

RINGO DE LAKA



OS MONTANHEIROS
SOCIEDADE DE EXPLORAÇÃO ESPELEOLÓGICA

ILHA TERCEIRA - AÇORES

BOLETIM INFORMATIVO

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"OS MONTANHEIROS"

- his story and main events

In the beginning of sixty's, in order to leave the sedentary live of the City, a team of boys and girls (families group) from "Angra do Heroísmo" decided to promote visits to the remaining island of Terceira, namely his interior, searching the adventure and the contact with Nature. Among others, we remember here Américo Luís, Jorge Silva, Rafael Azevedo, Eovaldo Moniz, Lester Andrade, Manuel Alves, Diamantino Paz ...

They were the first "Montanheiros", those who, sometime, founded a society, in the first of December of 1963, which activity, since then until 1980, had a recreative and tourist orientation.

First, his denomination was "OS MONTANHEIROS - COUNTRY ORGANIZATION OF TERCEIRA ISLAND"; after, "OS MONTANHEIROS - CULTURAL AND RECREATIVE SOCIETY", and finally, "OS MONTANHEIROS - SOCIETY OF SPELEOLOGICAL EXPLORATION", since 1967. They were located in "Rua de São João" (Saint John's St) until the earthquake of 1980, that destroyed their instalations, as happened with 75% of the buildings of "Angra do Heroísmo".

Then, in order to rebuilt the City, the Azores Government gave an important help to the citizens and the colectivities, including "OS MONTANHEIROS". A new house was built, the one that nowadays exists, in Rua da Rocha" (Rock's ST) officially inaugurated in 1986.

On the following pages, you may see a relation of several expeditions, that were made by "OS MONTANHEIROS" to the islands of the Azorean Archipelago, for some speleological studies.



In the good old days, "OS MONTANHEIROS" had really adventuresomeness. Here they are under way to explore the pit of "Madre de Deus". (Photo from 1965)

But also a recreative activity took place, as we said before, and specially organized in the last five years, as concerns to walks through Terceira island:

- 1988 - "NATURALLY NATURE" (May, 25 - September, 24)
- 1989 - "SEARCHING THE ISLAND" (April, 25 - September, 17)
- 1990 - "THE AZOR'S ROUTE" (April, 1 - October, 14). See the photos below.
- 1991 - "THE MILHAFRE'S EYE" (March, 24 - October, 5)

And, in the present year, "LIVING ISLAND", that begun in 25 of April and end in 18 of October.

In this matter, we try to have a salutar friendship and to increase a cultural richness keeping a good phisic condition.

We hope that, in the future, all this go on!



THE "OS MONTANHEIROS" AND THE SPELEOLOGICAL STUDIES IN THE AZORES (*)

By

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The "Os Montanheiros" is an amateur speleological group from Terceira (Azores), with almost 30 years of life. Although, all the nine Azorean islands were already visited and studied by them.

The earliest reference concerning the occurrence of caves in the Azores is difficult to establish. Probably the work of FOUQUE (1873), who briefly discussed lava tubes and pit caves on Terceira, Pico and Graciosa is one of the first. However, before his work, WEBSTER (1821) mentioned caves on and near Ponta Delgada (S. Miguel). Later, PICKERING (1908) gave a follow up on Fouque's exploration of the large pit Furna da Caldeira da Graciosa (= Furna do Enxofre) on Graciosa island.

The earliest speleological study recorded from the archipelago was made by FORJAZ (1963) with a fine description and sketch of "Furna de Henrique Maciel" (Pico). Unfortunately the map of the cave is not presented. Recently (May, 1990) two French speleologists (P. BRUNET and C. THOMAS) accompanied by one of us (A. SILVA) made the topography of this interesting cave (unpubl.).

In 1966, a work of the Portuguese group "Mocidade Portuguesa" - Centro de Instrução Especial de Espeleologia - describes the cave of Pau Velho (=Gruta dos Balcões) (Terceira) with an incomplete map. This map was reproduced later by HALLIDAY (1980). In 1967 the "Os Montanheiros" made a fine map of this cave, later completed by MONTSERRAT & ROMERO (1983) (see below).

MOTTET (1970, 1972, 1974) presented some data on the geomorphology of some caves from Terceira (e.g., Gruta das Agulhas, Gruta do Natal, Gruta dos Balcões), but no maps are available.

ARRUDA (1972) studied and described some caves and pits from Pico: Furna Abrigo, Furna de Henrique Maciel II, Furna de Manuel José Lima and Algar do Alto do Morais.

(*) Adapted from BORGES, SILVA & PEREIRA (in print).





During an expedition to the island São Jorge, May-25-1990 (MISSÃO S. JORGE)

Although the maps of the Algar do Alto do Morais and Furna de Manuel José Lima are probably incomplete, this author presents a fine map of Furna Abrigo.

The american speleologist W. R. HALLIDAY (see HALLIDAY, 1980 and also ANONYMOUS, 1978) visited the Azores in April 1980 and worked out the first checklist of the Azorean caves and pits (HALLIDAY, 1981). He listed the following caves and pits: Corvo (- ; -), Flores (- ; -), Faial (- ; -), Pico (2 ; 2), Graciosa (1 ; 1), S. Jorge (1 ; 2), Terceira (11 ; 2), S. Miguel (3 ; -) and S. Maria (- ; -) (see also Tab. I). In these works we can find some sketches of the caves and pits but no impressive maps were presented. Some of this sketches (e.g., Algar do Carvão, G. dos Montanheiros) were put at disposal of W. HALLIDAY by the "Os Montanheiros".

AUTHORS	N. Caves	N. Pits	TOTAL
HALLIDAY (1981)	18	7	25
OGAWA (1989)	35	7	42
BORGES <i>et al.</i> (in print)	88	24	112

Table I.- Evolution of the knowledge of the number of caves and pits from the Azores.

The first complete maps of the Azorean caves were presented by MONTSERRAT & ROMERO (1983). Three lava tubes (Balcões; Pau Velho; Natal) are described and mapped and one lava tube (Agulhas) and one pit (Algar do Carvão) from Terceira are described by this authors. More recently CHINCHON *et al.* (in press) presents further studies on "Gruta dos Balcões", now the best studied lava tube from the whole archipelago.

Recently, HAYES & BRAGA (unpub.) presented on the 5th International Symposium on Vulcanospeleology (Japan, 1988) the first checklist of caves and pits from S. Miguel.

Two Biospeleological Expeditions were carried out on the Azores directed by N.P. ASHMOLE (Edinburgh University) and P. OROMÍ (La Laguna University). This were supported by the National Geographic Society, USA : July - August 1987 and 1989 (the latter

also with the participation of one of us, P. BORGES) (see OROMÍ *et al.*, 1991; OROMÍ & BORGES, 1991; BORGES & OROMÍ, 1991).

