère des Sports intervient principalement dans le domaine de la prévention primaire, c'est-à-dire pour éviter la survenance d'un accident ou d'une

pathologie. Au sein de la fédération de spéléologie, la question de la santé est également importante. Il s'agit d'un sujet majeur. Une commission de la fédération est dédiée à

la question. Mais bien souvent la question de la santé en spéléologie est vue au niveau de la prévention tertiaire, à travers le secours.

Le Spéléo-Secours Français fait la fierté de la fédération. Cette commission créée en 1977 est reconnue par le ministère de l'Intérieur qui lui délègue l'organisation des secours souterrains. Les équipes du Spéléo-Secours Français sont constituées des bénévoles de la Fédération française de Spéléologie. Ce mode de fonctionnement semble obsolète dans les sports de nature. En effet, dans le domaine de l'alpinisme, l'organisation des secours était également communautaire jusqu'au milieu du XX^e siècle. Puis, les services publics (gendarmerie, compagnies républicaines de sécurité, pompiers) ont développé des compétences et des spécialités pour intervenir dans cet environnement spécifique (AGRESTI, 2018). Aujourd'hui, même s'il existe une solidarité et une entraide entre les pratiquants dans les sports de nature, il ne s'agit généralement que d'assistance à personne en danger. La spéléologie reste la seule activité

à disposer d'une convention avec les pouvoirs publics qui la conduit à mobiliser des spéléologues pour mettre en œuvre les opérations avec les services de secours (gendarmerie, compagnies républicaines de sécurité, pompiers).

Bien entendu, les spéléologues s'investissent également dans la prévention primaire, notamment à travers la formation. L'École française de Spéléologie et les bénévoles dans les clubs réalisent un travail d'envergure pour transmettre à chaque spéléologue les techniques et la maîtrise des engins nécessaires à la progression dans les cavités.

Bref, la santé est un sujet majeur en spéléologie puisque les plus importantes commissions fédérales s'y consacrent. Mais la question n'est pas posée comme elle l'est dans les politiques publiques. Elle est centrée sur l'organisation d'une pratique dans laquelle : 1. On cherche à éviter l'accident ; 2. On porte secours le plus efficacement possible à la personne blessée.

4. Accessibilité et protection des sites

L'enjeu de l'accessibilité et de la protection des sites est un élément fondamental pour la Fédération française de Spéléologie. Les présidents successifs n'ont eu de cesse de participer à ce combat qui se décline largement dans toutes les structures fédérales : comités et clubs. Le premier enjeu est l'accès aux cavités. En effet, les entrées de cavités fermées pour des questions de risques ou d'exploitation, ou encore celles situées sur des propriétés privées dont les propriétaires défendent l'accès, freinent l'exploration spéléologique. Par ailleurs, et parfois contradictoirement, les spéléologues militent également pour la protection du domaine souterrain : une protection environnementale dont Martel s'était fait le pionnier en militant contre l'abandon des carcasses d'animaux ; et une protection patrimoniale pour la préservation des vestiges (notamment les peintures pariétales) ou des concrétions qui ont un attrait certain chez les collectionneurs de minéraux.

Dans les politiques sportives, la question de la protection des sites de sports de nature s'est réellement concrétisée à travers la loi Buffet en 2000 qui apporte une modification substantielle à la loi sur le sport. Une section est dédiée à ce sujet et instaure un dispositif à l'échelle départementale. Les Commissions des Espaces Sites et Itinéraires de sports de nature (CDESI), composées de représentants des acteurs publics, du mouvement sportif, des professionnels et des associations de préservation de la nature, doivent définir un Plan des Espaces Sites et Itinéraires de sports de nature (PDESI). Ces plans doivent inventorier les sites de pratique pour garantir leur accessibilité et, dans une certaine mesure, réaliser les aménagements nécessaires. Juridiquement, ils confèrent une forme de garantie de la pérennité d'accès au site car tout projet d'aménagement qui engloberait le site devrait intégrer une solution pour pérenniser l'accès.

Ce dispositif paraît en adéquation avec la préoccupation des spéléologues. De plus, les inventaires des cavités sont nombreux pour fournir une information détaillée sur les sites, leurs localisations et leurs caractéristiques. Pourtant, la lecture de quelques PDESI révèle un usage très modeste

de ces outils. En effet, le PDESI de l'Hérault (source : <https://www.data.gouv.fr/fr/datasets/espaces-sites-et-itinéraires-de-pratiques-inscrits-au-plan-départemental-pdesi/>) n'évoque que l'aven de Genevaux concerné pour l'aménagement d'un chemin d'accès. Le PDESI de l'Ain fait bien état de 2600 à 2800 cavités mais précise d'abord que 5 % des sites présentent « un réel intérêt de pratique » (<https://www.ain.fr/content/uploads/2017/09/plan-départementalsportsdenature01.pdf>) tandis que la cartographie qui l'accompagne ne pointe que cinq « sites majeurs ».

Cet écart révèle en réalité une stratégie de gestion des sports de nature dans les politiques publiques : il s'agit de faciliter la pratique des sports de nature en facilitant l'accès à un nombre limité de sites qui seront aménagés et protégés pour cet usage. Cette problématique est la même pour les sites d'escalade ou les canyons. Le fait d'avoir d'innombrables sites dont un grand nombre sont très peu utilisés car moins attractifs, occasionnent plus de complications de gestion que de freins au développement des activités. Aussi, les politiques publiques tendent à rationaliser la gestion des sites de pratiques : il est préférable d'avoir peu de sites, bien aménagés. Ces derniers pourront être pris en charge pour d'éventuels travaux d'accès ou de stationnement pour réduire les nuisances pour les riverains. Leurs équipements pourront être vérifiés ou renouvelés pour assurer la sécurité et les secours connaîtront les sites. Bref, il faut créer les conditions d'une gestion facilitée par les pouvoirs publics qui rationalisent nécessairement les coûts.

