



40 Boletín de la Sociedad Venezolana de Espeleología

Caracas, Diciembre 2006

ISSN 0583 - 7731

EDICIÓN ESPECIAL 40 ANIVERSARIO



SOCIEDAD VENEZOLANA DE ESPELEOLOGIA 2007. PROFILE OF STRUCTURE, HISTORY, ACTIVITIES, AND EXPLORATIONS

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Recibido en diciembre de 2006

SUMMARY

This article presents the 2007 synthesis about the structure, history, activities, and explorations carried out by the Sociedad Venezolana de Espeleología (SVE) since its foundation 40 years ago. It includes summaries of Venezuela's main karst areas and caves, as well as the state of the knowledge in geospeleology, biospeleology, anthropospeleology, and notes on publications and cadastre. More information, including illustrations and the content of the latest bulletins, is available on the SVE website at www.sve-espeleologia.org.ve.

Keywords: SVE, history, research, explorations, publications.

RESUMEN

Sociedad Venezolana de Espeleología 2007. Perfil de su estructura, historia, actividades y exploraciones.

El artículo es una síntesis de información para el 2007 sobre la estructura, historia, actividades y exploraciones efectuadas por la Sociedad Venezolana de Espeleología (SVE) desde su fundación, hace 40 años. Incluye resúmenes sobre las principales zonas kársticas y cavernas de Venezuela y el conocimiento actual en geospeleología, biospeleología, antropospeleología, publicaciones y catastro. Una información más amplia, e ilustrada, junto al contenido de los últimos boletines está disponible en la página web de la SVE en www.sve-espeleologia.org.ve.

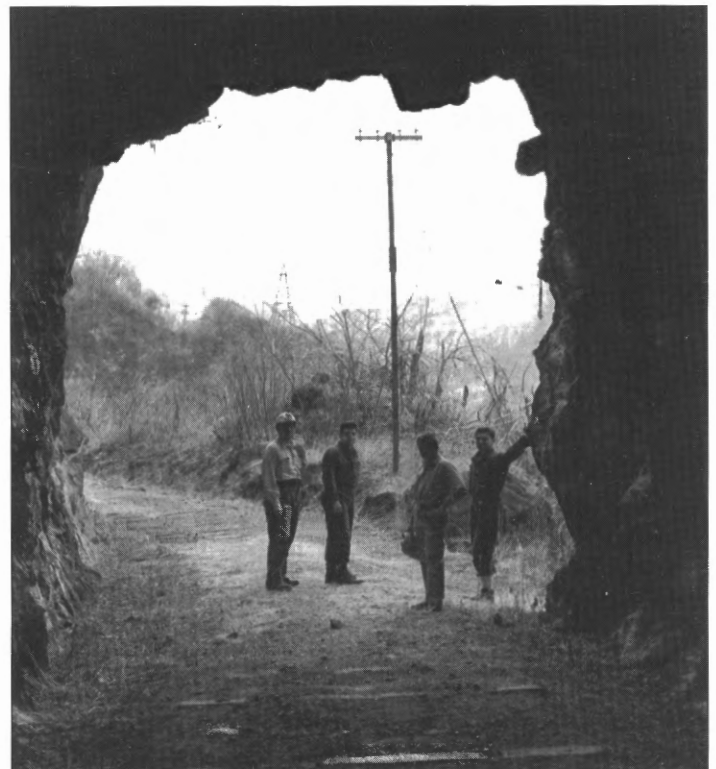
Palabras claves: SVE, historia, investigación, exploraciones, publicaciones.

INTRODUCTION

The Sociedad Venezolana de Espeleología (SVE) is the oldest speleological group in Venezuela. It was founded in 1967, although its original members had been active since 1952. The Society is a nonprofit, independent, scientific institution, whose activities depend on the work of volunteers. In its almost 40 years, the SVE has added over 580 caves to the Catastro Espeleológico de Venezuela (Speleological Cadastre of Venezuela), a registry that contains 658 surveyed caves, with location and descriptions following international standards. Moreover, it has published 39 bulletins (this one is the 40th) that survey almost 4 decades of national speleological research and exploration.

HISTORY OF THE GROUP

In Venezuela, the practice of modern and institutional speleology begins March 7, 1952, with the foundation of the Sección de Espeleología de la Sociedad Venezolana de Ciencias Naturales (SVCN). It organized many explorations, particularly to Cueva del Guácharo and to caves in the Birongo region (Miranda). Given the obstacles imposed on the functioning of the Section by the directive board of the SVCN, all of its active members decided to separate and form the Sociedad Venezolana de Espeleología (SVE) in March of 1967. The SVE has since been the main pillar of national speleology, with research and exploration carried out all over the country. Its main caving activities may be summarized thus: during the 50s and 60s in the central region of the country and in Caripe; during the 70s in the large vertical caves of the region between Caripe and Caripito, providing then the knowledge and impetus to enlarge Parque Nacional Cueva del Guácharo; the 90s in the region of Sierra de Perijá; and finally, during the present decade, numerous explorations have been carried out in Perijá, Guayana, and Falcón. The year 2007 marks the 55th anniversary of the group, with 40 years under its current name.