After these international events, the "Montanheiros" made also several Biospeleological Expeditions:

-(1989). 21st - 26th May, **BIOSPEL-89**, Biospeleological Expedition to the island of Pico (Azores);

-(1989). 10th - 14th October, **FAIAL-89**, Biospeleological Expedition to the island of Faial (Azores);

-(1990). 3rd - 11th and 17th-21st March, **BIOSPEL-90**, Biospeleological Expedition to the island of Pico (Azores);

-(1990). 9th - 29th August, **BIOSPEL-90-S. MIGUEL**, Speleological Expedition to the island of S. Miguel (Azores);

-(1991). 6th - 11th June, **ARCOSPEL-91**, Speleological Expedition to the island of Pico (Azores).



Near the cave of "Pico da Cruz, in S.Miguel, during the mission BIOSPEL-90

Concerning the results obtained, several works were already published describing new species for the science (*e.g.*, OROMÍ & BORGES, 1991; BORGES & OROMÍ, 1991; EASON & ASHMOLE, in print; HOCH, in print). OROMÍ *et al.* (1991) presented the description of the biologically studied caves during the first of these expeditions (July - August 1987). Moreover, BORGES & OROMÍ (in print) give the complete data concerning the hypogean fauna found during the former expeditions in the Azorean caves and pits.

The most recent catalogue of the Azorean caves and pits was made by OGAWA (1989) (Tab. I), listing 35 caves and 7 pits.

Since then, several speleological expeditions have been made to the Azorean islands by the Terceira (Azores) speleological group the "Os Montanheiros".

For a long period of time (1963-1987) the activity of the "Os Montanheiros" had a recreative and tourist orientation, but also some speleological studies were made during several expeditions to islands of the Azores:

- (1963-1976). Several speleological visits were made to Graciosa, directed by A. LUÍS and R. AZEVEDO. The results of this visits are presented in the Tab. III;

- (1967). Speleological expedition directed by A. LUÍS to Pico. Two caves were visited (Gruta do Henrique Maciel, Furna Frei Matias);

- (1972). Speleological expedition directed by A. LUÍS to S. Jorge. As main results of this visit, several sketches were made from the lava tubes Gruta da Beira and Gruta do Leão, and the pit Bocas do Fogo. All of them were revisited and completely mapped in recent expeditions of the "Os Montanheiros" (see below, S.JORGE-88 and MONTOSO-90);

- (1975). Speleological expedition directed by A. LUÍS to Flores and Corvo. No caves were found in this islands;

- (1976). Speleological expedition directed by R. AZEVEDO to Pico. The lava tube, Gruta dos Montanheiros, was explored for the first time and an access was built;

- (1978). Speleological expedition directed by A. SILVA to S. Miguel. Several lava tubes and pits were explored (e.g., G. do Esqueleto, G. da Rua do Carvão, Algar da Batalha).



From the left to the right: José Sousa, Luis Pimentel, mr. Castro, José Maria, Fernando Pereira, Luis Vasconcelos, Aguiar Silva and the geologist doctor Faria, photographed near to "Montanheiro's Cave", in April, 2 (MISSÃO TORRES -91) in Pico island.

However, some of the works cited before (*e.g.*, MOTTET, 1974; HALLIDAY, 1980, 1981; MONTSERRAT & ROMERO, 1983; CHINCHON *et al.*, in press; OGAWA, 1989; OROMÍ *et al.*, 1991; OROMÍ & BORGES, 1991; BORGES & OROMÍ, 1991) were possible only thanks to the kind assistance of the the "Os Montanheiros" during part of the field work.

Only recently a scientific goal was adopted by the "Os Montanheiros". In the last years the "Os Montanheiros" organized or took part in several expeditions to the islands of Flores, Faial, Pico, Graciosa, S. Jorge, S. Miguel and S. Maria (and, also the local island, Terceira). They have explored and mapped over 10 000 meters of caves and 400 meters of pits. The expeditions were:

-(1988). 31st October - 11th November, **S.JORGE-88**, Speleological Expedition to the island of S. Jorge;

-(1989). 21st - 26th May, **BIOSPEL-89**, Biospeleological Expedition to the island of Pico (Azores);

-(1989). 4th - 11th July, **FLORES-89**, Zoological Expedition of the University of Azores (Dep. of Biology);

-(1989). 10th - 14th October, **FAIAL-89**, Biospeleological Expedition to the island of Faial (Azores);

-(1990). 3rd - 11th and 17th - 21st March, **BIOSPEL-90**, Biospeleological Expedition to the island of Pico (Azores);

-(1990). 8th - 16th June, **ST. MARIA-90**, Zoological Expedition of the University of Azores (Dep. of Biology);

-(1990). 9th - 29th August, **BIOSPEL-90-S. MIGUEL**, Speleological Expedition to the island of S. Miguel (Azores);

-(1990). 11th - 15th September, **MONTOSO-90**, Speleological Expedition to the island of S. Jorge;

-(1991). 28th March - 3rd April, **TORRES-91**, Speleological Expedition to the island of Pico (Azores);

-(1991). 6th - 11th June, **ARCOSPEL-91**, Speleological Expedition to the island of Pico (Azores).

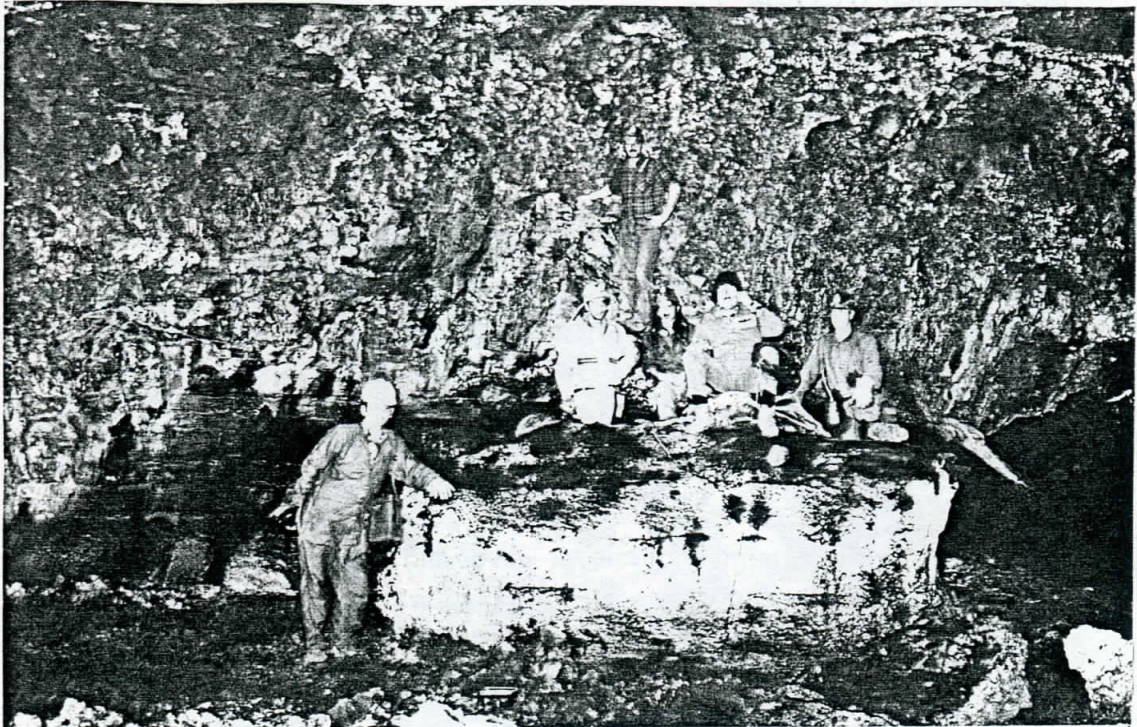
After all this work the number of known caves and pits from the Azorean islands are (see also BORGES *et al.*, in print): Corvo (1 ; -), Flores (- ; -), Faial (3 ; 1), Pico (28 ; 8), Graciosa (16 ; 1), S. Jorge (7 ; 5), Terceira (20 ; 6), S. Miguel (10 ; 3) and S. Maria (3 ; -).

