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BRITISH CAVE RESEARCH ASSOCIATION



TRANSACTIONS

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June 1981



Cueva de Cellarón, Secadura

Matienzo

BRITISH CAVE RESEARCH ASSOCIATION

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TRANSACTIONS OF THE
BRITISH CAVE RESEARCH ASSOCIATION

MATIENZO, SPAIN

Volume 8 Number 2

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CAVES AND CAVING IN MATIENZO

by L. D. J. Mills

ABSTRACT

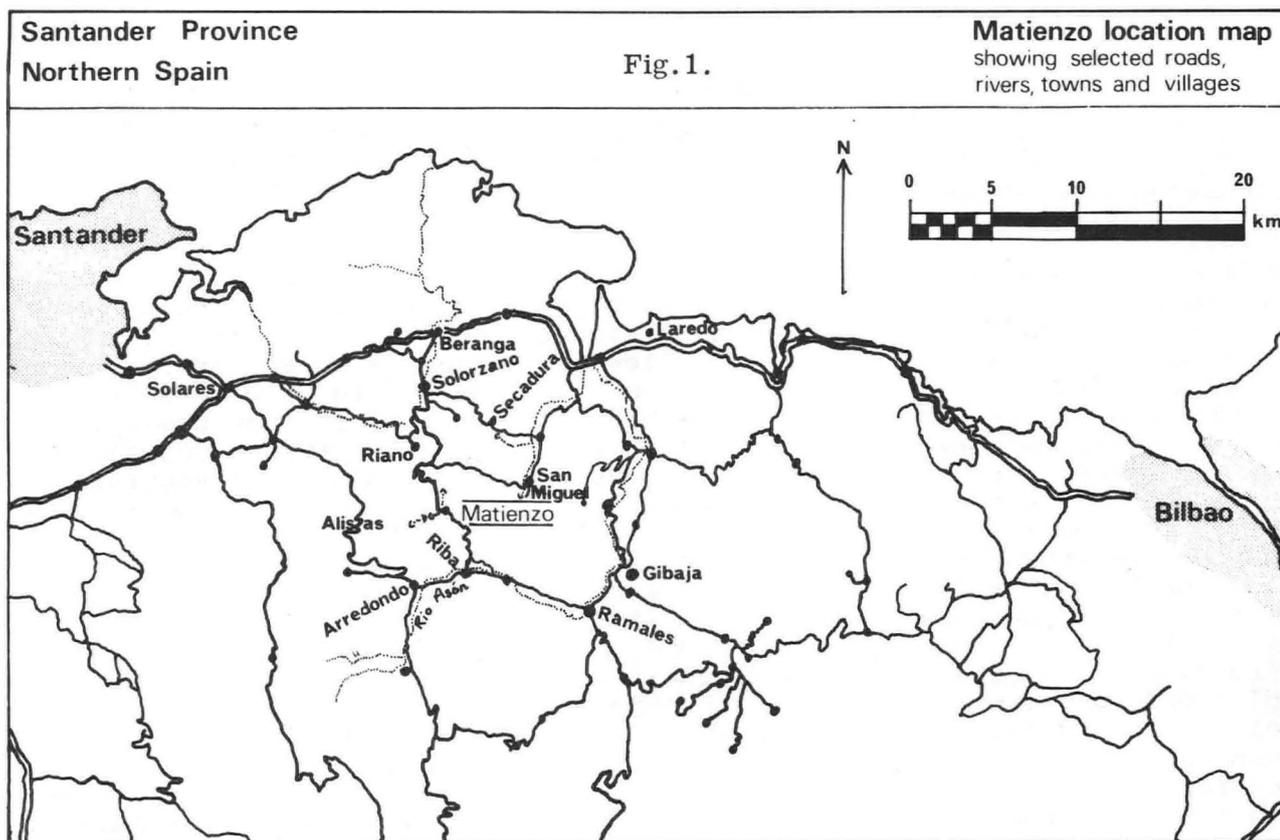
The work of the British Speleological Expeditions to the enclosed depression of Matienzo in northern Spain during the years 1969 - 1980 is reviewed. The history of the exploration of over 45 kilometres of cave passage in 250 caves is outlined, as are the prospects for the future.

The attractions of the Northern Provinces of Spain are obvious to all who travel through them. Their population has been historically independent and has a warmth and friendliness which is very noticeable to foreign visitors. The cost of living has, until recently, been very low and certainly less than in Britain. With food and wine at low prices (equivalent of 3p per litre of wine in 1965) it is not difficult to see why caving clubs have looked there for new areas to explore. The northern provinces are called the Costa Verde (Green Coast) and this is an appropriate name when one sees the area with lush green vegetation in high summer. The north is influenced by the closeness of the Atlantic to the Cantabrian mountains stretching from the Spanish-French border near San Sebastian, through the provinces of Guipuzcoa, Vizcaya and Santander into the high peaks of the Picos de Europa and dying out in the west of Asturias. For much of its length the Cantabrians are formed of limestones and, with the high rainfall, it is not surprising that it has produced one of the finest karst areas in Europe.

In 1963, a small group from the Manchester University Speleological Society joined an Oxford University Caving Club expedition to an area near the twin lakes of Enol and Encina near Covadonga in the Picos de Europa. Exciting discoveries were made and the potential of Spain as a place for further exploration was assured for many years to come. Expeditions were organised by the society in 1965 to the same area and in 1968 to an area slightly to the west near Amieva. Although some interesting caves were discovered the really long and deep systems eluded us. The generosity and friendliness of the local people did not however, and led to many lasting relationships which have meant continued visits up to the present day. It was on one such visit that the area which is the subject of this paper was discovered.