Members of the Sección de Espeleología in the tunnel 4 of the Central Railway (Petare-Santa Lucía sector). Early sixties.

OBJECTIVES

The main objectives of the SVE have been and continue to be: to explore new caves in Venezuela and to create topographic registries; to develop or promote research in subterranean anthropology, geology, and biology; to disseminate speleological information to specialists, students, and the general public; to offer support to speleological, academic or other national or international groups, making available scientific guidance; and to form speleologists that value teamwork and collective effort to achieve various projects in diverse specialties.

STRUCTURE AND FUNCTIONING OF THE SOCIETY

The Society is open to anyone interested in practicing speleology. The group will offer support to obtain both the knowledge and practice required for exploration through courses or field experience, aside from support to obtain required equipment or to participate in scientific activities in the various specialties.

The SVE is structured into various departments: geospeleology, biospeleology, anthropospeleology, cadastre, and publications.

The activities of the SVE consist primarily in exploration of caves in the national territory, for which it carries out rope work sessions (setup, ascent, and descent), topography, use of maps, criteria and techniques of collection, etc. Explorations, particularly those of longer duration and to more remote regions (tepuyes or table mountains, Sierra de Perijá, Mata de Mango, etc.), are most frequent during the dry season. However, during the rainy season, exploration is carried out to less distant karst regions (states of Falcón, Anzoátegui, Lara, Portuguesa, etc.). During this time, training sessions are carried out, as well as focusing efforts on the bulletin, the Society's main source of dissemination of findings and activities. The SVE has weekly meetings focused on defining

and planning exploration projects, preparing pending topographic projects, featuring lectures or slideshows, maintaining equipment, etc.

The results of speleological research are presented at the national level every two or three years in the Venezuelan Congress of Speleology. This event was last held in December 2004 in the Universidad Central de Venezuela. It featured almost 30 presentations by 10 speleological and/or academic groups.

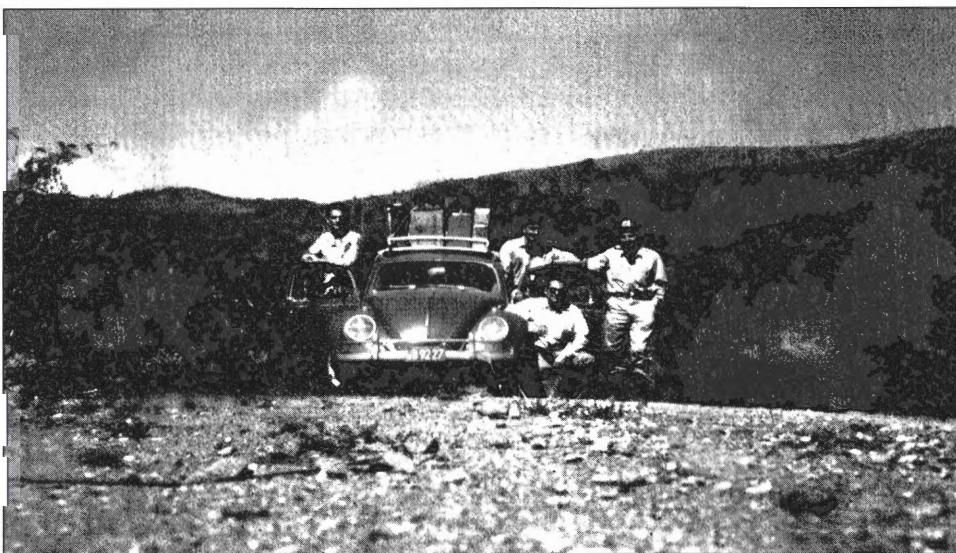
The offices of SVE are located in Av. Caurimare, Residencias Yoraco, sótano (basement) LE, in Colinas de Bello Monte, Caracas. The meetings are held every Wednesday at 7 pm. The SVE also has an electronic address, svespeleo@cantv.net, a web site www.sve-espeleologia.org.ve, and a P.O. Box address: Apartado. 47 334, Caracas 1041-A, Venezuela. To contact the SVE by telephone, dial (0212) 730 64 36 and (0212) 272 07 24 for fax.

EXPLORATIONS

One of the main objectives of the SVE is exploration, survey, scientific study, and dissemination of information of the country's caves. During the last five decades the group has added over 580 caverns to the Catastro Espeleológico de Venezuela, which today features over 650 surveyed caves.

There is much to recount on activities carried out during half a century of exploration. Following is a brief historical summary of exploration activities of three generations of speleologists.