As already noted by HALLIDAY (1981) the Azores are islands of unusual speleological interest. They have some remarkable volcanic chimney caves (*e.g.*, Algar do Carvão Algar do Cabeço Bravo, Algar do Tambor, Furna Ruim and Algar do Montoso) and lava tube caves (*e.g.*, Balcões, Chocolate, Queimada, Agulhas, Torres, Montanheiros, Frei Matias, Soldão and perhaps still others). Therefore all the lava tubes and pits of these islands should be protected.





Photo from June, 8 (ARCOSPEL-91, in Pico island). From the left to the right: José Maria, the biologist doctor Paulo Borges, Fernando Pereira, Jorge Silva, Luis Vasconcelos, Aguiar Silva, Luis Pimentel and Marcelina Alves. Just behind them, is located the pit of "Cabeço Bravo", explored for the first time in that day by "Os Montanheiros", considered the beginning of the Cave of Torres, because it is located about 500 meters above the entrance of that big cavity, in the same lava flow. Below, you can see the magnificence of the Cave of Torres, in comparing with the people inside it...who seems so small...!



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- III NATIONAL CONGRESS of SPELEOLOGY

- I INTERNACIONAL MEETING of VULCANOSPELEOLOGY of the
ATLANTIC ISLANDS

(Angra do Heroísmo, Terceira, Azores. 1st-4th October, 1992)

SCIENTIFIC PROGRAM

SEPTEMBER 30th, 1992

PRE-SYMPOSIUM EVENTS, TERCEIRA

- 11.00 - Reception for registrants and accompaniers in "OS MONTANHEIROS"
15.00 - Excursion A - Accompaniers - Round-the-island tour.
- Excursion AE - Registrants - Round-the-island tour, with Lava tube cave visits
(Gruta dos Balcões and Queimada).

OCTOBER 1st, 1992

- 10.00 - Reception for registrants and accompaniers in "OS MONTANHEIROS"
12.30 - Welcome Party - Reception in the CITY HALL OF ANGRA DO HEROÍSMO.
14.00 - OFFICIAL OPENING OF THE SYMPOSIUM

VULCANOSPELEOLOGY OF THE AZORES

- 14.15 - SCIENTIFIC COMMUNICATION
"GEOLOGICAL RESOURCES FROM TERCEIRA ISLAND"
Dr. Victor Hugo Forjaz
15.15 - COFFEE BREAK

- 15.30 - "The utilization of volcanic materials in the Ceramic"
R. C. Silva
- 15.50 - "Contribution for the inventory of lava caves from São Miguel Island (Azores)"
J. C. Nunes, J. P. Constâncio and T. de Braga
- 16.10 - "Vulcanospeleological bibliography from the Azores"
J. P. Constâncio and T. de Braga
- 16.20 - "Caves and Pits from the Azores Islands"
P. Borges, A. Silva and F. Pereira
- 17.10 - COFFEE BREAK
- 17.30 - "Caves and Pits from the Terceira Island"
P. Borges, F. Pereira and A. Silva
- 18.00 - "Speleology and Environmental Education: The case of Gruta do Carvão in S. Miguel"
T. de Braga and J. C. Nunes
- 21.30 - Reunion of the **Federação Portuguesa de Espeleologia**