In 1969 a few members of the society decided to revisit Amieva but on the way explore other potential caving areas in the Cantabrians. So it was that one evening they motored down the impressive limestone gorge above Ramales de la Victoria in Santander province into the town itself. As night fell they made their way up to the pass of Puerto de Alisas and seeing the lights of Santander from this impressive vantage point decided it was just the place to camp for the night. As dawn broke at five next morning they were even more excited by the sight to their east. Here was a most impressive valley, half filled with white mist - the nearly horizontal bedding of the limestone standing out well in the shadows cast by the early morning sun. This angle of bedding was in sharp contrast to that of the more familiar Picos de Europa where angles of 70-80° were not uncommon. What made this mist-filled valley even more interesting was that to the north there was no mist and it soon became obvious that they were looking at a large enclosed depression surrounded by limestone ridges. It contained the village of Matienzo and had much of speleological interest. So began our visits to the valley which have continued almost yearly until the present.

Matienzo lies 25 km south east of Santander in the northern foothills of the Cantabrian mountains. (Fig. 1). The landscape is dominantly one of rolling scrub covered hills broken by the occasional limestone scar or lapiaz. The Matienzo valley is completely closed and forms an impressive karstic depression. (Plates 2, 3). The floor of the valley is almost level for about 3 km² but the total area of the depression enclosed by the surrounding ridges is 26.3 km². Local relief is nearly 800 m. The lowest point in the Matienzo valley is at an altitude of 147 m. and from here the underground drainage falls another 97 m. to the rising in the Secadura valley which is less than 15 km from the sea. Two passes lead out of the Matienzo valley at altitudes of 450 m and 347 m and the highest point on the rim is Mullir at 833 m. Practically the whole of the relief is in Cretaceous limestones. Three branches compose the Matienzo valley. The lowest to the north is known as Secada; it has a broad flat floor and is prone to flooding when the flow of the sinking river is too great for the cave into which



it disappears. The western, Vega branch has a long, narrow, flat floor only slightly higher than Secada. Rather different is the Ozana branch to the south east, which is more broken and sloping down to the confluence. Matienzo village stands at the hub of the valley. It is a straggling farming community containing about one hundred houses, a school, church and seven bars. Three roads give easy access to the valley via the main passes from the north-east and south. While the valley floors are all cultivated and cropped, most of the hills are only grazed or left untouched because of the dense vegetation.

Owing to the influence of the Atlantic, the climate on these northern slopes of the Cantabrians is not typical of the rest of Spain - Matienzo receives an annual rainfall of around 1200 mm. In summer the afternoon temperatures frequently reach 25°C, but the valley acts as a cold air trap in the night and early morning causing the formation of mist which clears only slowly on windless days.

Within the Matienzo valley and its immediately surrounding area we have now discovered over 45 km of cave passage. Most of this is often 5 m or more high and wide. Many of these passages have been abandoned by the present day streams and hence are dry and relatively warm with a typical temperature of around 10°C. These factors combine to make most of the caving in the area relatively easy, and exploration, surveying, and photography proceed at a pace which might be envied in Britain. Although many of the caves explored are near horizontal some do contain vertical sections and several approach 200 m. in depth.

The river in Matienzo valley has a mean annual flow of around 0.5 cumecs although J. C. Fernandez Guterrez (1966) has reported an impressive flood in 1965 in which something like 600,000 cubic metres of water passed out of the main sink at Carcaveuso in 36 hours. This gives a mean flow of 5 cumecs over this period. Although such floods are not rare in summer we have been lucky in not experiencing them while underground.

HISTORY OF EXPLORATION

1969..... After our brief visit to the valley in 1969 we continued on to visit our friends in the Picos de Europa. On our return we decided to visit some of

the many caves containing prehistoric paintings to be found along the coast. The finest among these is probably the cave of Altimira. Now sadly closed it was at that time open to visitors. Among the publications for sale we were delighted to find a journal (Guitierrez 1966) detailing the Spanish exploration in the Matienzo valley in the early sixties. They had discovered and explored parts of the Risco cave system and several of the small feeders. Cueva del Agua (Pl.1, Fig.1 and Pl.4, Fig.1; also Fig.6) had been partially explored and many of the dry abandoned remnants such as Cofresnedo, the entrance of Cubio de la Reñada and Codisera had been investigated. From their accounts there appeared much potential remaining with sink to resurgence distances of 3.5 km and many questions marks on surveys. We read the book and vowed to return!

1970..... In 1970 a group of eleven M.U.S.S. members visited the area and spent two weeks exploring the most obvious caves. Descents were made of Loca 2, Cueva del Agua, Sima Cueva del Risco, Jiveros 1, 2 and 3, Comediante and several other known caves. The strongly draughting entrance to Carcaveuso was discovered and the cave explored for a short distance to the main river but no way on could be found through the choke. Outside the valley near Riaño the entrance to Cueva Uzueka was looked at and the small caves nearby were explored.

1971..... The summer of 1971 saw an abortive attempt by a small group to return to the area. The vehicle broke down and only a few days were actually spent in Matienzo. The only notable discovery was the finding of a way through the choke in Carcaveuso. Unfortunately after 300 metres the river sumped and no way on was obvious.

1972..... In 1972 only two society members made the journey to Spain. They visited the resurgence for the Matienzo river in Secadura and considered it needed further investigation. The entrance to Cueva Riaño was found although their camping gaz light proved inadequate for the exploration of the tight and strongly draughting entrance series!

1973..... Despite the obvious potential there seemed little club enthusiasm for an organised trip in 1973 and it was again a small group who returned in the summer of that year. Although only in the valley for three days this trip turned out to be very successful. The tight and rather unpleasant entrance series of Cueva Riaño was soon passed into a complicated series of large dry tunnels which were estimated to be 3 km in length. In Cubio de la Reñada the previously known cave was extended from 600 m to approximately 4 km (Fig.5, Plates 7 & 8). In both cases many passages were left unexplored and the potential seemed considerable. On their return to England it was not difficult to organise a larger party to visit the area in the next year.