- Exploration and topography of Cueva del Guácharo, Monagas (1967-1971). This cave remained the country's largest for 20 years.
- Exploration and topography of Cueva Alfredo Jahn (1972). It was the country's 2nd largest cave until 1990.
- Exploration and topography of Cueva Autana (1975) opened in Precambrian quartzites. This place had already been accessed by helicopter, but the SVE performed its first climbing ascent, exploration, and complete survey of the cave.
- Exploration of Sarisariñama (1976). The SVE exhaustively explored and surveyed simas (vertical caves) Mayor, Menor, and de la Lluvia (the latter discovered during the expedition). The survey of Sima de la Lluvia remained registered for decades as the largest quartzite cave in the world.
- Complete study of Cuevas del Indio in El Cafetal (1972). These studies formed the base of the creation of the Parque Recreacional El Morro de La Guairita, in El Cafetal.
- Exploration of cave Quebrada del Toro (1974-1983). This cavern and its drainage basin were also declared a national park. It consists of Venezuela's second most abundant underground river.
- Exploration and topography of Sima



Exploring in a beetle during the sixties. Left: Juan L. Gañán. Right: Raúl Alvarado Jahn and Julio Lescarbura (standing) and Eduardo Schlageter.

del Guarataro, -305 m, in Falcón (1979-1983). This vertical cave is the deepest in limestone in the country. Exploration of many other important vertical caves and large caverns in la Sierra de San Luis (haitones de La Sabanita, Sabana Grande, Coycoy de Uria, Coycoy de Acurigua, Los Arcos, Sima San Lorenzo, Cueva La Madama, Cueva Zárraga, etc.)

- Exploration and topography of many vertical caves in the region of Mata de Mango (1978-1988). The discovery of important guácharo colonies in this region determined its inclusion inside the Parque Nacional Cueva del Guácharo in order to protect the peculiar bird.

- Discovery and exploration of caves in tepuys (1981-1994). Dozens of expeditions were carried out to the tepuys located in the basin del Caroní – Paragua (Auyan-tepui, Guaiquinima, Chimantá, Marutaní, Aguapira, Kukenán, Roraima, Ilú, Tramen, etc.), aside from other caverns in the Gran Sabana, the Caura region and Cerro Autana, in particular the exploration of the Aonda system, the deepest vertical cave in Venezuela, with -383 m in depth.

- Discovery and exploration of the Cueva El Samán, Zulia (1990-1994). It resulted in the country's major cave system. With 18.2 km, it surpassed the extension of the famous Cueva del Guácharo.

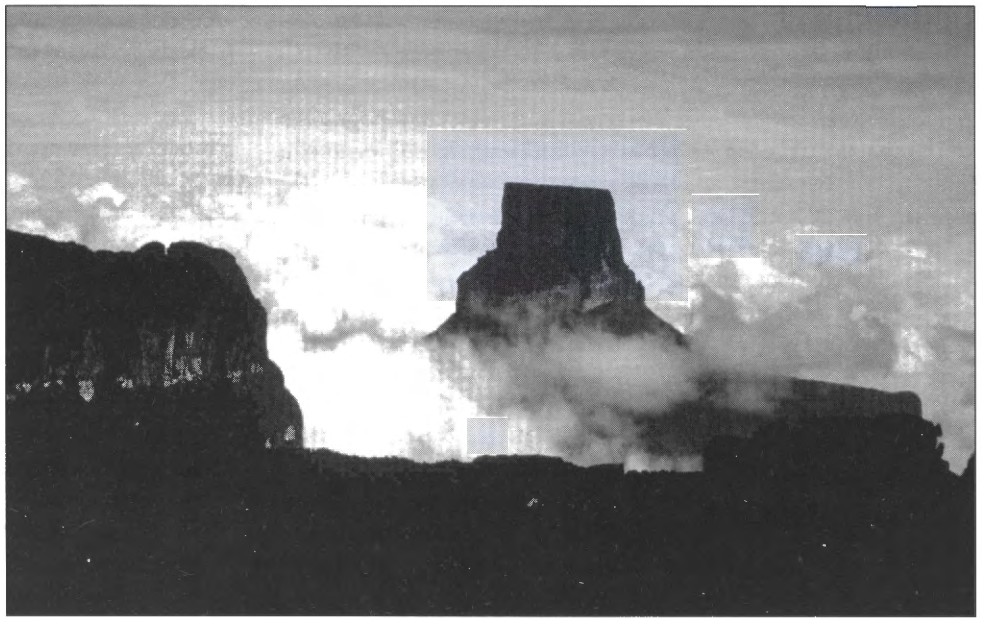
- Expedition to Mesa Turik (1991), Sierra de Perijá, Zulia. Discovery and exploration of an important group of large caverns. In past years, expeditions by helicopter had taken place to Cerro Pintado and to the upper basin of Guasare, and to the foot of the Bajo Guasare, Oro River region, Machiques, and the Socuy basin, with the discovery of large caves and subterranean systems. Caves F. Zea, Los Verdes, Sistema Mara, Inhská Troá, Orro, Toromo, Los Laureles, Los Encantos, La Carlótica, La Cristalina, etc.