En effet, l'octroi de la compétence pour la mise en place des PDESI et CDESI aux Conseils départementaux n'a pas été assorti de moyens financiers particuliers. L'expérience de ces collectivités pour la gestion des PDIPR (Plan Départemental des Itinéraires de Promenade et Randonnée) qui leur a été confié près de quinze ans plus tôt a révélé les limites du système. Les collectivités les plus investies ont construit un réseau de sentiers. Dans certains cas, elles ont

dû signer des conventions de transfert de responsabilités pour la traversée de terrains privés. Dans d'autres cas, elles ont évité d'initier ce type de démarche pour ne pas avoir à gérer la signature et la reconduction d'une multitude de conventions avec différents propriétaires, au détriment de la qualité des itinéraires. Les PDESI étendent la charge à un panel illimité d'activités dont les contraintes, la technicité ou la gravité des accidents est de toute autre nature tandis que la pratique est moindre. Rappelons que la randonnée pédestre est l'activité préférée des Français (CROUTTE & MÜLLER, 2018). Cette situation est inconfortable pour les collectivités qui, rationnellement, ne peuvent s'engager dans le travail à accomplir. Au mieux, elles s'engagent partiellement sur un nombre de sites restreints. Au pire, elles repoussent l'échéance. À la date du 31 décembre 2020, seuls 42 départements ont installé leur PDESI (source : <https://www.sportsdenature.gouv.fr/comprendre/observa>

toire/cdesi-pdesi), soit moins de la moitié de la France vingt ans après la promulgation de la loi.

Cette stratégie de gestion des sports de nature est ambivalente. Certes, il est possible de louer l'investissement des pouvoirs publics. Mais cette action est contradictoire avec la volonté de découverte qui anime les pratiquants. Si le PDESI crée un univers limité pour la pratique, tous les spéléologues ne s'y reconnaissent pas. L'amateur de « classiques » sera satisfait mais ce mode de gestion s'oppose à l'exploration et la recherche de nouveaux réseaux souterrains ou leur extension. Or, la découverte anime la communauté. Les récits qui en retracent les réalisations marquantes emplissent les pages des magazines comme *Spelunca* ou *Spéléo*. Sur cette question de la gestion des sites de pratique, il existe un décalage entre la position des spéléologues, du pratiquant anonyme jusqu'aux élus fédéraux, et la politique de gestion menée bon an mal an par les pouvoirs publics.

5. Une question identitaire

En comparant l'incomparable, ce texte a volontairement mis en lumière les différences fondamentales qui séparent la spéléologie du monde sportif tel qu'il est mobilisé à travers les politiques publiques. Cet argumentaire n'avait d'autre fin que de mieux valoriser les spécificités de la spéléologie et sa place atypique dans le monde sportif. D'autres activités sportives ont des questions communes avec la spéléologie ; d'autres encore revendiquent leurs propres particularités. Les spéléologues ne sont pas seuls dans cette situation. Le Ministère des sports peine à se saisir de ces différences et appliquent souvent une politique générale au mouvement sportif pris comme un ensemble. Il contribue d'ailleurs à homogénéiser ce mouvement en l'astreignant au

même cadre (statuts-types pour les fédérations, diplômes professionnels), condition *sine qua non* pour obtenir le soutien financier de l'Etat. Aujourd'hui, il existe donc un (grand) écart entre les attentes des spéléologues et les injonctions de l'Etat, toutes deux adressées à la fédération. Dans un environnement changeant : les spéléologues évoluent dans leurs compositions et leurs pratiques ; les gouvernements successifs modifient leurs orientations, il est important de se poser continuellement la question de l'identité de la spéléologie pour savoir dans quelle mesure elle pourra s'appuyer sur le monde sportif fédéral et l'Etat, et dans quelle mesure elle doit prendre à sa charge –ou avec d'autres partenaires– des problématiques spécifiques.

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Sami Karkabi & the Spéléo Club du Liban

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Abstract

Sami Karkabi, co-founder of the Spéléo Club du Liban (SCL), passed away on the 24th of March 2017 at the age of 86 years. His name is mostly associated with the Jeita cave (discovery, exploration, mapping, photography) and its development and management as one of the most visited show caves in the Middle-East, as well as the history of the Lebanese speleology. For many years he has been the mentor of many cavers and speleologists, to whom he continuously offered help and support. He spared no efforts to keep sustainable bridges between the Lebanese speleologists and the international community of speleologists, especially through the International Union of Speleology (UIS). His memory and legacy will be safeguarded by the present and future generations of the Spéléo-Club du Liban, who would have never been the same without him. This article aims to summarize the principal life milestones and achievements of Sami Karkabi.

Résumé

Sami Karkabi et le Spéléo-club du Liban. Sami karkabi, co-fondateur du Spéléo-Club du Liban (SCL) est décédé le 24 mars 2017 à l'âge de 86 ans. Son nom reste surtout associé à la découverte, à l'exploration, à la topographie et à la photographie de la grotte de Jeita, puis à son aménagement et à sa gestion comme l'une des plus grandes grottes touristiques du Proche-Orient, et plus largement à l'histoire de la spéléologie libanaise. Pendant des décennies, il a été le mentor de nombreux spéléologues et il s'est efforcé d'entretenir des liens entre les spéléologues libanais et l'Union internationale de Spéléologie. Son souvenir et son héritage seront conservés au sein du Spéléo-Club du Liban qui, sans lui, n'aurait jamais été ce qu'il est devenu. Cet article retrace les grandes étapes et réalisations de la vie de Sami Karkabi.

Introduction

Born in Haifa, Palestine, in 1931, Sami Karkabi obtained in 1952 a MPC general mathematics from the Graduate School of Mathematics of Beirut. That same year, he taught hotel accounting at the Ecole Hôtelière before working in the Lebanese Petroleum Company from 1952 to 1953.



Figure 1: Sami Karkabi at the entrance of Jeita Cave in 1953.

He started caving in 1949, and since 1951 (founding of SCL) he led many expeditions first inside the Jeita cave

where he pushed the explorations from 2500m till 6400m (Terminal Siphon) from the entrance and later on in many different areas through Lebanon. Sami was a pioneer in cave photography. He documented most of his caving expeditions and Spéléo Club du Liban activities in Lebanon and abroad.