1974..... In July 1974 probably the most successful of our expeditions arrived in Matienzo. The potential for exploration had by now attracted members of other clubs and K.C.C., B.S.C., and U.L.S.A. were now represented amongst our numbers. Early arrivals explored Cueva Tiva to a choke and surveyed Carcaveuso. When the main party arrived at the beginning of August, Cubio de la Reñada was surveyed and Cueva Onite discovered. This was soon connected to Cueva del Risco and the through trip completed. Torca de la Cabaña was found and explored and while Cueva del Agua was surveyed Cuevaona was dived by Geoff Yeadon and connected to it. Attention was then turned to the caves around Riaño. Most of Cueva Riaño was surveyed before the team was diverted to Cueva Uzueka where the entrance was engineered and partly surveyed in four trips. An easier entrance was found and this considerably eased exploration in later years. As the heavens opened in the last few days of the expedition, Cueva Mortiro was explored and Cubio de la Reñada detackled. In all 15 km of new passage had been explored and surveyed. The group returned to England well satisfied, but convinced that there was much work still to be done.

1975..... With this in mind a small group organised themselves so that they could visit the area from early spring to summer 1975. Although small this group were able, despite incredibly bad weather, to do much surveying and surface work. They discovered extensive passages in Cueva Tiva and made the connection with Risco. They completed the survey of this complex cave and its tributary feeders and brought the combined length to over 10 km. Cueva Coveron was located and its 2 km of passage surveyed. As other members of the 1975 expedition came out from England, attention was again given to Cueva Uzueka. At the time it seemed obvious that this and Cueva Riaño were connected and efforts were made to make this a reality. To this end a party went to the 1974 end of Pigs Trotters Chamber and pushed a low, wet crawl from which blew a very strong draught. This was soon extended into large passage and it became obvious that they were not in Cueva Riaño but heading away to the east. Further exploration that year extended the cave through Cross-over Crawl into Las Playas to the Astradome and eventually

into the enormous boulder chaos of Armageddon. (Fig. 4; Plates 5 and 7). Here the known end was to remain for another year. In Cubio de la Renada two successful dives had allowed Renada 2 to be surveyed and increased the caves length by over a kilometre. The divers had also penetrated the Nacimiento del Rio Clarin and after carrying scaling poles through the 12 m sump had explored more than 300 m of complicated passage on several levels. On our return the Matienzo 1975 report was produced and contains many of the surveys done during the previous years.

1976..... The 1976 expedition began with the first arrivals investigating a large depression which had been noted in previous years at the head of the Llueva Valley. Considerable digging at two strongly draughting holes had not produced any results and other possibilities were sought. A short crawl was investigated at the bottom of the depression and after a few hours digging they were able to gain access to the very impressive Cueva Llueva and meet the water last seen in the main sink of Carcaveuso in Matienzo valley. After some days of exploration they were disappointed to find that although over 2.5 km long, the cave sumped both up and downstream and progress was thus halted in the expected link up of the now Four Valley System. (Fig. 8; Plates 1 and 4). Some days later the Armageddon choke in Cueva Uzueka was pushed and after a short pitch the streamway regained. Reincarnation, as this passage was named, led to another kilometre of passage and ended in a further choke in Rocky Horror. (Plate 6; Fig. 1). The exploration party had placed 1 kg of fluorescein in the streamway at Duckhams sump and this was detected one week later at Secadura and also by activated charcoal detectors placed in Cueva Llueva. Uzueka and Llueva were now less than 300 m apart according to our surveys and the attempted connection of this Four Valley System was to dominate our activities for years to come. Near Secadura an interesting maze of a cave named by us Torca del Rayo de Sol was discovered and this also was to become more significant in future years.

1977..... The weather in Spain in 1977 was atrocious and for much of the time large parts of the valley were completely under water. This severely restricted the work programme and only small finds were made. The upstream and downstream sumps in Llueva were dived but little progress was made. A further dye test indicated that Cueva Uzueka entered Cueva Llueva beyond the upstream sump.

1978..... Possibly because of the weather in 1977, 1978 saw a reduction in the numbers of participants in the expedition of that year. Further progress was made through the Rocky Horror boulder choke and several possibilities opened up. The very impressive 30 m diameter Astradome aven was investigated using a weather balloon filled with helium and was found to be 101 m high. (Plate 7, Fig. 4). A new cave (Solviejo) partly explored by the Spaniards from Laredo Caving Club was extended, bottomed and finally joined up to form a 3.5 km system with Torca del Rayo de Sol. (Plate 8, Fig. 2). Torca de Mostajo was discovered and explored. Cueva de Cellarón was descended and its significance as part of the old high level route between Llueva and Secadura was realised. (Cover photo).

1979..... The 1979 expedition was able to borrow the 'Molephones' from Bob Machin and one of the priorities was to locate various points in Cueva Uzueka relative to the surface. In this they were very successful and found that the survey was remarkably accurate being only about 30 m out at Rocky Horror some 7 km into the cave. A by-pass to Armageddon was discovered and further progress made in the Rocky Horror choke. The weather was again not kind and curtailed further exploration in this area of the cave. Several smaller caves and pots were discovered and a dive by Phil Papard in the upstream sump of Llueva discovered the way on, though this was not pursued due to the lack of a support diver.

1980..... In 1980 this sump was passed by four divers and found to be 30 m long. After 140 m of boulder-filled passage the way on was choked, although there appeared to be possibilities for digging. This choke is now only 170 m from the downstream end of Uzueka. The upstream sump in Cubio de la Reñada was passed again and the way on was found although some work is still needed. A new cave (Fuente de la Cuvia) near Riaño was explored for 735 m (Plate 8, Fig. 1) and another at Fresnedo pushed through a complicated maze for 300 m. Although various potholes had been explored in previous years, in 1980 real attention was given to the hills of Muela, Mullir and Cueto and over 50 shafts noted. Of these over half were descended, the deepest being a single drop of 152 m.

This then brings us to the present day. In eleven years of activity over 45 km of cave have been explored and over 250 caves located. This has produced a particularly clear picture of the underground development in the area.

FUTURE PROSPECTS

Each year has allowed us to answer more questions about the valley but there are still areas where our knowledge is uncertain.