- Exploration and topography of the Sistema Roraima Sur, Bolívar (2003-2005). This is currently the largest quartzite cave in the world and the second largest in Venezuela, with 10.8 km surveyed. The cave comprised two subsystems interconnected by a very narrow passage.

Cueva El Samán, the largest in Venezuela

With its 18.2 km of the galleries, Cueva el Samán is the largest cavern in Venezuela. It is located in the Sierra de Perijá, Zulia, where until now an additional 90 caverns previously unknown to science have been reported.

Cueva el Samán was discovered and explored for the first time by SVE speleologists in 1990. In 1992, the sum of explored galleries of this cave surpassed the 10.2 km of the famous Cueva del Guácharo of Monagas. The work underground took over 4 years, spread across 7 expeditions, and resulted in the cave's length of



View of Tramen-tepuy, eastern Gran Sabana, from Ilu-tepuy. Two caves were surveyed on top of Tramen during April, 1989.

18.2 km. This effort was the result of volunteers who worked during periods of vacation. Its map has been published in the Catastro Espeleológico de Venezuela with the code Zu.30.

The course of the cave is primarily horizontal, although quite rugged, and some areas exhibit overlapping levels and internal shafts. Its development sometimes occurs through ample galleries, while elsewhere it exhibits complex labyrinths. The cave's imposing Boca Sur (southern entrance) is 80 m wide and 28 m high. One of the obstacles that the speleologists had to overcome was the numerous siphons or flooded conduits. The cavern also contains areas with large pits and pools that require swimming to cross. It is worth noting that the subterranean drainage is one of the risks that this cave poses to explorers, since during the rainy season the main entrance remains submerged during the floods of the important río Socuy basin.

The cavern has great ecological relevance since it serves as refuge to a large colony of guácharos (*Steatornis caripensis*). This bird is very important to the botanical diversity of the mountain range, since it is a frugivorous animal that contributes with the spread of various plant species. In the future some of the caves in the region could be threatened by numerous mining projects that are being promoted in this mountain range and by deforestation.

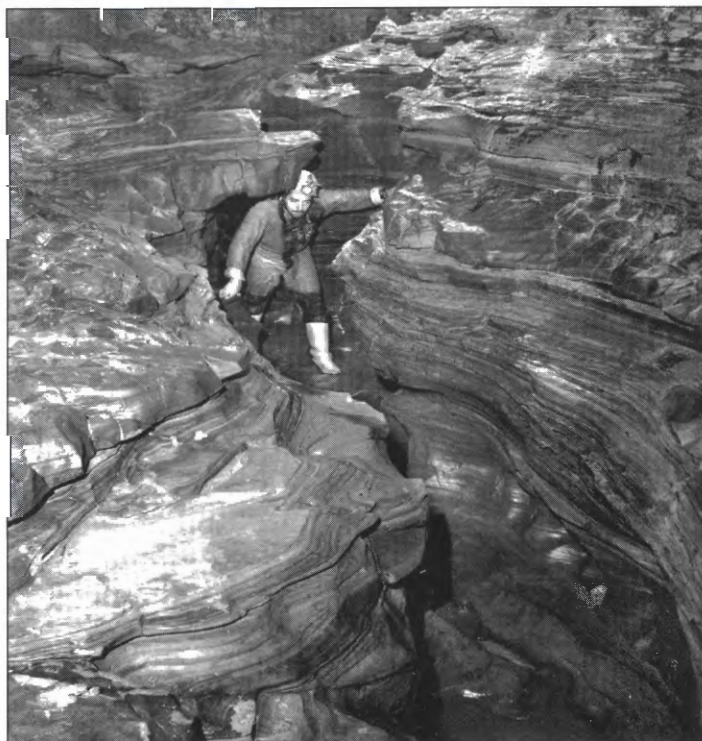
This speleological patrimony deserves its preservation for future generations. This Venezuelan marvel still requires much study. Moreover, it is important to note that very few people know about the existence of this gigantic cavern, given its remote location near the border with Colombia.

Sistema Roraima Sur

The cavern consists of 11.2 km of galleries, of which 10,820 m have been surveyed in detail. The exploration and survey of the

Sistema Roraima Sur (SRS) took four explorations between 2003 and 2005. The system's upper entrance was known since 1994 and several parts of the system had been partially explored. A group of Slovak and Czech explorers carried out a revision of one of the sectors of the cave. However, it was the systematic work of the Sociedad Venezolana de Espeleología (with the support during two trips of the Sociedad de Ciencias de Aranzadi, Spain, and the Oxford University Caving Club (England) that resulted the record length among caves formed in quartzite.