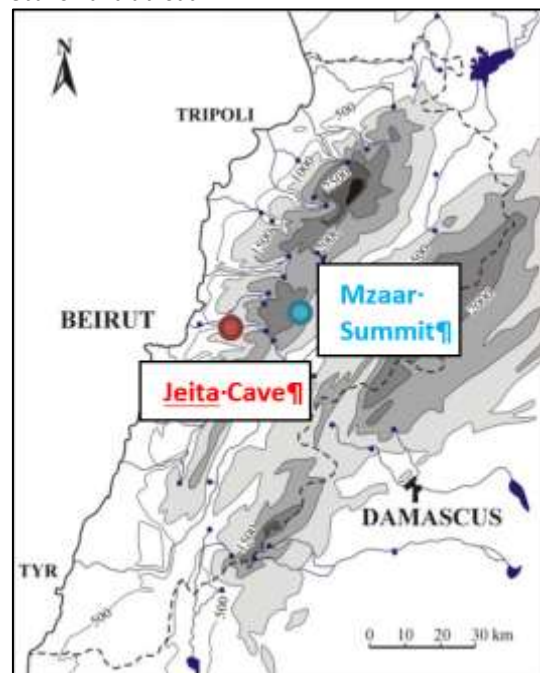


Figure 2: Map of Lebanon with Jeita Cave & Mzaar summit locations.

The Story of a caver

In 1954, Sami Karkabi travelled to France and met Robert de Joly (president of “la Société Spéléologique de France” at that time) and brought the lightweight, portable steel-cable ladder to overcome the major obstacle in Jeita cave, the famous 15m height “Falaise Karkabi” (named after him)(Fig. 4)

One year later, he became in charge of the design of the touristic part of the lower level of Jeita cave, while at the same time he was the director of the project on behalf of the Lebanese Tourism Office (Commissariat Général du Tourisme).



Figure 3: Sami Karkabi, Raymond Khawam, Albert Anavy & Farid Zoghbi at the entrance of Jeita Cave in 1953.

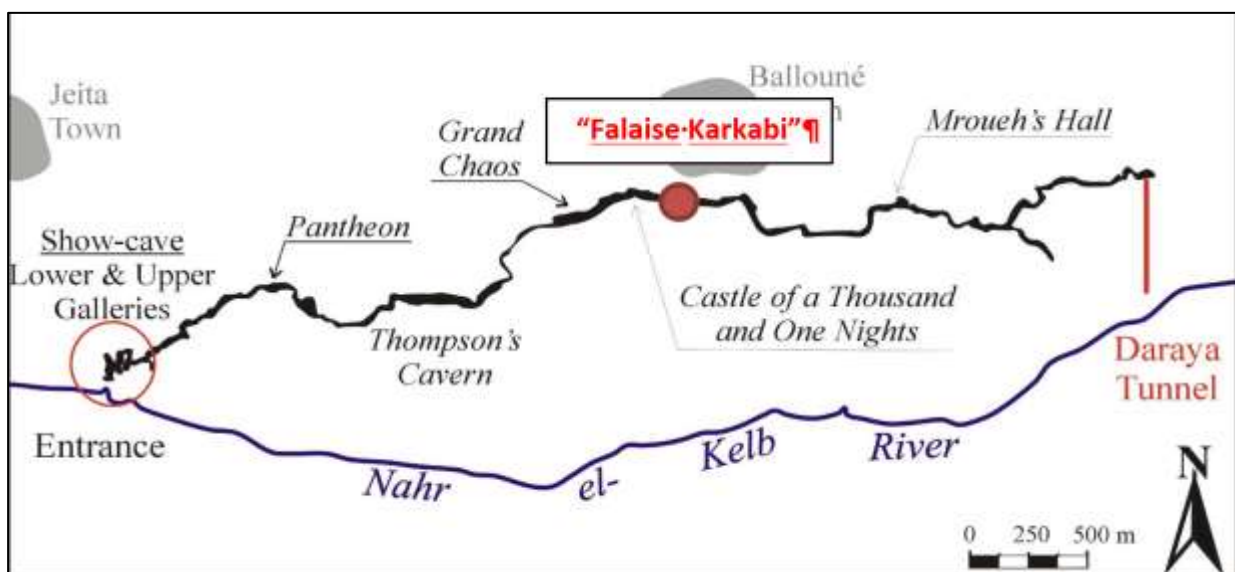


Figure 4: Jeita Cave map and the location of the famous “Falaise Karkabi

The lower part of Jeita cave was inaugurated in 1956 by the president of the Lebanese Republic, Camille Chamoun and in presence of Spéléo Club du Liban members (Fig. 5).

Passionate about speleology, he explored numerous cavities and underground karstic systems in Lebanon, as well as abroad. Thus, in 1956, he took part in the French expedition of the “Gouffre Berger” in the Vercors in France, 1st -1000m deep cave in the XXth Century. He is the first Lebanese caver to descend -1000m underground (Fig.6).

In Lebanon, together with Spéléo Club du Liban members, they discovered the Upper Galleries in Jeita Cave in 1958 which led to a new 1400m of touristic development. The new galleries were inaugurated with a musical concert by the French composer Francois Bayle in 1969 (Fig. 7).



Figure 5: Inauguration of the lower part of Jeita cave in 1956.



Figure 6: Sami Karkabi at the entrance of Gouffre Berger in 1956.



Figure 8: During the works in the Upper Galleries in 1967.



Figure 7: Inauguration Concert of the Upper Galleries by Francois Bayle in 1969.



Figure 9: Sami Karkabi at the 4th ICS at Ljubljana, Yugoslavia in 1965.

Sami Karkabi, was the editor of the SCL's speleological journal *Al-Ouat'Ouate* from 1954 till 1999. He was also an anthropologist, and carried out numerous studies in this field. As a university professor, he had organized numerous seminars on vernacular habitats in countries such as Iraq, Morocco, Algeria, Iran, Ethiopia, Turkey, Sudan, Yemen and Kenya. He also took charge of two anthropo-architectural research workshops in Lebanon, Wadi Kannoubine (the Holy Valley) and Wadi Nahr es-Salib. The first became a UNESCO world heritage site in 1998.

Sami participated in different International Speleological Congresses and Symposia from 1958 until 1999.



Figure 10: Sami Karkabi in Jeita cave- 1956.



Figure 11: Antoine Boustany, Robert Kasparian, Sami Karkabi, Emile Ghanem and Farid Zoghbi in Jeita cave 1954.