Starting in the La Vega branch of the valley, the source of the main river which flows through the far reaches of Cubio de la Renada is still unknown. There are very few inlets to the system and the water flow at the end of the cave is much the same as at the entrance. Is this percolation water from under the Beralta-Alisas ridge? Or are there stream sinks further away which could account for the flow? There are certainly sinks in the Bustablado valley to the south but it seems unlikely that these are accounting for the Renada flow. The position of Arenal and its strong draught perhaps indicates some connection with the system beyond the present end of Renada. Future work here may help to answer the question. In Cueva del Agua the source of the inlet water is unknown and the past function of Rascavieja perched as it is above the present valley floor is enigmatic.

In the Ozana branch of the valley there are fewer problems as we have a particularly clear picture of the present day drainage. Only the past function of Codisera and the present destination of the water flow in Orillon are difficult to explain.

The high hills of Muela, Mullir and Cueto and their associated potholes have recently introduced a new phase to the exploration in the area and it seems certain that some exciting finds will be made.

In the La Secada branch of the valley lie some of the most interesting prospects. Carcaveuso has progressed only a few hundred metres towards Cueva Llueva and is still nearly a kilometre away. The cave itself does not give much hope for extension, but in the fields and woods above are several strongly draughting holes which may prove more worthwhile. The closeness of Rocky Horror in Uzueka to this end of the valley must not be forgotten. The possibilities for the link between Uzueka and Llueva are still high and this must remain a priority for the future. Downstream in Cueva Llueva could still be divable and other holes like Cellarón may drop into the old route from one valley to the other. The possibilities of completely unknown caves are also high. Four of the longest of our discoveries were all entered by digging out entrances which were originally less than body size! In 1981 it is hoped to be able to set up a three way 'Molephone' link between Uzueka, Llueva and the surface and this could enable the Four Valley link to be forged at last. The 1981 expedition like the previous three is being organised by J. Corrin and with prospects for further discoveries excellent, the area will undoubtedly be visited for many years to come.

ACKNOWLEDGEMENTS

Although the earlier expeditions consisted of solely M.U.S.S. members, other clubs have joined us in our activities since 1974. Most prominent amongst these were Kendal Caving Club and Bolton Speleo Club and other clubs have joined in the explorations more recently. These include B.C.C., C.P.C., C.D.G., D.C.C., E.P.C., N.M.C.C., P.C.C., P.P.C.P.C., S.M.C.P.C., U.L.S.A., W.R.C.P.C. Credit must be given to these clubs for their contributions over the years as it must to the following cavers: Frank Addis, John Alexander, Phil Berrie, Stan and Di Brown, Chris Cleary, John Cope, Juan Corrin, Tim Cuniffe, Stuart Davey, Barry Davies, Martin Delamere, Pat Devine, Nigel Dibben, John Dickenson, Eddy Edmundson, Bob Emmot, Dave Evans, Tony Fifield, Steve Foster, Andy Finch, Lenny Gee, Paul Gelling, Roger Graham, Dave Hanson, Pam Henson, Dave Howard, Andrew Jones, Wayne Kitchen, Howard and Debbie Limbert, Dave Linton, Lank Mills, Ian Morley, Chris Moys, Roy and Julie Mundy, John Naish, Phil Papard, Keith Plumb, Dave Rowlands, Dennis and Rhoda Rugg, Gail Searby, Pete Smith, Geoff Standing, Grodon Strefford, Ron Taylor, Dave Tringham, Alan Trevarethan, Joe Turner, Tony Waltham, Ian Williams, Tony Williams, Fred Winstanley, 'Squirrel' Wood, John Yeadon, Geoff Yeadon, Linnet, Graham O and Sweeney.

The Spanish Caving Authorities have, from the very beginning, taken an interest in our work. We have greatly appreciated the personal interest shown by J.C. Fernandez Guterrez and Jose Leon Garcia. Since our earliest days in Matienzo J.C. Fernandez Guterrez has often visited us during our summer camps. His intimate knowledge of the pre-1969 Spanish caving explorations and the geology of the area have often suggested to us new areas for exploration. Jose Leon Garcia, as Regional Committee Chairman based at the Museo de Prehistoria, Santander, has helped us by providing some of the necessary permits as has the President of the National Soc. de Espeleologia in Madrid.

A number of active Spanish cavers have helped us during our stay, particularly Alfonso Pinto and Regino Rincon.

The mayor and villagers of Matienzo have been (and indeed still are!) incredibly friendly and hospitable. They have taken an interest in our caving activities and without their guidance many of the entrances would have remained undetected by us. To catalogue the communal events to which we have been invited would take several pages. Suffice it to say that goat, donkey and sardine barbecues, cricket, pasablo and football matches and the convivial atmosphere of evenings in the bar have heightened the Matienzo Experience !

We would like to express our thanks to Bob Machin who, on two occasions (1979 and 1980) lent the expeditions a set of Molephones. Without the use of these radio-location devices we would be much less confident of the accuracy of the Four Valleys system survey.

The following firms have donated equipment:

- Phillips Patents (Bury) Ltd. - Three weather balloons for finding the height of the Astradome Aven in Cueva Uzueka.
- Rabone Chesterman - A number of closed and open reel 30m surveying tapes and one 100m open reel tape.