The study area that contains the Sistema Roraima Sur is located in the southern center of the top of Roraima (Bolívar), relatively close to the wall or escarpment of the plateau. The Roraima tepuy is 2,810 m above sea level, and the triple frontier Venezuela – Brasil – Guyana is located in its center. The summit, with an area of 15 by 10 km, is characterized by a relatively flat topography between 2,700 and 2,800 m of altitude, but it is intricately detailed. Next to areas of soft relief are others that are deeply fissured and contain fissures that follow the structural patterns of fractures. It too contains small plateaus or buttes that reach a height of 50 m above the surrounding flat areas. The southern part of the plateau, completely within Venezuelan territory, drains towards the río Caroní basin, tributary of the Orinoco. Precisely above the southern border the plateau reaches its greatest elevation. This border presents a central edge that is very compact, the region that contains the cave, while towards the east and west the border is intensely fractured with cracks and canyons with depths of hundreds of meters, as can be seen in the external walls.



River passage in Roraima Sur System, the longest cave of the world in quartzites, with 11 km.

The complexity of the network of galleries next to the presence of various drainage micro-basins have led to the use of the term "System" to refer to the group of interconnected passages.

One of the particular characteristics of SRS is the presence of very narrow galleries or very low ceilings, some temporarily flooded, that allows the connection of some sectors of the cave with others. These narrow galleries are characteristic in what is called Subsystem 1, given that it is across them that the main galleries interconnect. Subsystem 1 connects to Subsystem 2 that in turn contains several shafts of -30 m and several openings along the wall of the exterior of the tepuy 70 m below the summit. The subsystems defy simple description given their maze-like network of galleries. It could be generalized that in Subsystem 1, which consists of the eastern portion of the cave, N-NW drainages predominate, as well as descending galleries with a dip of 5° to 12°. Subsystem 2, located in the western portion of the system, contains water that drains primarily to the west and, in general, its galleries are characterized by a very gentle dip (< 5°). This last sector contains the most abundant subterranean river, the principal collector of the various water currents contained in the cave. The underground waters disappear in between large rocks, exiting in a series of surgences located at the base of the wall of the tepuy, 700 m below the cave and the Roraima's summit.

Additionally, the cave contains a great amount and diversity of speleothems and a unique representation of cavedwelling fauna. A large colony of guácharos was located in a canyon of great depth near the cave.

ANTHROPOSPELEOLOGY

The SVE has discovered and explored many localities containing archaeological sites and vestiges in caves, in the Mallorquines coast and Cueva la Quebrada del Toro (Falcón), Sierra de Perijá and Goajira Peninsula (Zulia), Lara and Trujillo states, central region (Cueva Crucent, in Barlovento; surroundings of Caracas, La Guairita), Macaira (Guárico state), Cueva del Guácharo (Monagas), Galeras del Cinarucò (Apure), Parguaza region (Bolívar), and streams of Atures (Amazonas).

Anthrospoleological studies have included diverse aspects of ethnographic relevance, about rites, traditions, and human activities that remain alive among the various indigenous peoples of the country. In this sense, particular attention has been given to sites that constitute (or have in the past) locations of burials and of magico-religious practices of diverse indigenous groups. Various cave sites with bone remains of different ages, have been subject to anthropological, anthropometric studies, and of radiocarbon dating.

Recent archaeological prospecting, financed by the Universidad Central de Venezuela has permitted the location of a large range of archaeological sites, including indigenous settlements, lithic workshops, missionary locations, forts, and ceremonial sites. This research has the goal of documenting later pre-Hispanic locations in the region of the Middle Orinoco, as well as studying the transformations that took place in the region as a consequence

of European contact. Among the sites of archaeological interest we have localized more than 20 caves and rock shelters that contain a great quantity and variety of rock paintings and petroglyphs related to pottery fragments, lithic instruments, and funerary remains and votive objects. The complex sequence of pictographic styles suggests that the ceremonial use of these caverns dates back to the first human settlements of the Orinoco and that such use continues among current indigenous populations. The archaeological and ethnographic information collected on the use of these caves by the local populations have expanded the knowledge of their function and significance that these places have had through time.

Speleology in artificial cavities

Underground we find not only typical caves or vertical caves enlarged by the natural processes as the water dissolves the rock. There are other cavities created by humans in different types of rock. Their ecological importance resides in the fact that they constitute new ecosystems where a diversity of living organisms find their refuge. In our country, the Sociedad Venezolana de Espeleología has explored and surveyed close to one hundred of such spaces, the majority of them of small size given breakdowns. Their current interest lies in their mineralogical, biological, or historical study. The reasons to create such underground passages are varied and range from industrial projects to efforts inspired by legends. In these cases we can appreciate how the use of minerals, the creation of water systems, train networks, or the search for so called colonial treasures have influenced folk or professional digs. In Venezuela, the most extensive underground mines are located in the region of El Callao (Bolívar), while the oldest are located in the region of Buria and Aroa (Yaracuy). Currently the exploration of tunnels is extremely dangerous given several factors such as the structural weakness of ceilings, the risk of flooding, the labyrinths, the accumulation of flammable or toxic gases, etc. For these reasons, it is not recommended to enter these places without proper guidance.