In addition, he took part of the organizing committee of the 1st and 2nd Middle East Speleology Symposium in 2001 and 2006. He was appointed honorary member of the Spéléo Club of Paris in 2004. He also had numerous scientific and other publications (books, articles).

Conclusion

This brief account presented the major life stages and some of the important accomplishments of Sami Karkabi, who was with no doubt a great building block for the Lebanese speleology and its impact on the Lebanese society and the international community of speleologists. A real cave explorer, scientist and photographer, he became a symbol of team-spirit, perfection and ethics among several generations of Lebanese cavers. For many years he has been the mentor of many cavers and speleologists. He spared no efforts to keep sustainable bridges between the Lebanese speleologists and the International community of speleologists, even during the difficult times of the Lebanese civil war. His memory and legacy will be safeguarded by the present and future generations of the Spéléo-Club du Liban, who would have never been the same without him. He is remembered every year in Lebanon, by an event that brings together the Lebanese speleologists for a walk up to Mzaar Summit (a place he liked very much and where his ashes were scattered in 2017), the Library of the Spéléo-Club du Liban (named after him), and an international photography

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Figure 12: 50 years later (2004), Georges Farra, Sami Karkabi, Farid Zoghbi, Robert Kasparian and Zahi Hakim.

Sami Karkabi has more than 25,000 cave photographs and more than 250 000 photos from his anthropological studies in different countries he visited. He started photography in 1952. He was the fourth cave photographer in Lebanon after Lionel Gorra, Zahi Hakim and Manoug. He documented the Spéléo club du Liban activities from 1952 till his last days.

Award that is given every four during the ICS event. (www.samikarkabi.com)



Figure 13: Scattering the ash of Sami on Mzaar Summit on the 9th of July 2017

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SAMI KARKABI ARCHIVE.

La grotte d'Espalungue, une grotte touristique au XIX^e siècle

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Résumé

À l'entrée de la vallée d'Ossau, entre histoire et légendes, la grotte d'Espalungue (Arudy, Pyrénées-Atlantiques) est connue depuis fort longtemps, des fouilles archéologiques ayant fait remonter son occupation jusqu'au Magdalénien.

Durant le XIX^e siècle, elle devient l'une des quatre grottes visitées par les curistes qui sont venus prendre les eaux dans les deux stations thermales de la vallée. De nombreux auteurs la décrivent et conseillent sa visite. La municipalité d'Arudy, propriétaire de la grotte, va l'affermier pendant une quarantaine d'années. L'étude d'un manuscrit qui relate la visite de la grotte en 1841, puis des actes notariés des locations, et enfin la découverte récente du cahier de comptes (de 1859 à 1867) d'un des fermiers permettent d'avoir une idée assez précise de l'organisation des visites, du nombre de visiteurs et de la rentabilité de l'affaire. À partir de 1887, la municipalité va louer la grotte à des archéologues. Les visites accompagnées se terminent, la grotte n'étant plus assez attractive.

Abstract

The Espalungue cave, a tourist cave in the 19th century. At the entrance of the Ossau Valley, between history and legends, the Espalungue cave (in Arudy, Atlantic Pyrenees) has been well-known for quite a long time and archaeological excavations have even dated its occupation back to the Magdalenian period. During the 19th century, it became one of the four caves visited by persons taking waters in one of the two spas in the valley. Many authors depict it and advise to visit it. Arudy town council, the owner of the cave, leased it for forty years. The study of a manuscript relating the visit of the cave in 1841, research on the lease notarial deeds and most of all the recent discovery of one of the farmers' accounting book (from 1859 to 1867) enable to have a quite precise idea of the organization of visits, the number of visitors and the profitability of the business. From 1887, the town council let the cave to archaeologists. Guided visits came to an end, the cave was not attractive any longer.

1. Une grotte connue depuis longtemps

Dans les textes anciens, la grotte d'Espalungue est appelée grotte d'Izeste ou grotte d'Arudy. Son vaste porche (11 m. de large, 6 m. de haut) s'ouvre au nord-est du petit pointement calcaire du Larroun. Aujourd'hui caché par des arbres, il était visible de loin et, en particulier, de la route arrivant de Pau par le col de Sévignac et descendant vers l'entrée de la vallée d'Ossau.

Les fouilles archéologiques attestent de l'occupation humaine de la grotte du Magdalénien à l'époque romaine.



Figures 1 et 2 : gravures au fond de la grotte (1665 et 1744)

Sous l'Ancien Régime, la grotte est déjà visitée. Deux dates gravées, en haut de l'éboulis terminal, le prouvent (1665 et surtout 1744, date associée aux noms Bordeu et Disse). Deux ans après avoir visité la grotte avec son cousin Jean de Brumont-Disse, le médecin philosophe Théophile de Bordeu la décrit (Bordeu 1746). Pendant près d'un siècle, son texte

sera repris par différents auteurs, dont le géologue Bernard Palassou qui en parle dans plusieurs de ses livres. Il situe même la grotte sur une carte (PALASSOU, 1781).



Figure 3 : Extrait d'une carte de Bernard PALASSOU (1781)

Palassou constate l'existence du mur qui ferme, en partie, l'entrée. Pour lui, il est naturel que la grotte serve d'asile pour les habitants des alentours pendant les périodes troublées (PALASSOU, 1815). Une autre idée avait déjà été proposée par Bordeu : « aussi, dit-on que Messieurs les Rois Maures y faisaient leur habitation ». Reprise plusieurs fois, la légende devient de plus en plus merveilleuse. « Au dire

des ossalois, une armée de Maures s’y réfugia, lorsque Charles-Martel les eut défaits près de Tours et que, sous ces voûtes, dont on ignore, assure-t-on, quelques ramifications, ils enfouirent de grands trésors » (SAMAZEUILH, 1858).

Dans la première moitié du XIX^e siècle, les curistes, de plus en plus nombreux, viennent se soigner, en prenant les eaux dans les deux stations thermales de la vallée d’Ossau. Les investissements des deux communes propriétaires (Laruns pour Les Eaux-Chaudes et Aas pour Les Eaux-Bonnes) commencent à être importants grâce aux aides du Conseil Général et de l’Etat. Les visites de personnalités facilitent ces investissements.