OCTOBER 2nd, 1992

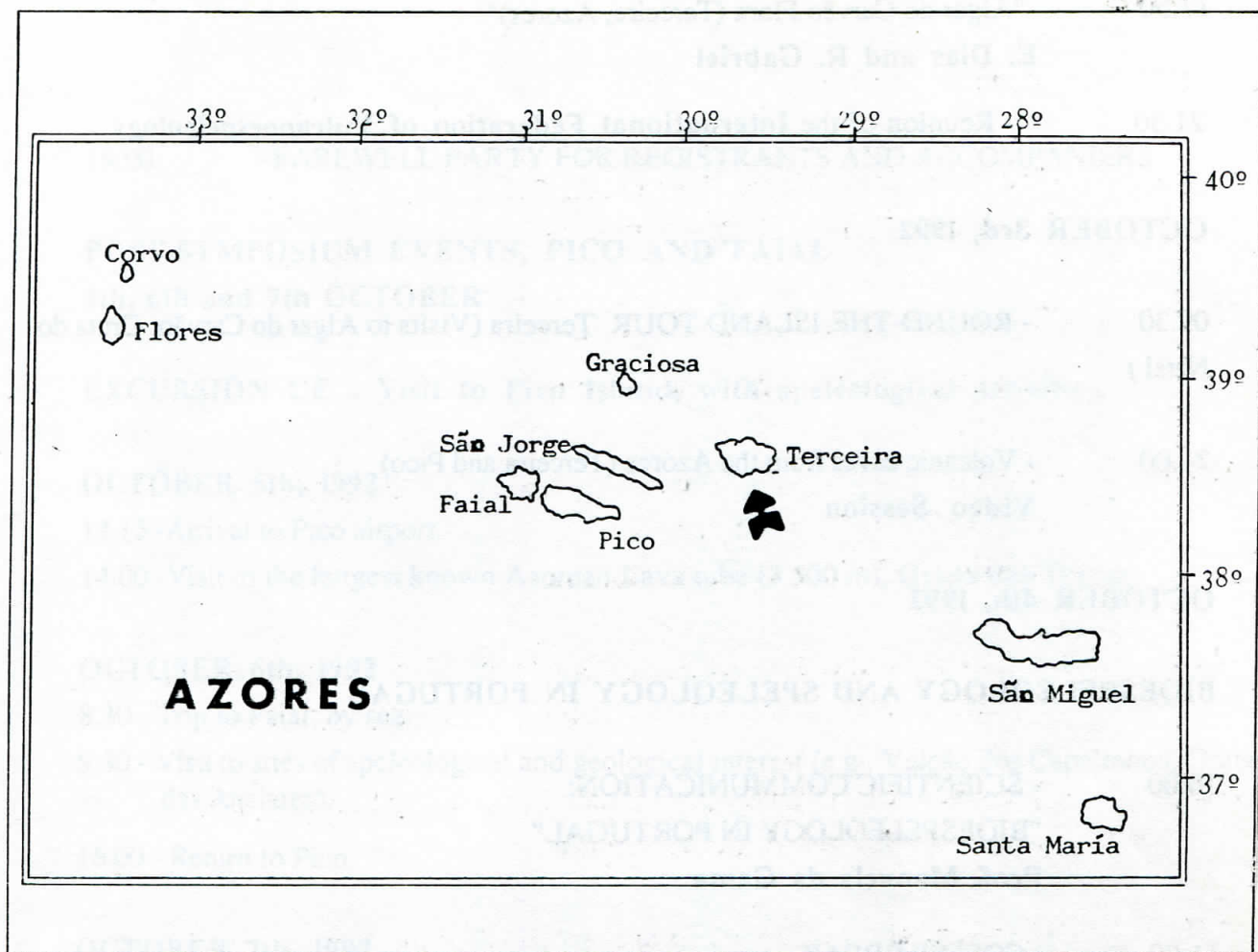
VULCANOSPELEOLOGY OF THE WORLD

- 9.30 - SCIENTIFIC COMMUNICATION:
"WORLD-WIDE PROGRESS AND PROBLEMS IN VULCANOSPELEOLOGY"
Prof. William Halliday
- 10.30 - "Cave Minerals in Volcanic Caves"
P. Forti
- 10.50 - "Software method for study geological conditioning in caves development"
F. Cucchi & F. Ulcigrai



- 11.10 - COFFEE BREAK
- 11.25 - "Structure of the Volcanic Pits from the Canary islands"
L. Lainez, F. Rijo & J. A. Bonilla
- 11.45 - "The lava tube caves from the Canary islands"
L. Lainez, F. Rijo & J. A. Bonilla
- 12.05 - "The Volcanic Pits from Domo de Montana Rajada (Las Cañadas del Teide, Tenerife, Canary Islands, Spain)"
F. Rijo, L. Lainez & J. A. Bonilla
- 12.30 Reception in the PALÁCIO DOS CAPITÃES GENERAIS by THE SECRETÁRIO REGIONAL DA ADMINISTRAÇÃO INTERNA.
- 14.30 - "The Volcanic Pits from Tingaton (Lanzarote, Canary Islands, Spain)"
F. Rijo, L. Lainez & J. A. Bonilla
- 14.50 - "Open vertical volcanic conduits and associated reflux chambers associated with xenolith beds on Hualalai volcano, Hawaii"
Prof. William Halliday
- 15.15 - COFFEE BREAK





BIOSPELEOLOGY OF THE MACARONESIA

- 15.30 -SCIENTIFIC COMMUNICATION:
"THE HYPOGEAN MACARONESIAN FAUNA"
Prof. P. Oromi
- 16.30 -"Relationship among the Hypogean fauna from Superficial Underground
Compartment (MSS) and Volcanic Caves in Canary Islands"
Ana L Medina Hernandez
- 17.00 -"The Mesocavernous Shallow Stratum (MSS) from the Azores.
P. A. V. Borges
- 17.20 - COFFEE BREAK
- 17.30 - "Liquens from Cuevas Negras (Tenerife, Canary Islands, Spain))"
J. M. Gonzalez-Mancebo



17.50 - "Algar do Carvão Flora (Terceira, Azores)"
E. Dias and R. Gabriel

21.30 - Reunion of the International Federation of Vulcanoespeleology

OCTOBER 3rd, 1992

09.30 - ROUND-THE-ISLAND TOUR Terceira (Visits to Algar do Carvão, Gruta do Natal)

21.00 - Volcanic caves from the Azores (Terceira and Pico)
Video Session

OCTOBER 4th, 1992

BIOESPELEOLOGY AND SPELEOLOGY IN PORTUGAL

10.00 - SCIENTIFIC COMMUNICATION:
"BIOESPELEOLOGY IN PORTUGAL"
Prof. Manuela da Gama

11.00 - COFFEE BREAK

11.15 - "Seasonal patterns in the Bat *Miniopterus schreibersii*"
L. Rodrigues and J. Palmeirim

11.35 - "Environmental patrimony from Serras da Adiça and Ficalho (Portugal)"
R. P. Pedro and J. J. Melo

11.55 - "Speleology and Environmental Education: - Three years of activity of the PNSAC"
M. J. C. Martins and O. M. Martins

12.15 - "Instruction of the Speleology in Portugal"
R. P. Pedro and J. J. Melo

12.35 - ADJOURNMENT OF SESSIONS

14.00 - GUIDED TOUR TO ANGRA DO HEROÍSMO, WORLD HERITAGE TOWN.
By the Head of Office for the Classified Zone of Angra do Heroísmo (WORLD HERITAGE), Dr. Maduro Dias

19.00 - FAREWELL PARTY FOR REGISTRANTS AND ACCOMPANERS

POST-SYMPOSIUM EVENTS, PICO AND FAIAL
5th, 6th and 7th OCTOBER

EXCURSION CE - Visit to Pico Island, with speleological activities.

OCTOBER 5th, 1992

12.15 - Arrival to Pico airport.

14.00 - Visit to the longest known Azorean Lava tube (3 500 m), Gruta das Torres.

OCTOBER 6th, 1992

8.30 - Trip to Faial, by sea.

9.30 - Visit to sites of speleological and geological interest (e.g., Vulcão dos Capelinhos, Gruta das Anelares).

16.00 - Return to Pico.

OCTOBER 7th, 1992

9.30 - Visit to several beautiful Lava Tubes from Pico (e.g. Furna dos Montanheiros; Furna Frei Matias, Gruta do Soldão).

OCTOBER 8th, 1992

10.40 - Trip to Terceira by air.

COMPANIONS

The organization committee is planning a special program to companions and other interested persons during the Congress days.

EXCURSION C - Visit to Pico and Faial Islands (Companions).

ORGANIZATION:

Federação Portuguesa de Espeleologia

LISBOA - PORTUGAL



OS MONTANHEIROS

SOCIEDADE DE EXPLORAÇÃO ESPELEOLÓGICA

CAVES AND PITS FROM AZORES

All the islands of the Azorean Archipelago have a volcanic origin. The geological age of the nine islands, however, is very dissimilar; once their formation took a large period of time, these islands present a recent volcanic morphology (e.g. Pico) or more eroded ancient formations (e.g. Flores and S. Maria).

Different ages have been proposed for some islands, but nevertheless, the Oriental Group is the oldest, and the Central Group is the youngest.