History of Venezuelan speleology

During the last two decades the SVE has carried out much bibliographic and documentary research with the goal of highlighting the history of visits, explorations, and studies of the country's caves. It is worth noting that since the first navigations to the coasts of Venezuela during the XV and the XVI centuries, coastal caves may have been sighted although we know of no writings on the subject. The first documented visit to a cave describes the entrance of Diego Ruiz de Vallejo in 1548 into a cavern located near Escuque (published in 1847). By 1666, Aragonese Capuchin missionaries had entered the region of Caripe and one of them, José de Carabantes, is



Members of the SVE in a cave used by local population for magic-religious practices. From left: Eduardo Schlageter, Juan A. Tronchoni, Juan L. Gañan and two others.

the first to publish a brief description of Cueva del Guácharo (published in 1666). In the XVIII century, aside from Cueva del Guácharo, other caverns are mentioned in the regions de Aroa, Humocaro, Quíbor, Mérida, and Margarita, as well as a few shelters located along the shores of the Orinoco River. In September 1799 takes place the famous visit by Alexander von Humboldt and Aimeé Bonpland to Cueva del Guácharo, and with the resulting publications, the extraordinary characteristics of this cave and the scientific description of the *Steatormis caripensis* become known to the world, thus making it the first species described in Venezuelan ornithology.

In the XIX century, after the wars of independence, the work of Agustín Codazzi stands out given its detailed description of the tourist sector of Cueva del Guácharo. He is followed by a notable list of European travelers, most of them German, that leave behind a great many descriptions of speleological interest, as well as documentation in paintings. Among others worth mentioning are Antón Göering, Ferdinand Bellerman, Hermann Karsten, and Wilhelm Sievers. At the end of the XIX century, the Venezuelan scientist Vicente Marcano stands out with his visit to nearly 20 caves to prospect for guano to use as fertilizer. He published with French colleagues important works on the process of nitrification of the soils and the nitrogen cycle based on the samples collected from Venezuelan caves.

During the first half of the XX century, it is mostly anthropologists that make speleological references. In this period is it worth noting the work of Wagennar von Hummelinck who surveys the Cueva del Piache, a small cave in Nueva Esparta. This map is one of the few surveys that precedes the creation of the Catastro Espeleológico de

Venezuela. In 1952 the first institution dedicated solely to speleology was created, with SVE as its continuation with a different name.

BIOSPELEOLOGY

Paleontology

There are a few registries of fossil vertebrates found in the caves of Venezuela. For the moment these represent three time periods: the Holocene, the Pleistocene, and the Miocene. This findings suggest four possible forms of origin: one due to animal predation (caves of Quebrada Honda, Los Carraos, La Brújula, Sorotamia canyon, El Guácharo); another due to accidental or natural death, distinct from acts of predators (caves of Toromo, Los Huesos, Los Murciélagos, El Guácharo); also, resulting from water currents that take with them fossils from the surface into caves; and fossils that are themselves part of the same material within which the cave develops and that become exposed due to water erosion and/or come off to become part of the sediments of the riverbeds (Cueva Zumbador, in part). Current research focuses on the systematics and paleoecology of fossil vertebrates in the karst systems of Cerro Misión, Falcón and el Guácharo, Monagas.

Ecology and Biodiversity

The cave dwelling fauna of Venezuela is notable for its biomass and diversity. There are caves in the country with both eutrophic and oligotrophic environments. The former are frequented by colonies of thousands of guácharos and chiropters. Associated with the guano and seed deposits of these caves exist interesting and very diverse communities of vertebrates and invertebrates. These types of caves contain probably the greatest values of biomass and

biodiversity in the world.

Most cave dwelling invertebrates of Venezuela are troglophilic species (until now nearly 400 distinct species have been described) and a smaller proportion consists of more than 40 troglobite and stygobitic species (strictly cave dwelling, terrestrial and aquatic), although the latter are predominant in the caves or sections of caves that are oligotrophic. Many rare taxa of arachnids (opillions, araneids, amblypygids, scorpions, acarids, hydrachnelles), crustaceans (amphipods, isopods, decapods), collembollas, coleopters (carabids and catopids), or fish (various families) are endemic and relicts, some of them of ancient origins and unique representatives of their respective taxonomic groups in the South American continent.

The cave dwelling fauna of Venezuela also contains a high degree of diversity because caves develop in various lithologies and are distributed in various geographic regions (calcite caves in the northern part of the country, quartzite caves in the tepuys of Guayana, anchialine caves in the coast of Falcón, etc.) with various climates and ecosystems (karsts covered by mountainous humid forest predominate).

Tropical subterranean environments offer the opportunity to study the colonization, differentiation, and speciation of unique and rare forms of live. Furthermore, they provide a glance into processes that occurred in the past in temperate regions. Also they are the ideal stage to locate high levels of endemism and/or new species which contribute to the knowledge of biodiversity in the planet.