De nombreux récits de voyage décrivent les activités proposées aux curistes issus des classes aisées de la société française mais aussi de pays étrangers et surtout d’Angleterre. Ces activités comprennent de grandes fêtes, des promenades le long des allées construites autour des stations thermales, des randonnées vers les cascades, les sommets ou les grottes (GAUCHON, 1997).

Les grottes touristiques de la vallée d’Ossau sont au nombre de quatre. À la grotte d’Espalungue, s’ajoutent :

- La grotte des Eaux-Chaudes dont le sentier d’accès est rectifié en 1828. Mais c’est surtout à partir des années 1840, quand la commune décide de louer la grotte, que des aménagements importants vont être réalisés.

- La petite grotte Bonnacaze (en fait un pont de tuf), située dans les gorges du Valentin, aménagée en 1840.

- la grotte de l’Œil du Nééz à Rébénacq, découverte en 1853.

Les récits publiés sont assez nombreux et souvent très semblables. Nous présentons ci-dessous la visite de la grotte décrite par Armand-Gustave Houbigant. Celui-ci a rédigé un très beau manuscrit sur son voyage, réalisé en 1841, avec sa femme, accompagnée d’une amie Louise Leullier. Le manuscrit est illustré par des dessins de l’auteur, des gravures collées et même une carte sur laquelle sont situées les grottes d’Espalungue et de Bétharram. Il est déposé à la bibliothèque patrimoniale de la Communauté d’agglomération Pau-Béarn-Pyrénées et peut être consulté sur le site <https://www.pireneas.fr>

2. La visite de la grotte du 15 août 1841 par Armand-Gustave Houbigant

Avec un couple d’amis, ils partent des Eaux-Bonnes en début de matinée avec une calèche qui a été réservée la veille. La menace de pluie et même d’orage les inquiète, craignant pour les belles tenues des femmes. A 10 heures, ils arrivent à Louvie-Juzon où un repas les attend, composé de truites cuites avec trois sauces différentes, d’un fromage de chèvre passable et de pêches excellentes.

Guidés par le frère de leur hôtesse, et accompagnés par quatre femmes et un jeune homme, ils arrivent à la grotte après 45 minutes de marche et de montée. Le chemin n’est pas difficile mais ils ont dû traverser des champs de maïs et de pommes de terre "au milieu des représentations de mauvaise humeur des propriétaires qui font observer qu’il y a un chemin, par où les chevaux passent, plus long mais qui évite les cultures."

Ils admirent la voûte assez vaste et "un reste de muraille qui passe pour être d’une haute antiquité" pendant que le guide allume des chandelles et confectionne des torches avec de la paille. Les cinq personnes qui les ont accompagnés se proposent de les aider dans la progression, ce qui sera refusé tant que le sol reste assez uni. Mais, très vite, il devient "raboteux et accidenté ; on monte et on descend sur des rochers de formes peu commodes pour y placer les pieds. Quelques fois, on est dans des portions fangeuses d’où les dames auraient de la peine à sortir sans aide."

"Notre guide, dont plus tard, retourné à l’hôtel, j’ai fait un croquis, pendant qu’on attelait, allumait très souvent des poignées de paille, et il en laissait toujours un petit tas allumé – rien n’était à la fois plus beau et d’un effet plus singulier que l’aspect de ces voutes ainsi éclairées ; mille figures fantastiques se formaient, nées des portions éclairées, et de celles qui se trouvaient plongées dans l’ombre ; et aussi des colonnes de fumée qui s’élevaient de



Figure 4 : "Notre guide dont j’ai fait un croquis" (Houbigant)

toutes ces petites flammes."

"Cette grotte n’est parcourue par aucun cours d’eau. Il n’y a pas même de filtrations ou au moins elles sont rares. Il en résulte qu’il n’y a ni froid ni humidité. L’absence de filtration explique le petit nombre de stalactites suspendues aux voutes, et l’absence totale de stalagmites. Probablement aussi les couches qui composent le terrain supérieur sont-elles peu abondantes en carbonates de chaux éléments indispensables à la formation de ces ornements des grottes. – à 2 heures nous étions de retour à l’hôtel."

Le temps étant devenu froid et pluvieux, ils sont obligés de relever la capote de la calèche et d’ouvrir des parapluies pour abriter les parties non couvertes. Au retour, ils s’arrêtent dans le village de Bielle pour voir des mosaïques romaines nouvellement découvertes et seront de retour aux Eaux-Bonnes dans la soirée.

3. La mise en ferme de la grotte par la municipalité d'Arudy

Lors du conseil municipal du 5 août 1844, un adjoint expose « qu'il existe dans les communaux d'Arudy une grotte dite de l'Espalungue qui, chaque année à l'époque où les établissements thermaux de la vallée sont fréquentés par les étrangers, attire par la curiosité naturelle qu'elle présente, un nombre fort considérable de visiteurs et que l'affermage de ladite grotte produirait probablement un revenu de plus que la position financière de la commune ne permet nullement de négliger ».

Quelques mois après, le conseil municipal décide de louer la grotte, aux conditions suivantes :

1° La commune s'oblige de rendre l'accès praticable pour un voyageur à cheval.

2° La durée du bail est portée à trois ans.

3° La mise à prix annuelle est fixée à 40 francs.

4° Le tarif des droits à percevoir par le fermier est d'un franc par visiteur ; néanmoins les habitants d'Arudy auront leur entrée gratuite.

5° L'adjudicataire sera tenu de fermer à ses frais l'entrée de la grotte ; laquelle fermeture sera acquise à la commune à l'expiration du bail, et de veiller à ce qu'il ne soit fait aucune dégradation aux stalactites que la grotte renferme.

Le 8 juin 1845, après avoir reçu l'aval de la préfecture, la municipalité charge un notaire de diriger la vente aux enchères de la ferme aux conditions précédentes avec 3 compléments : la durée ne sera que de 2 ans, le fermier ne permettra jamais qu'on tire des coups de fusil dans l'intérieur de la grotte et enfin il sera tenu de faire suivre par les visiteurs le chemin qui a été pratiqué pour aboutir à la



Figure 5 : Entrée de la grotte avec le mur reconstruit, vers 1844/1845, pour faire payer les visiteurs. Photo destinée au livre d'E. Piette "Les Pyrénées pendant l'âge du Renne".

grotte, de fermer la barrière et d'entretenir la porte d'entrée. Quatre fermiers vont se succéder, mais en 1870, la guerre contre la Prusse stoppe l'arrivée des curistes en particulier des étrangers. N'ayant plus de clients, le fermier Clément Lalande demande à la mairie l'annulation de son bail. Celle-ci accepte mais ne trouve pas de locataire pour le remplacer au moins jusqu'en 1875.