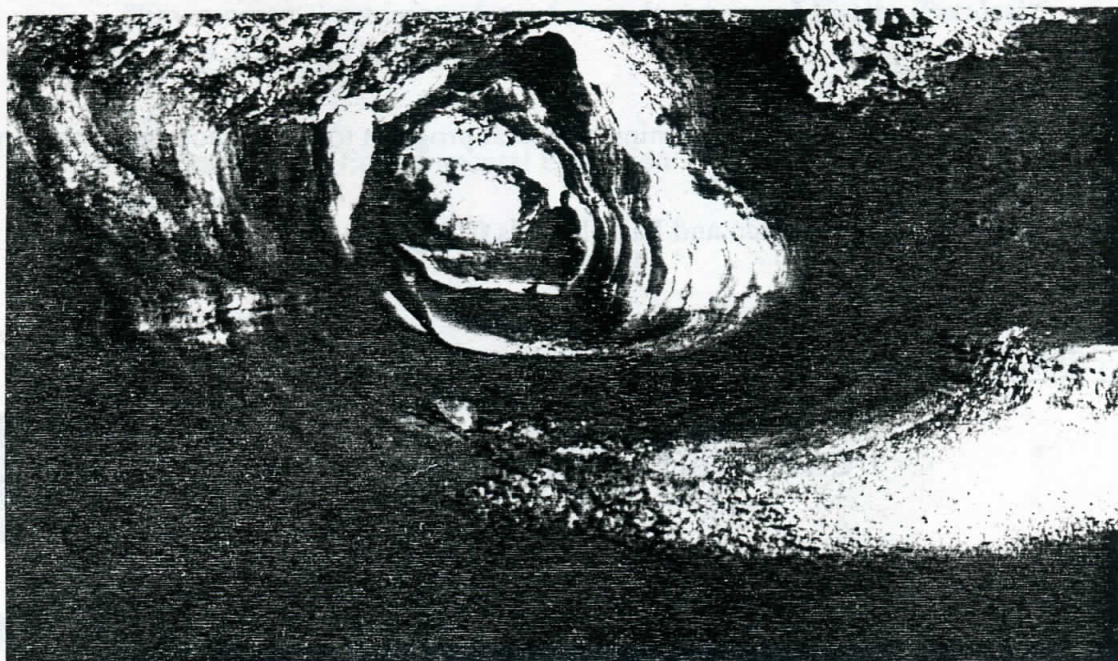
The earliest reference concerning the occurrence of caves in the Azorean Archipelago is difficult to establish. But, really, there are a lot of them. We listed, up to now, more than a hundred and twenty caves and pits, and we present here a checklist of the most important ones:

- IN PICO -

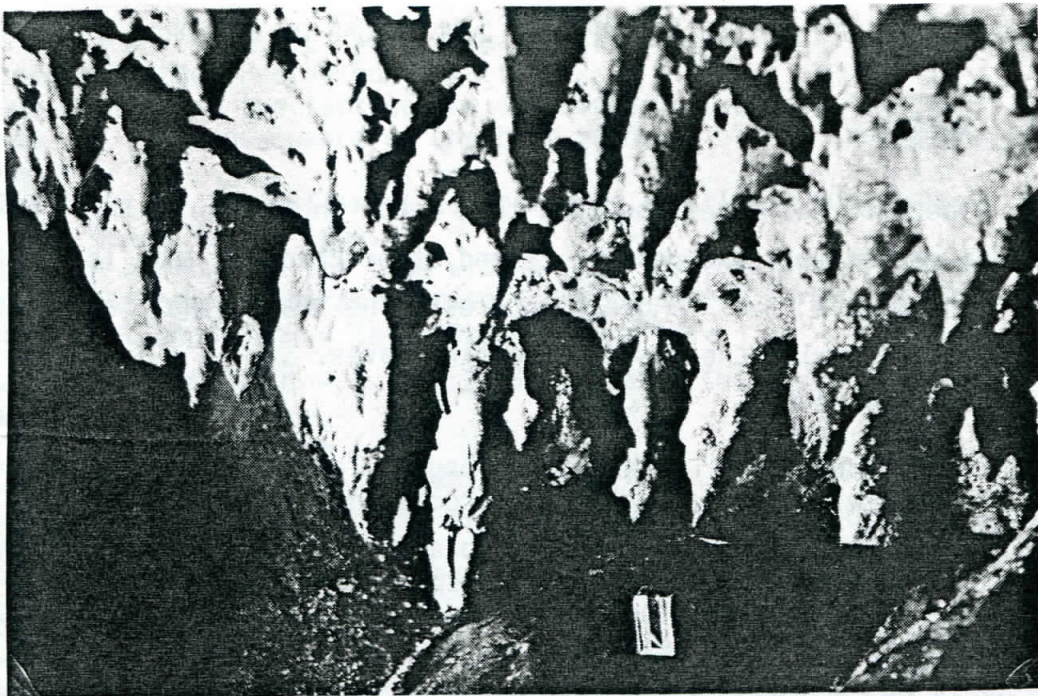
There are several historical lava flows areas with a great concentration of lava tube caves and pits, such as "Mistério de S. Luzia" (1718) and "Mistério da Silveira" (1720). Probably some of them are remain of a unique longitudinal tube.

Up to now, 28 lava tubes and 8 pits are known from PICO. Among them:

- "FURNA DO HENRIQUE MACIEL";
- "FURNA DE FREI MATIAS" (Photo below);



* Adapted from BORGES, SILVA & PEREIRA (in print), with some complementary comments.



- "FURNA DO MONTANHEIRO" (above and below photos) - a unitary "throughway" system, with remarkable formations that make it one of the most interesting lava tubes from Azores. The west part of the cave is the most interesting one, with some notable formations on the pavement, like a model lava tube at reduced scale that shows how a large lava tube can be formed;



- "GRUTA DAS TORRES" - this is now the most impressive volcanic lava tube from Azores, with a total of about 4.000 meters length. There are, at least 11 (!!) levels of drainage registered on the walls by lateral benches and 3 cornice levels. The height of 15 meters and the 11 drainage levels give an idea of the sumptuosity of this lava tube cave.

This lava tube has two entrances; one, a skylight near one extremity, the other 600 meters down a large cone formed by the allowance of the roof.

- "GRUTA DO SOLDADO" - a simple "unitary" or "throughway" type lava tube, excellently preserved;

Still in PICO, there are several pits, such as "ALGAR DA FURNA ABRIGO", "ALGAR DO CABEÇO BRAVO", "ALGAR DO CAPITÃO" and "ALGAR DO TAMBOR".

- IN TERCEIRA -

With respect to the caves and pits that occur on it, Terceira is without any doubt the second most interesting island after Pico. In this island, there are several areas with caves of great interest. The "Pau Velho" lava flow (1761) is probably the one with the most interesting caves.

Among them, we have:

- "GRUTA DOS BALCÕES" - the second longest lava tube from the Azores, with 2713 meters long, with several galleries, rooms and halls;

- "GALERIA DA QUEIMADA" - it is also a 3-dimensionally braided system. There are some unusually colorful limonite speleothems forming columns.