Guácharos (Oilbirds)

The Guácharo (Caprimulgiformes, Steatornithidae, *Steatornis caripensis* Humboldt 1817) is the only fruit eating bird that lives preferably in caves and canyons located in humid neotropical forests, from Venezuela and Colombia to Bolivia, Brazil, and

Trinidad. The largest colonies are been reported in Venezuela, and they are found in practically all mountainous regions of the country, including the tepuys of the Venezuelan Guayana. The guácharos utilize caves as places of refuge and as site of reproduction, relying on echolocation as the mechanism of navigation within them. To feed they perform nightly flights beyond the cave to obtain the pulp of palm fruits, Lauraceae (laurel family), and Burseraceae. Generally, the guácharos build their nests in rock ledges that are preferably located in regions of the cave in complete darkness. In large galleries, and given the gregarious behavior of the bird, it may be found colonies of several thousand individuals (up to 20,000 in some caves), although it may also be found in groups of only dozens of birds.



Detail of the head of an Oilbird (*Steatornis caripensis*). This bird is quite common in Venezuelan caves with ample entrances and galleries, located in forested areas.



View of Tramen-tepuy summit, showing the entrance of a small shaft.

GEOSPELEOLOGY

SVE studies in caves developed in siliceous rocks in the Roraima Group

Venezuela enjoys the privilege of having the Guayana shield within its borders, extensive areas of quartzite rocks, part of the geological unit known as the Roraima Group, of the Precambrian (Proterozoic), located to the south of the Orinoco. This rock traditionally had been considered impermeable, which adds to the importance of the caves that have been found in the region given their almost exceptional character. SVE's first explorations to caves of this kind were: at the end of 1975, to Cueva Autana, and in 1976, to the Sarisariñama Plateau. In this last location the two first caverns of this type in the world with over a kilometer in development were studied. This work established the presence of caves of great size and with all the conditions characteristic of true karstic phenomena in this type of rock. In the decade of the 80's it is when SVE carried out the largest explorations to caves of this kind, covering virtually all of the Caroní river basin, as well as that of Paragua river in the plateaus of Guaiquinima and Aguapira. Although most of these cavities are configured as vertical caves, with large openings that allow the entry of

light to their depths, many of them are completely dark with horizontal or descending passages. To this date the system that has been most exhaustively studied is Aonda, in Auyán-tepui. It was first explored by the SVE in 1983, with several subsequent explorations until its maximum depth of -383 m was reached. This made it the deepest cavern in the country, aside from having 1,880 m of development. This system includes a surface river that after a waterfall goes completely underground. Several vertical caves achieve a level of circulating waters at depths greater than -300 m, with the water exiting the system through a cave-surgence that forms a high waterfall in the exterior wall of the tepuy. More recently the study of the Sistema Roraima Sur, that reaches a totally interconnected development of 10.8 km, makes it the largest cave of its type in the world and the second in the country, even larger than the well-known Guácharo Cave.

Venezuela was the pioneer in the study of caves of this type and because of this a number of foreign speleological groups have come to the country to carry out collaborative explorations, among them Polish, Italians, Spaniards, and English, thus contributing to the knowledge of the country's subsoil, as well as to international friendship and cooperation. Since the 80's, caves of this type have been found in Brazil, South Africa, and Zimbabwe (Africa), some of them with dimensions similar to the ones in Venezuela. However, Venezuela is the country with the greatest number of caves and surveyed development in this category.

SVE studies in caves developed in limestone rocks

Classic caves develop in limestone, including those in the karst or karst region, between Slovenia and Italy, which is the world exemplar of karst phenomena. Limestone is composed of calcium carbonate and is relatively soluble in rain water containing CO₂ that circulates in the subsoil. In Venezuela, as in the rest of the world, most caves are formed in this kind of rock, and this is the pattern that is reflected in the Catastro Espeleológico de Venezuela. Caves of this type are characterized by the presence of speleothems, typically stalactites, stalagmites, and flowstone.

Geologically, Venezuela's limestone bedrocks are predominantly of the early Cretaceous (100-120 million years ago -Ma-) corresponding to the units of the Cogollo Group in the west and to the Formación El Cantil to the east. These are followed in importance by the Querecual and La Luna karst formations, of the late Cretaceous (70 to 90 Ma), in the east and west respectively. Third follows karst of Falcón, corresponding to the Formación Capadare, dating to the mid Miocene (10 to 15 Ma), and the Formación San Luis, of the Oligocene-Early Miocene (20-30 Ma). But there are numerous caves along the territory north of the río Orinoco, mainly in the mountainous regions, in other smaller geological units.

In Venezuela calcite caves may be described in general terms as: 1) simas (vertical caves), or cavities with predominantly vertical development that predominate in Sierra de San Luis, in Falcón, and in the mountains between Caripe and Caripito, in the state of Monagas; 2) Caves with

predominantly horizontal development in almost all of the rest of the country, mostly in Sierra de Perijá (Zulia) and Birongo (Miranda).