À la fin du siècle, la grotte est louée à des archéologues à la condition qu'ils rebouchent les trous et qu'ils acceptent les visites des habitants et des étrangers.

Date	Fermiers locataires	loyer annuel	Durée
1845	Jean-Pierre Cazaux, Propriétaire-cultivateur d'Izeste	77 francs	2 ans
1847	Clément Lalande, Tailleur d'habits d'Arudy	71 francs	2 ans
1849	l'acte notarié n'a pas été retrouvé		9ans
1858	Sylvestre Moncla, pâtissier d'Izeste	58 francs	9 ans
21 juillet 1867	Clément Lalande, Tailleur d'habits d'Arudy	81 francs	9 ans
1870 à 1875	la grotte n'est pas louée par manque de candidat		
1875 à 1887	les actes notariés n'ont pas été retrouvés		
21 août 1887	M. Descoffre, archéologue de Châteauneuf-sur-Charente	75 francs	2 ans
12 juillet 1896	l'abbé Hourcastagné de Barzun et un archéologue landais	100 francs	

Figure 6 : Les fermiers locataires de la grotte d'après les actes notariés (Archives départementales des Pyrénées-Atlantiques)

4. Le cahier de compte de Sylvestre Moncla (1858-1867)

Le 25 juillet 1858, a lieu, dans la maison commune d'Arudy, la mise en ferme de la grotte aux enchères. La mise à prix est de 50 francs pour une année. Sylvestre Moncla, pâtissier à Izeste, propose 52 francs. Clément Lalande monte à 55. Moncla l'emporte pour 58 francs. La durée de la location est fixée à 9 ans. C'est sur un petit cahier d'écolier à couverture cartonnée bleue que le fermier va tenir ses comptes, avec d'un côté les dépenses et de l'autre, en retournant le cahier, les recettes.

Les dépenses : Elles occupent simplement deux pages. En août 1858, il règle 33,25 pour les frais d'adjudication et 50 centimes pour des affiches de publicité aux Eaux-Bonnes. En 1862, il achète une serrure à François Moncla, forgeron à Louvie-Juzon (3,50 F.). La vieille serrure doit être gardée pour remplacer la neuve à la fin du bail. En rajoutant les 522 francs de loyer pour les 9 ans, on arrive à un total de dépenses de 559 francs et 25 centimes. On ne trouve pas de trace de l'achat des moyens d'éclairage (torches, paille).

Les recettes : Sur 23 pages, le fermier note la date de la visite, le nombre de visiteurs et la recette du jour. Au 1^{er} août, il fait le total de l'année. À partir 1864, il fait payer les torches et indique cette recette supplémentaire. Cette même année, il fait payer 27 francs pour 3 jours de fouilles probablement à Felix Garrigou et Louis Martin qui vont publier, un mois après, le premier article d'archéologie sur la grotte (MARSAN, 2008).

Les visites : Comme on pouvait s'y attendre, la majorité des visites se déroule en été. Sur les 9 ans, juillet et août reçoivent 57 % des visiteurs alors que 17 % viennent entre novembre et avril.

Le prix de la visite, fixé par la mairie est de 1 franc par personne. On remarque qu'il est toujours supérieur mais très variable (entre 1,29 et 1,87 francs). Le "N'oubliez pas le guide, svp" doit déjà fonctionner, y compris pour les habitants d'Arudy qui ne devraient pas payer.

Une seule fois, il indique "mauvais payeurs" pour 5 personnes qui n'ont donné que 3 francs.



Figure 7 : Couverture du cahier de compte

En additionnant la vente des torches et les recettes des visites, on arrive à un total de 2268,90 francs pour 366 visites (soit en moyenne 40 visites par an) avec 1375 visiteurs (soit en moyenne 4 personnes par visite).

Date	Visiteurs	Recette (francs)	
12 juillet 1864	134	277.20	
22 juillet 1864	2	004.20	
23 juillet	4	07.00	
25 juillet	2	4.	
26 juillet	10	16.	
30 juillet	5	10.	
Recette de la 6 ^{ème} année Total		177 316.20	
XXXXXXXXXXXX			
Date	Torches	Visites	Recettes
1 ^{er} août 1864	4	10	16.
13 août	5	5	8.
13 août	6	1	3.
14 août	5	2	9.
17 août	4	8.	
Total		15	27 44.00

Figure 8 : Une des 23 pages des recettes

Conclusion

Quarante journées de travail par an pour un bénéfice de 190 francs annuels, ça semble correct mais sûrement pas assez pour vivre uniquement de cette activité, en particulier si le nombre d'étrangers diminue comme en 1870. À la fin du siècle, l'exploitation touristique de la grotte est terminée.

Les autres grottes touristiques de la vallée d'Ossau seront confrontées aux mêmes problèmes. Seule la grotte des Eaux-Chaudes continuera d'être affermée par la mairie de Laruns jusqu'à la première Guerre mondiale.

Remerciements

Un grand merci à Jean-Pierre Dugène pour ses recherches en archives, à Geneviève Marsan pour nous avoir fait découvrir ce cahier de comptes, à Madia et Anne-Marie Araneder, descendantes de Sylvestre Moncla pour avoir prêté ces documents familiaux, à Gérard Cazenave pour la relecture et aux archivistes de la communauté d'agglomération Pau Béarn Pyrénées.