Near the end of the main tube there is a beautiful structure of limonite forming a "waterfall" (Photo below right).

- "GRUTA DAS AGULHAS" - the main entrance is at sea level; the pavement is type "aa" or "pahoehoe" and there are, at least, 4 levels of drainage registered on the walls by lateral benches. The cave was named "Agulhas" (= needle) because of its needle-like lava formations of vitrified silica ("opala") of about 0,2 - 0,5 cms length;

- "GRUTA DO CALDEIRA"

- "GRUTA DO NATAL"

- "FURNA DO CABRITO"

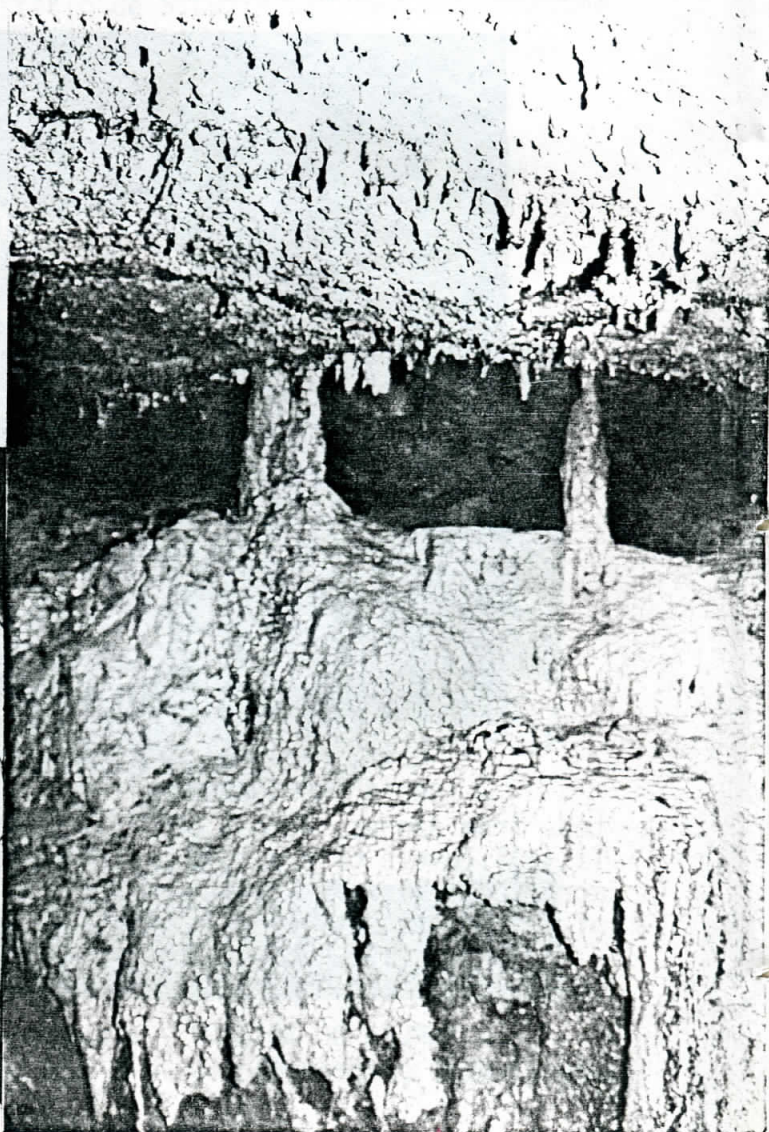
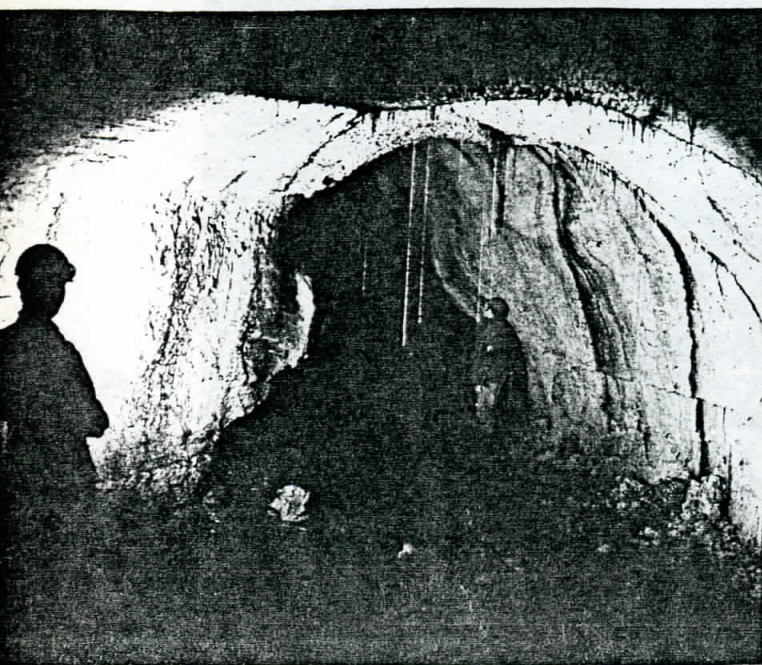
- "GRUTA DA MADRE DE DEUS"

- "GRUTA BRANCA OPALA"

- "GRUTA DAS MERCES"

- "FURNA DA AGUA"

- "GRUTA DOS PRINCIPIANTES" - the beginners' cave (Photo below);



- "GRUTA DO CHOCOLATE" - is a small (109 meters length) but beautiful lava tube located in the "Pau Velho" lava flow.

One thinks that the fact of the occurrence of three superimposed tubes in this cave, is the consequence of the bent tendency of the ground where the lava is formed.

The first of the galleries is formed by a drainage tube through a hollow in the main tube, "sink" type.