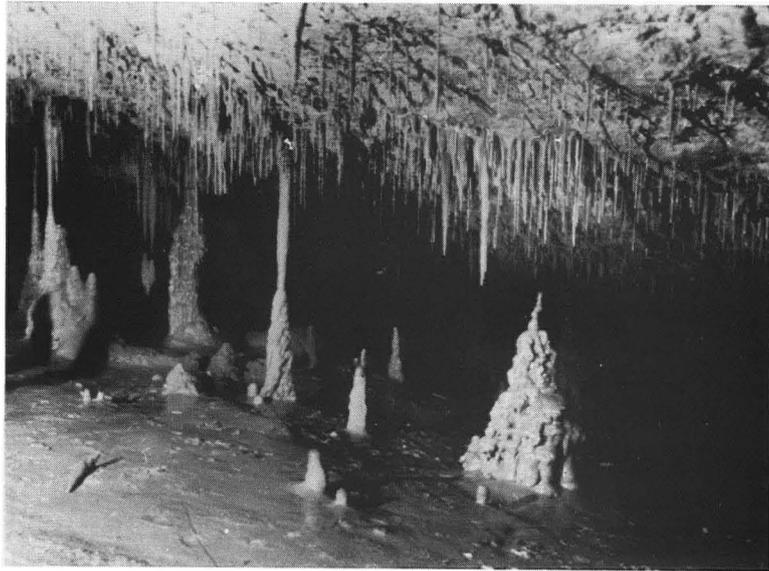
We are grateful to the Ghar Parau Foundation who administered our Sports Council Grants in 1976, 1978, 1979 and 1980 and who gave us a G.P.F. grant in 1979.

REFERENCE

Fernandez Guterrez, J.C., 1966, La Depresion cerrada de Mateinzo; Caudernos de Espeleologia, v. 2, Santander.

February 1981

L.D.J. Mills,
St. Georges Terrace,
Cowpe,
Rossendale,
Lancs.