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Research History of Guangxi Karst, Southwest China

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Abstract

Guangxi Karst has always been a highlight of China since ancient times. In ancient times, it depicted karst peaks of northern Guangxi in a map unearthed in Han Tombs of 168 BC at Mawangdui; the famous man such as LIU Zongyuan of Tang Dynasty, FAN Chengda of the Song Dynasty, WANG Zhenggong of the Song Dynasty, XU Xiake of Ming Dynasty described Guangxi karst in their works. In the recent centuries, a French team first proposed the concepts of 'tower karst' and 'cone karst' in the 1920s. Since 1970s, Dr. Marjorie Sweeting had great contribution to the study of Guilin karst. In the past 30 years, ZHU Xuwen put forward the tiankeng theory, YUAN Daoxian established the theory of "karst dynamics". After dozens of years of research, Professor Paul Williams even pointed out in 2011 that the Guilin Karst is the "diamond in the crown" of the South China Karst. The mysterious underground world of Guangxi has attracted cave explorers from all over the world since 1985. They came to Guangxi, together with local cavers, explored a large number of caves and tiankengs.

1. Introduction of Guangxi karst

Guangxi is situated in the southwest China; it is one of the most important karst regions and the most perfect humid tropical-subtropical karst regions in the world. Carbonate rocks in Guangxi covers an area of 98,700 square kilometers, accounting for 41.57% of the total area of Guangxi (LI, 1983). Guangxi is close to the ocean to the south and the land to the north. The tropic of cancer traverses the central Guangxi. It belongs to the East Asian monsoon region, with hot and humid season at the same season. Abundant precipitation played important role in developing surface rivers and underground river systems. The rivers greatly enhance the

dissolution and the transport capacity of carbonate rocks, so that many types of karst diversity are formed, including more than sixty thousands of caves, 49,642 square kilometers of cone karst and 13,118 square kilometers of tower karst, 445 underground rivers with 7,112 kilometers in total length (ZHU, 2000), 11 tiankeng groups consisting of 84 tiankeng (great collapsed doline from very large cave chamber), 6 very large cave chambers of more than one million cubic meters (ZHU, 2018), as well as many shilin, karst gorges, polje, springs, etc.



Figure 1: Location and distribution of Guangxi Karst

The perfect Guangxi karst has attracted attention of ancestors and researchers since 168. B.C. It depicted karst peaks of northern Guangxi in a map unearthed in Han Tombs of 168 BC at Mawangdui; the famous man such as LIU Zongyuan of Tang Dynasty, FAN Chengda of the Song Dynasty, WANG Zhenggong of the Song Dynasty, XU Xiake of Ming Dynasty described Guangxi karst in their works (ZHU,2009). In the recent centuries, a French team first proposed the concepts of 'tower karst' and 'cone karst' in

the 1920s (Lehmann,1926); after 1930s, Chinese scholars renewed the concepts as "fengcong" and "fenglin" (ZENG,1960). Since 1970s, Dr. Marjorie Sweeting had great contribution to the study of Guilin karst (Sweeting, 1995). Due to the well-developed karst in Guangxi, the Chinese government established the world's largest professional "Institute of Karst Geology" in Guilin, Guangxi in 1976; UNESCO also established the "International Karst Research Center" in Guilin, Guangxi in 2008.

2. Ancient research in the feudal dynasties

Research before Tang Dynasty (168 B.C. - 618 A.D.)

In December 1973, the "the topography of Changsha Kingdom in the Early Western Han Dynasty" was unearthed from Han Tomb No. 3 in Mawangdui.

The map was draw made before 168 B.C. It is made from silk, 97 cm long and 93 cm wide, about 1:180,000 of original scale, upward the south. The scope of the map is roughly 111°-112°30'E and 23°-26°N, including the northwest part of Guangxi. It shows the rivers, mountains, peaks and valleys. In particular karst peaks in Jiuyi Mountain were drawn with nine cylindrical pictures (ZHU, 2000)).

The earliest record of caves in Guangxi is ZHANG Bo (~260 A.D.) in "Wulu Geography" of the Jin Dynasty, which records: "There are caves in Shi'an and Shiyang (Guilin), and speleothems inside caves" (LI, 1973). The earliest show cave in Guangxi is the "Reading Cave" in Duxiu Peak in Guilin. It was exploited by the local leader LIU Yanzhi (384-456). The earliest "tablet inscription" of "Qixia Cave" preserved at the entrance of the Seven Star Cave in Guilin indicated it was made by the eminent monk TAN Qian (542-607).



Figure 2: Topography of Changsha Kingdom in the Early Western Han Dynasty (from Baidu.com).

Research in Tang and Song Dynasties (618 – 1279)

Since the Tang Dynasty, the description of Guangxi Karst has increased greatly. LI Jifu (758-814) in "Chronicles of Yuanhe Counties" recorded caves of Pingle County, 12 caves of Gongcheng County, two caves of Mengshan County.

LIU Zongyuan (778-819) made a field survey of the karst landforms in the suburbs of Liuzhou and authored "A Traveller's Notes on Liuzhou's Mountains and Waters",

which described pinnacles, caves, karst springs and underground rivers. In 817, LIU Zongyuan wrote in his "Zijiazhou Pavilion records" that there were lots of unique peaks in Guilin, standing straight up on the ground and distributed throughout the plain. MO Xiufu wrote "Guilin Scenery" in 899, which described Guilin's many scenic spots and explored most of the passages of the Seven Star cave passages.

FAN Chengda (1126-1193) In the Song Dynasty in his "Guihai Yuheng Zhi" discussed the tower karst and caves in Guilin, said that Guilin's caves are better than Lianzhou in Guangdong. The book records "more caves and more formations than those in Lianzhou. Looking up at the stone veins, there are thin and hollow like a bamboo tube, dripping and deposited." Later, ZHOU Qufei wrote "Lingwai Answer" in 1178, which made some supplements to "Guihai Yuheng Zhi", and had an explanation on the genesis of underground river.

Other scholars in the Song Dynasty also had a certain record of karsts, such as LIANG Shian (1136-~) recognized that the temperature in the Seven Star Cave in Guilin was constant throughout the year and the formations growth was extremely slow; LUO Dajing (1196-122) in his book of "Helin Yulu" also recorded Seven Star Cave in Guilin and Goulou cave in Rongxian County.

Research in Ming and Qing Dynasties (1368 – 1900)

The pioneer researcher on Guangxi karst in the Ming Dynasty was XU Xiake (1587-1641). It lasted 350 days for him to inspect more than 200 karst caves in more than 30 counties, and his observations on karst landforms and caves are of high scientific value in his book "Xu Xiake's Travels" (Note, the book was firstly completed in 1642) (XU, 1982; ZHU, 2009). XU Xiake had detailed description on karren, karst dolines, sinkholes, natural bridges, caves, underground rivers, karst lakes and cave formations, especially the source of underground rivers and spring water, flowing paths, relationships, and dynamic changes all have a very insightful understanding.