Mineralogy

The open cavities in calcite rock developed from a dissolutional process of the calcite rock. A similar process occurs with those caves in the Roraima Group in southern Venezuela, but to a much lesser degree. Water tends to pick up chemical elements that dissolve the rock and in proper conditions these chemical compounds reach saturation levels and tend to precipitate inside of the galleries. These chemical deposits are known as speleothems. Their most common and known forms are stalactites and stalagmites.

Aside from the chemical elements derived from the same process of rock dissolution, there are those that originate from other sources such as the decomposition of guano, whether of bats or guácharos.

Since the beginning of the 60's many studies of Venezuelan speleothems have been carried out, resulting in the identification of nine new mineralogical groups: Carbonates (calcite, aragonite, azurite, dolomite, magnesite, malaquite); Halides (halite); Nitrates (nitrammite, sveite); Oxides/hydroxides (goethite, lithiophorite, maghemite, ferro-hydrate, amorphous oxide-hydroxides of Fe and Mn); Phosphates (ardealite, brucite, carbonate-apatite, carbonate-fluor-apatite, chlor-apatite, evaniste, fluor-apatite, hydroxyapatite, leucophosphite, struvite, whithlockite); Silicates (opal, calcedony, allophane, palygorskite, sepiolite); Sulfates (aluminite, amonio-jarosite, bassanite, epsomite, gypsum, hexahydrate, koktaite); Arseniates (mangano-berzelite); and Organics (pigotite).

This list places Venezuela among the countries with the greatest diversity of minerals in its caves. Among them is sveite, a mineral new to science (second new mineral for Venezuela), discovered by the SVE in Autana. Currently there are numerous samples under study, with the possibility of finding two new minerals, as well as a few others previously described but found for the first time in cave environments.

In limestone caves, calcite is the most abundant mineral in speleothems, while in caves of the Roraima Group the mineral that most predominates in speleothems are those of coralinoid forms of opal, which mostly precipitate through processes of biomineralization.

PUBLICATIONS

Bulletin of the Sociedad Venezolana de Espeleología

The *Boletín de la Sociedad Venezolana de Espeleología* is the official organ of dissemination of the Sociedad Venezolana de Espeleología. It publishes peer-reviewed articles related to

speleology, whether in Venezuela, the rest of Latin America, and occasionally, of other continents. The bulletin is open to all speleological groups, as well as individuals and researchers, whether Venezuelan or foreign. The first issue of the *Bol. Soc. Venezolana Espeleol.* dates to 1967. Since then it has been published uninterrupted during 40 years during which 40 issues have been published. On the whole, 74 articles have been published on anthropospeleology, 60 on biospeleology, and 91 on geospeleology, together with almost 700 cave's maps and descriptions as part of the Venezuelan cadastre. The printing costs of the bulletin have been covered by the Fondo Nacional de Ciencia, Tecnología e Innovación (FONACIT) since 1993.

The SVE bulletin publishes articles related to the main areas of speleological knowledge: biospeleology, geospeleology, and anthropospeleology, and a large section titled "Catastro Espeleológico de Venezuela." This last section's objective is to collect survey and descriptive information about all cavities that have been explored in detail in Venezuela by any speleological group or individual that is dedicated to the activity. Moreover, it includes a news section that features the most notable events of national and international speleology.

All of the articles are indexed in Speleological Abstracts of the International Union of Speleology. Also, the biological studies are indexed in Biological Abstracts of the Biosciences Information Service and the Zoological Record. The works of geological contents are indexed in GEOREF, the largest database of the geological sciences, in Elsevier Geoabstracts. Most recently, the content of the bulletin is noted in the Scielo platform, part of the Scielo-Venezuela Project.

Editorial Committee (2003-current). Editor: Francisco F. Herrera, Ph.D. Associate Editors: Franco Urbani, Ph.D. Miguel Ángel Perera, Ph.D. Carlos Bosque, Ph.D. Pedro Aso, Ph.D. Field Editors: Franz Scaramelli, Ph.D. (Anthropospeleology Editor). Carlos Galán, BSc. (Biospeleology Editor). Rafael Carreño, BA. (Cadastre and News Editor). Editorial Production. Composition: Joaquim Astort. Final Art: Yelitza Velásquez, Ana María Pérez, Joaquim Astort, and Francisco Herrera.

El Guácharo

During 1967, the SVE library published a newsletter (*Boletín Informativo*) with the goal of divulging a list of received publications, the contents of magazines, and some bibliographical information of general interest. In 1968 this bulletin was renamed as *El Guácharo*, and from then on becoming an informal publication with no formal publishing schedule nor review process. It has included informational works and, particularly worth noting, the reprinting of rarely known works, exploration reports, bibliographies, thus becoming an invaluable source of speleological information. Fifty five issues have been published until now. A current project involves the complete digitalization of this publication in order to divulge it in DVD format to libraries and interested parties.

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Espeleólogos en el puente colgante de acceso a la planta eléctrica del Encantado, río Guaire, en 1965. Foto: Archivo de la SVE.