1. Formations on the 'ramp in Cueva del Agua
(L.D.J. Mills)



2. Negotiating the deep water in the phreatic zone downstream
of the entrance pitch in Cueva Llueva (J.S. Corrin)



3. The sand banks of Las Playas, Cueva Uzueka. (J.S. Corrin)

Plate 2

Matienzo depression viewed from Fuente las Varas

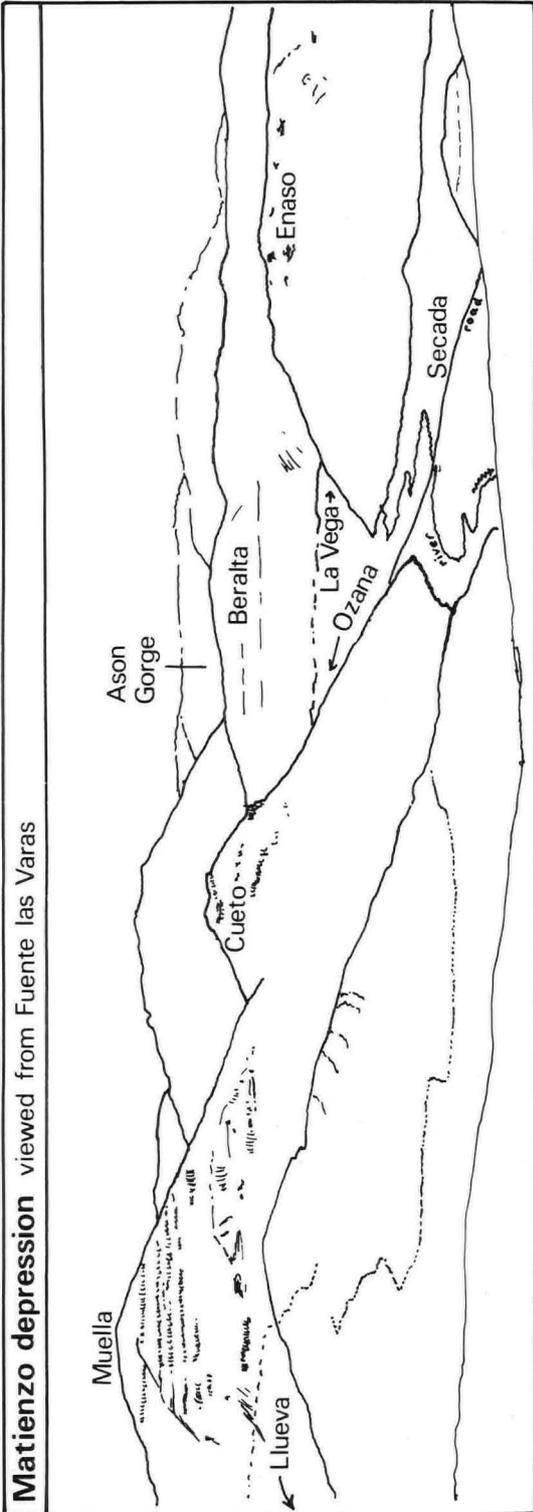


Plate 3

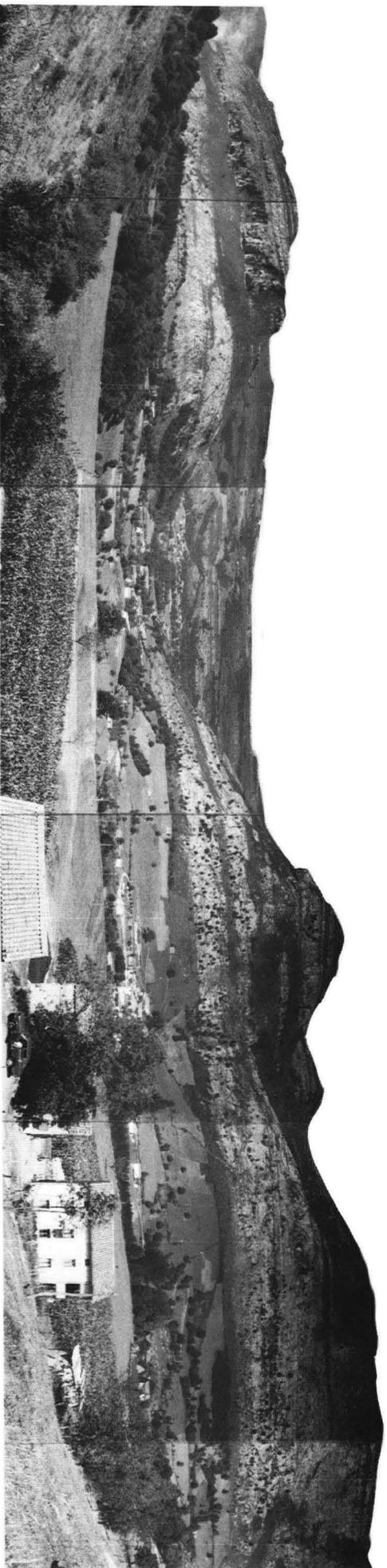
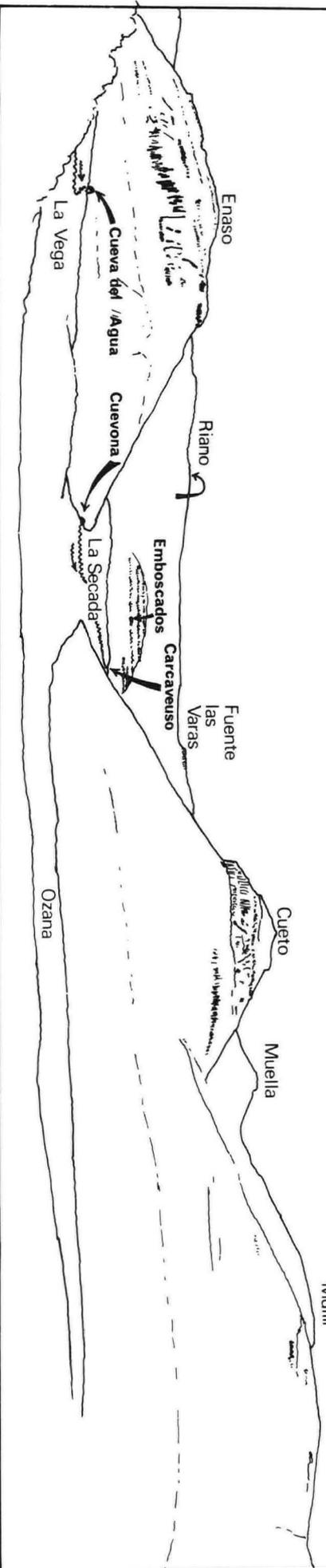
Matienco depression

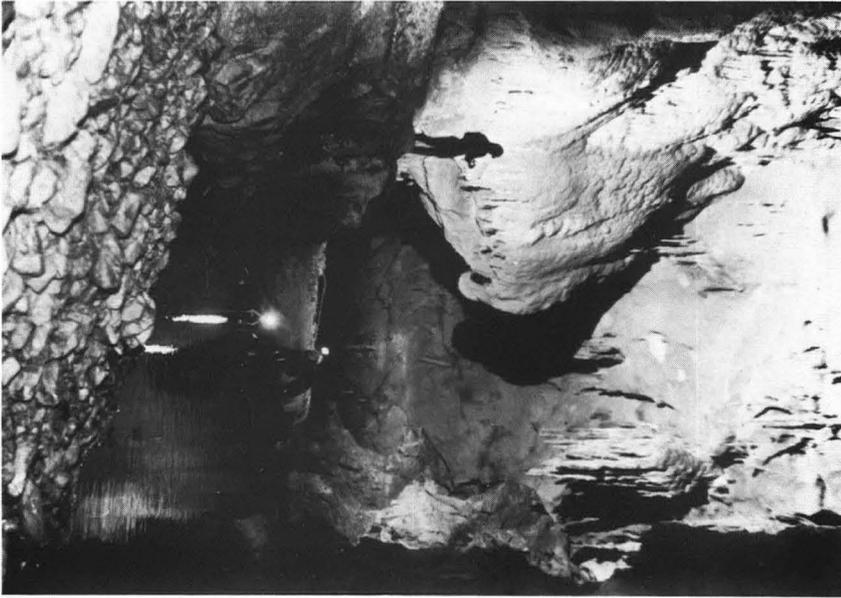
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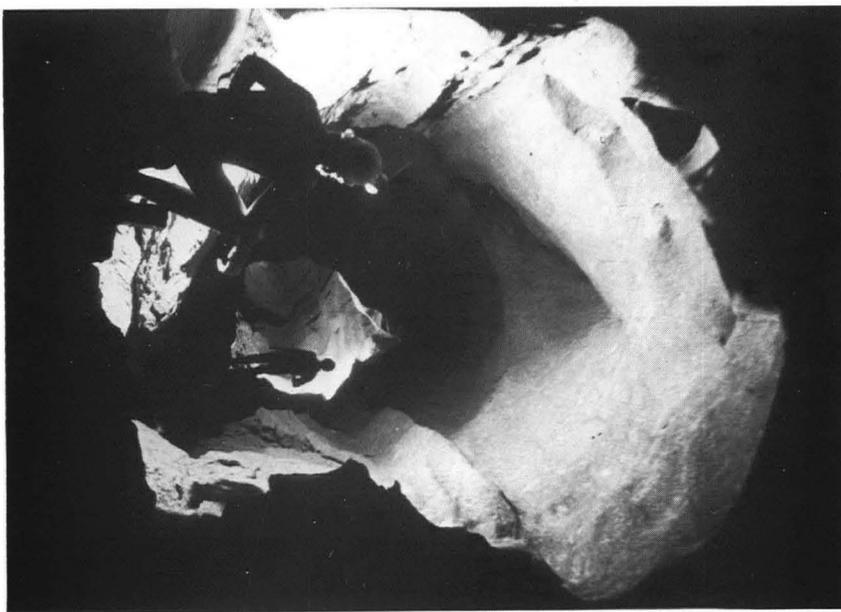




1. First lake in Cueva del Agua (L.D.J. Mills)



2. The high level passage of Cueva Lluvea. The light at the far end is 200 metres distant. (L.D.J. Mills)



3. Quadruphenia, the sandy-floored entrance series of Cueva Uzuoka (L.D.J. Mills)

Mattienzo

GEOMORPHOLOGY OF THE MATIENZO CAVES

L. D. J. Mills and A. C. Waltham

ABSTRACT

The Cretaceous limestones of Matienzo include massive, Urgonian facies, and the whole sequence has been gently folded into an anticline and parallel syncline. Major features of cave geomorphology are described. Drainage paths of Matienzo's early development are not clear but the large volume of the modern closed depression infers a karstic history back at least as far as the early Pleistocene. Since then the Matienzo valley has drained underground and created a sequence of caves many of which are now fossil. Sandstones, marls and synclinal structures have influenced cave development, but the overall controls have been available resurgence levels in adjacent valleys.