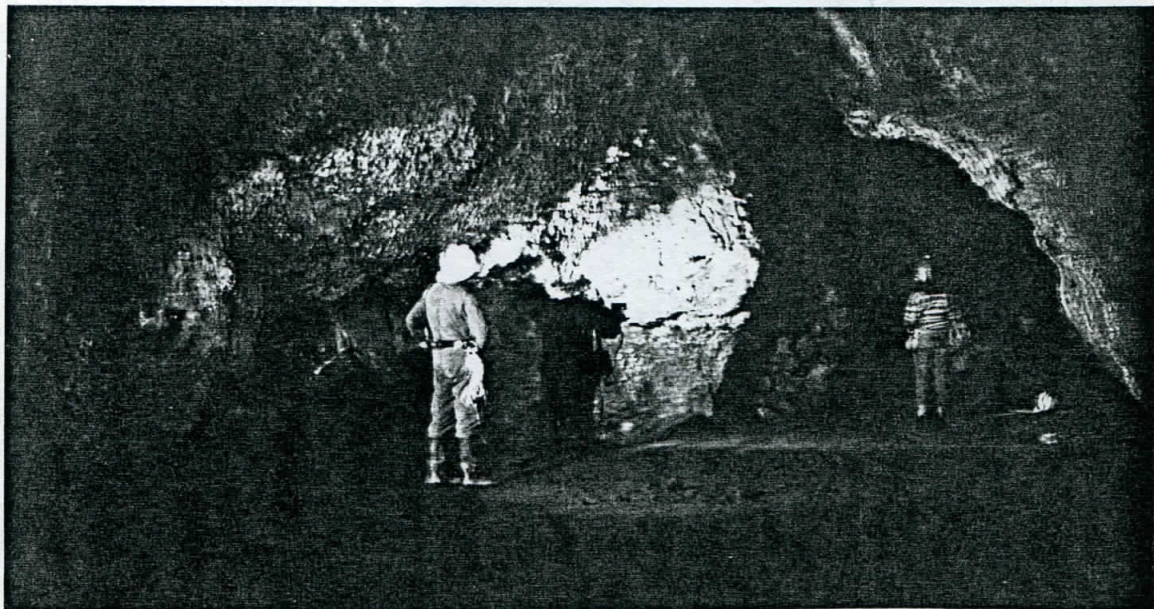
It is a narrow and low tube with an "aa" type pavement. The walls and ceiling are rich in remelting structures; there is also a formation (miniature of a lava tube) that shows how a lava tube can be arise.

- "ALGAR DO CARVAO" - a remarkable volcanic chimney, developed as show cave since 1988.

As a consequence of the constant effort of the "OS MONTANHEIROS", most of the main lava tube caves and pits from Terceira are already listed; however, this speleological group has not yet been able to find the "magnific" pit described by Fouqué (1873) (300 meters deep).

- IN S. JORGE -

There are two lava tubes and two pits of great interest in this island, not only because of their speleological structures, but also because of their unique fauna:



- "GRUTA DA BEIRA" (Photo above) - this cave is located in the volcanic complex of "Rosais", mainly in the porphyryc basalts, and has a NNW orientation flowing to SSW at the sea direction.

The entrance is a hollow in the collapsed roof of the cave. The pavement and in some extent lateral walls are covered by earth, because of the water infiltrations from the roof and the entrance.

Because of their dimensions and beauty, this lava tube should be protected.

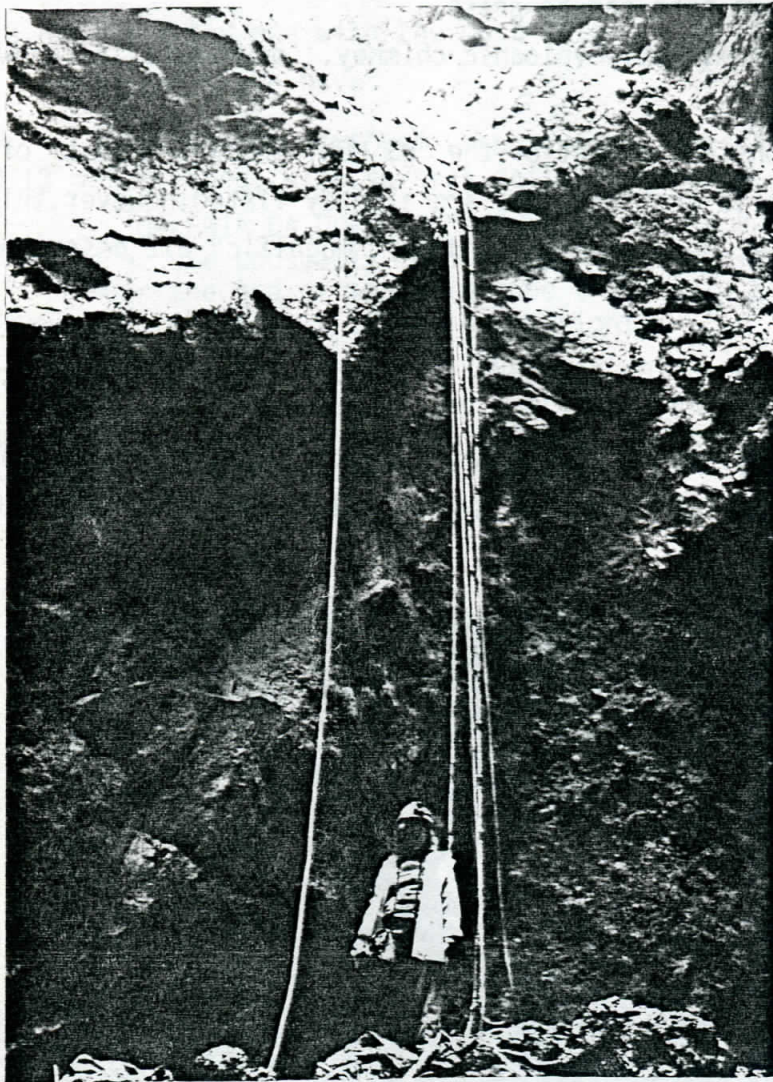
- "GRUTA DO LEÃO" - One thinks that this cave was formed by the lava flows of the eruption of 1808 ("Bocas de St Amaro").

This gallery is narrow and high with a considerable slope. Near the entrance, there are yellowish formations.

- "ALGAR DO MONTOSO" - The "Pico do Carvão", where this pit is located, is an extinct volcano, with one crater and three openings being two of them closed and the third open. This last volcanic chimney has three orifices being the "Algar do Montoso" (incorrectly named by error of toponymy; the correct name should be "Algar do Carvão").

It is the Azorean deepest pit and could be developed as a show cave like "Algar do Carvão" (Terceira)

- "BOCAS DE SANTO AMARO" (Photo below) - It is a volcanic crater in which the chimney has 3 openings which lead to a chamber with 30 x 50 meters.



Due to the materials addu-
mulated under the lateral o-
penings the pavement has a V
form section.

The best access is the lar-
ger opening with an unlevel-
ling of 40 meters.

The 1808's eruption of St.
Amaro originated two openings
with two lava flows.

A small cone of volcanic
materials is present under
the central opening.

The two lateral ramps have
30 and 20 meters length with
an unlevelling of 15 and 10
meters.

On the walls of the south
part of the crater there are
some deposits of white gypsum.

Also named "Algar das Bo-
cas do Fogo", this pit was
mapped during the recent ex-
pedition of the "OS MONTA-
NHEIROS", - S.JORGE-88.

During the Biospelaological
Expedition directed by OROMI
and ASHMOLE (1989), a new spe-
cies of troglobitic ground be-
etle was found and described
later, *Trechus jorgensis* Oromi &
Borges. Unfortunately, only
a female is known.

- IN GRACIOSA - In this island occurs the most important and magnificent ca-
vity of the Azorean Archipelago, "the unique of its kind in the all world", as
said, sometime, the oceanographer Prince of Monaco, when he did visit this cavern.

It has a large lake at the bottom and "solfataras", and is named "FURNA DO
ENXOFRE". Here, in the past month of August, two people were victims of the es-
cape of a dead gas.