ZHANG Mingfeng wrote "Gui Sheng" (Guilin Sceneries) in 1613, it is the first book about Guilin scenery in history (ZHU, 2000). KUANG Lu (1604-1650) served in Guangxi and later wrote the book "Chi Ya", recorded the cave location, underground rivers in Guilin and Liuzhou.

Since the Ming and Qing Dynasties, local chronicles had been compiled in most counties of Guangxi, in which the karst areas are recorded including famous karst peaks and caves, as well as karst springs and collapses.

3. Recent Research at the early 20th century

Guangxi karst scientific research began in the 1920s. First, geologists surveyed the geological and mineral resources in Guangxi. Kegelkarst was first proposed by Handel Mazzetti and Otto Lehmann after their visit of southwestern China during 1914-1918 (Lehmann, 1926). Pierre Teilhard de Chardin and YANG Zhongjian in 1935

discussed the evolution of Guilin karst, GAO Zhenxi had further explanations on the tower karst development in 1936 (ZHU, 2000). "Karst Topography and Guilin Scenery" (1937) by Ou Yuanren and "Stone Forest in Guangxi" (1940) by ZHNG Wenyong are the most important documents at the early 20th century.

4. Modern Research after 1950

Research in the 20th century

With the founding of the People's Republic of China, a series of karst scientific investigations and works have been published, including PENG Shupeng (1957), ZENG Zhaoxuan (1960, 1961), LI Cuizhong (1961, 1962), QI Yannian (1962), etc. who published a series of papers and maps on karst and caves. Also, in 1964 the Guangxi Geological Survey compiled the "1:500,000 Cave Distribution in Guangxi". During this period, the Institute of Vertebrate Paleontology and Paleoanthropology of the Chinese Academy of Sciences carried out fossil excavation, collection, and research on 87 caves in Guangxi, and many major discoveries were made. In 1976, the Institute of Karst Geology was established in Guilin to start a comprehensive research on Guilin karst, and it published 9 books on "Guilin karst and carbonate rocks", "Guilin karst and geological structure", "Guilin Quaternary Glacial Geology", "Guilin Karst Landform and Cave Research", "Guilin Karst" (atlas), "Guilin Water Source Evaluation and Its Methods", "Guilin Environmental Engineering Geology", "Guilin Environmental Hydrogeology and Water Resources Protection Research" and "Application of Airborne Thermal Infrared Scanning in Guilin Karst Geology". In 1986, the Sino-French Cooperative Karst Hydrogeological Test Site was established in Guilin, indicating truly modern karst research on the media structure of the karst hydrological system, the regulation and storage functions of epikarst and the water volume conversion model, providing effective research methods and reliable parameters for future work.

Since 1975, the world's most famous karstologists came to Guilin to investigate karst landforms and hydrogeology, including J. N. Jennings, P. Williams, M.M. Sweeting, especially Dr. Sweeting visited Guilin and stayed in the institute for cooperative research and instructing knowledge and technology of karst and cave in the field work. Later she introduces Andy Eavis to the institute, who had coordinated 29 Chinese-British cave expeditions in China since 1985, 14 expeditions occurred in Guangxi. Except for the Chinese and British caving cooperation, there are also Chinese and French, Australia, Japanese, American, Polish, Italian cooperation in Guangxi. These activities have not only discovered cave resources and promoted the local tourism development, but also trained many local cavers and speleologists.

Research in the early 21st century

There are several marked achievements of karst research in the early 21st century. The new theories establishment of karst including the "Karst Dynamics Theory" by YUAN Daoxian and "Tiankeng Theory" by ZHU Xuewen, and the establishment of the «Key Laboratory of Karst Dynamics» and the «Guangxi Key Laboratory of Karst Plant Conservation and Restoration Ecology».

The Karst Dynamics Theory is defined as the discipline for studying structures, behaviors, functions and types of the karst dynamics system (KDS) in the world (YUAN, 2016). The KDS is the karst system of material, the energy transfer in the forms of carbon cycling, water cycling, calcium and other element cycling on the interfaces between lithosphere, atmosphere, hydrosphere and biosphere. The KDS has laid a solid foundation for the establishment of the International Research Centre on Karst (IRCK) under the auspice of UNESCO in Guilin, China.

"Tiankeng Theory" is established relying on the discovery of tiankeng groups in Leye, Guangxi, which were explored by Chinese-British cave expeditions, it is defined as "a very large doline formed from cave chamber (s) in carbonate rocks that is more than 100 m deep and wide, and/or has a volume of more than one million cubic meters, a steep profile with vertical cliffs around all or most of its perimeter and is/was connected with an underground cave river" after the tiankeng theory 10 more tiankeng groups have been discovered in Guangxi and the interdisciplinary research achievements have been made (ZHU, 2018).

The Laboratory of Karst Dynamics was established in 1997 and it was approved as the first batch of key laboratories in 2004 by the Ministry of Natural Resources (the former Ministry of Land and Resources), which plays international influences of karst research global changes, karst dynamics and water cycle, karst action and carbon cycle and karst ecological environment.

The Guangxi Key Laboratory of Karst Plant Conservation and Restoration Ecology was established in 2014, it relies on the Guangxi Institute of Botany, Chinese Academy of Sciences and mainly conducts the research on karst plant diversity and sustainable utilization of resources and the research on karst ecosystem pattern process and its ecological function.

5. Conclusion

Guangxi karst is famous for its geo-diversity and widespread area. Its records dated back to more than 2000 years. Its early research is mainly about the aesthetic value of Guangxi karst, in particular the works of Tang Dynasty, for example, the famous poet Han Yu of the Tang Dynasty once compared the Lijiang river to a green silk ribbon and the karst peaks to jade hairpins. When the modern karst theory was introduced in 1920s and Guangxi karst was known to the

world. In the recent century, the research of Guangxi karst has expanded from traditional karst geology, hydrogeology, and geomorphology to the fields of ecology, botany, landscape science, etc., and achieved remarkable results, showing that karst subjects have a vigorous development momentum

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