Las calizas cretáceas de Matienzo comprenden enormes facies Urgoniana y toda la sucesión se ha plegado ligeramente en un anticlinal y sinclinal paralelos. Describimos las características principales de la geomorfología de las cuevas. No se destacan los primeros cursos de drenaje de Matienzo pero el gran volumen de la depresión cerrada actual indica un pasado karstico que se remonte por lo menos hasta el principio de la época Pleistoceno. Desde aquel entonces el valle de Matienzo se ha vaciado bajo tierra y ha creado una sucesión de cuevas entre las cuales muchas son fósiles. Piedras areniscas, margas y estructuras sinclinales, todas han influenciado la evolución de las cuevas pero en realidad han sido los niveles de resurgimiento disponibles de los valles contiguos los que han controlado todo.

The karst of Matienzo has developed on a spectacular scale. Nearly 50 km of cave passage have been mapped in the area and a large proportion of the active underground drainage system is now known. This permits a reasonable understanding of the geomorphology of the modern Matienzo valley. Unfortunately the evidence of the early history is limited to only fragments of once extensive fossil cave systems. This paper summarises the evidence and its interpretation up to the present time and is intended as a foundation to continued and more detailed studies as progressively more cave is explored.

GEOLOGY

The solid rocks of the Matienzo area are all of lower Cretaceous age (Fig.2) and can be simplified into the following succession:

Albian	300 m	Thin bedded limestones, with some massive beds
Aptian	100 m	Massive limestone (Urgonian) with thin marls
Aptian	200 m	Thin bedded limestones, with thin sandstones
Barremian	500 m	Sandstones and marls (Wealden)

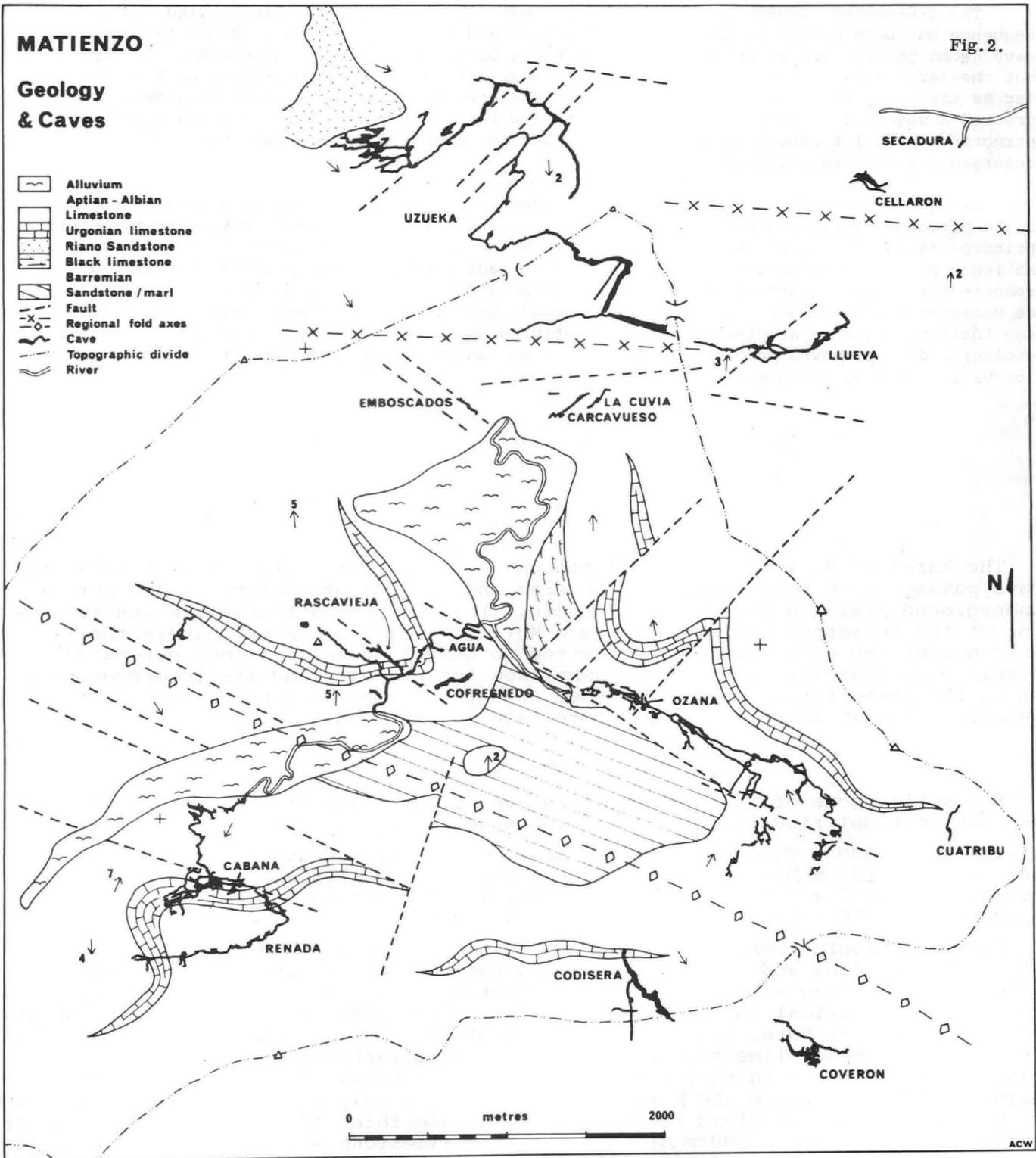
The impermeable rocks, locally known as the Wealden, are exposed only in the floors of the Vega and Ozana valleys, and form a clear basement to karstic development. Above these there are at least 600 m of limestones displaying considerable vertical and lateral variation. The Upper Aptian consists of about 100 m of massive, pure, compact, white limestone - typical of the facies known as Urgonian (a type of limestone which is not stratigraphically constant but is famous for its caves in many parts of Southern France). The Urgonian facies forms major cliffs all around the Matienzo valley and is only broken by the marls crowded with fossils of Orbitolinid foraminifera and some thin sandstone beds. The lower Aptian contains nearly 200 m of more variable limestone - even though most of it is also very cavernous. In the west it is mostly thin bedded, but it is more massive towards the east and could be described as Urgonian in the base of the hill of Muela. It contains many thin discontinuous sandstones which have had a major effect on cave development. Its base represents a marine transgression onto the Wealden, and as such may be highly irregular.