It exists too another important cave, the "FURNA DE JOÃO MORENO", at the o-
ther side of the island; however, this cave was closed by the population in the
beginning of nineteenth century, with rocks and soil, so deeply that has been
difficult to open it, in spite of the effort of the "OS MONTANHEIROS" Luis Vas-
concelos, José Maria, João Silva and Luis Pimentel, those who tryed, in July of

1991, to do it, during the expedition "ALVO-MORENO-91". With the some target, another mission was listed for the present year, but, unfortunately, it did not took place, and the cave of "Bom Jesus" will remain closed.

- IN FAIAL -

Faial has a small and not impressive lava tubes, but with striking endemic hypogean arthropods on it:

- "GRUTA DAS ANELARES" (Photos below) - this is a small lava tube, with only one entrance, a skylight situated 3,40 meters above the ground.

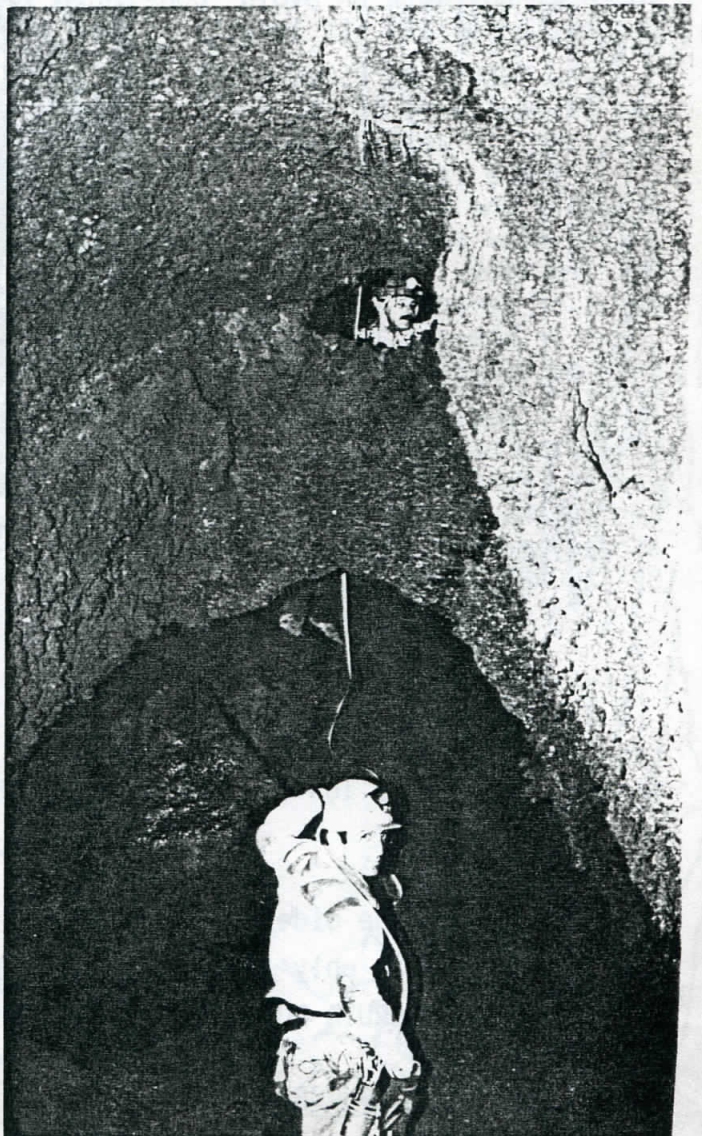
The pavement is of lava "aa" and the ceiling is completely covered with brown thin stalactites (blade like) and the ring stalactites; from the last ones results the name of the cave.

- "GRUTA DO CABEÇO DO CANTO" - it is located in the "Capelinhos" area. The entrance is covered with ashes from that eruption (1957-58) and the pavement of the cave is covered with many collapsed rocks.

There are two obvious levels of drainage shown on the double gallery at the end of the cave. In this part, the superior level forms an arch ("double-ceiling") and the walls are reddish.

- "ALGAR DA FURNA RUIM" - it is the third bigger vertical of the Azorean pits (55 meters);

- "GRUTA DO PARQUE DO CAPELO.



- IN S. MIGUEL -

All the main caves are located in the recent part of the island, the central plateau. Most of them are small and very much destroyed:

- "GRUTA DE AGUA DE PAU" - a small mildly braided lava tube cave, located only 2 meters a.s.l. and covered by some 70 meters of overburden. There are also 2 levels of galleries being the access to the secondary gallery a lateral entrance near the ceiling.

There are 2 main galleries that intercept each other. In the walls there are rod stalactites and blisters (remelting stalactites);

- "GRUTA DO PICO DA CRUZ" (Photo right) - is a simple "unitary" or "throughway" lava tube type with about a hundred meters length.

It is a narrow and low lava tube, but with an ovoid configuration in all its length;

- "GRUTA DO ESQUELETO" - the initial part of it, the largest one, is well preserved.

There is a lid type wall, probably the stopping point of a lava flow posterior to the tube formation. The walls have marks of several lava levels.

In the ceiling, there are many melt-stalactites.

- "GRUTA DA RUA DO CARVÃO" it is the bigger cave, and located at "Ponta Delgada" (about 2 Kms length, a thousand meters already mapped by the "OS AMIGOS DOS AÇORES")

- "ALGAR DO PICO QUEIMADO"

- "GRUTA DO PICO DO ENFORCADO"

- "ALGAR DA BATALHA" - this pit is associated to a lava tube. The lava that flew in the tube rising through the roof forming a pit and a secondary tube that ended in a low and crawling gallery.



- IN S. MARIA -

S. Maria is the oldest island of the Azorean Archipelago, without recent lava flows. It has only littoral caves of sea erosion ("GRUTA DOS ANJOS", "GRUTA DAS POMBAS", "GRUTA DOS ROMEIROS").

- IN FLORES AND CORVO -

In the smallest of the two occidental islands, CORVO, there is the record of one cave, presently closed. In FLORES, there are no caves known.

MY FRIEND



SPELAEAN

THE MUSEUM

During these last three decades, the "OS MONTANHEIROS" did collect a large number of volcanic exemplars, founded in the ground of the caves and pits of the Azorean Archipelago, when they made the respective explorations.

These exemplars were preserved in boxes, rightly identified, in order to be exposed when the Society had opportunity to it.

As we said in the front page, in 1986 the "OS MONTANHEIROS" received a new building, in which did exist all the conditions to install a MUSEUM-HALL.

And, with an important governmental aid, in June, 18 the Museum was officially inaugurated by the widow of one of the "OS MONTANHEIROS" founders, JOSE MACHADO FAGUNDES, whom name was given to this new cultural space, that represent oneself as a fine auxiliar to the students of the events concerning the volcanic activity of the AZORES.



PINGO DE LAVA

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