MATIENZO

Geology & Caves

-  Alluvium
-  Aptian - Albian Limestone
-  Urgonian limestone
-  Riano Sandstone
-  Black limestone
-  Barremian Sandstone / marl
-  Fault
-  Regional fold axes
-  Cave
-  Topographic divide
-  River

Fig. 2.



The wedge of black limestones in the eastern wall of Secada appear to represent a trough of impure basal Aptian of no great lateral extent. The overlying Albian limestones are mostly thinner bedded than the Urgonian, and are broken by thin marls and sandstones.

The rocks of the Matienzo area were caught up in the edge of the Alpine fold belt along the Cantabrians. The limestones now occur in a series of gentle folds in which the dips are normally around 5° , but the structure is complicated by large numbers of faults. The upper, southern, end of the valley is crossed by an anticline which brings the Wealden shales up to the floors of the Ozana and Vega branches. The beds do not arch smoothly over the fold, for much of the deformation is absorbed by the faults, many of which are rotational. Particularly at its western end the anticline is largely a rising series of tilted fault blocks. To the south a major syncline runs into the Ason valley. There is an additional structure indicated by the northerly dip of the beds in part of the Renada cave. This is not seen on the surface above; it is most probably a small rotated fault wedge, but it could be a feature of an initial dip in the limestones. Most of the Matienzo valley is cut in the northern limb of the anticline and a shallow syncline cuts across the northern tip of the valley. Its easterly continuation appears to be displaced northwards in an en echelon fashion.

Faults in the limestone are abundant, though most have small displacements - none have been recognised of more than 120 m. Many are inclined well away from the vertical, and rotational movement took place on many of them. The few exposed faults contain considerable breccia zones. They largely fall into two systems - approximately NE-SW and between W and NW, though the entrance series of Cueva Uzueka show how complicated the patterns may be in detail.

Excepting the widespread but thin veneer of red soils, the only superficial deposits in the valley are the alluvial floors of the Vega and Secada branches. This sediment forms two separated outcrops and in each case the thickness is unknown but is probably not many metres.

SURFACE KARST

The major karst landform of Matienzo is the valley itself, which is entirely closed and drained underground. This can only loosely be referred to as a polje because, although large enough and closed, it does not have the completely flat floor with the sharp transition into the slopes diagnostic of a true polje. Matienzo is therefore best described as a rather spectacular, closed valley (Plates 2 & 3). In the wide sense the Vega and Secada branches, separated by a low col just west of the village, could each be described as poljes. They do have flat alluviated floors, are fed and drained by cave rivers and Secada is prone to partial inundation, but their slope edges are not all as sharply defined as in the classical Yugoslavian poljes.

Karst drainage has influenced the nature of many of the other valleys. The Ozana branch valley is largely dry due to its underlying cave system, and the Cubija valley is closed by a low col before it joins the Vega branch. The Llueva valley, an easterly outlet to the Matienzo area, contains an underfit stream, probably due to karstic capture. There are many other much smaller valleys and gullies on the slopes into the Matienzo depression; few are sharply defined and nearly all are dry for most of the time as underground drainage can cope with all but the wettest weather. Doline karst is not extensive in the Matienzo valley. There are fields of depressions on the northern shoulder of Enaso hill, and on the Muela ridge, and within the latter there is one massive doline 500 m across and 100 m deep. Over most of the area, slopes are too steep for ready development of large dolines. However, many of the cave entrances in the Ozana valley are at the foot of sizeable dolines or blind valleys. Lapiaz is restricted to the more gently sloping non-alluviated areas, which essentially means the crests of the ridges. Even then it is only extensive on the southern ridges, along Trillos, Piluca and Muela. Limestone pavements do not occur, as there has been no glaciation. Instead the surfaces are extremely inhospitable, deeply dissected, very sharp lapiaz perhaps best described as a mixture of spitz-karren and kluftkarren. Relief within the lapiaz is commonly 5 m and there is little vegetation cover on the main fields. It is fortunate for ease of access that most of the slopes are partially covered in limestone rubble, though steeply inclined slabs scored by smaller solution grooves do occur on the more massive limestone beds.

HYDROLOGY

The great majority of the rainfall landing in the Matienzo valley sinks straight underground, the major exceptions being that falling on the impermeable valley floors and that in wet weather which temporarily occupies steep gullies in some limestone slopes. Once underground most of the drainage is in discrete systems separated by surface courses across the main valley floors.

The main headwaters are in the Renada cave system, from which they resurge to flow across the floor of the Vega valley and disappear into the open entrance of the Agua cave cutting through the corner of Enaso hill. They then resurge to form the Matienzo river flowing across the floor of the Secada valley. This surface section is joined by the drainage from the Ozana valley most of which is underground all the way down the valley to the springs near the Tiva cave. Unlike the Agua outlet for the Vega depression, the exit from Secada is through a boulder pile which at high stage results in ponding and flooding at the lower end of Secada - in the worst recent case deep enough to reach head height in a number of houses.

The northern end of the Matienzo valley is a classic example of karst drainage having a complete disregard for surface topography. Underground the water from Secada joins the drainage from the southern portion of the Riano valley, flows under the head of the Llueva valley without emerging on the surface and finally resurges at the Secadura rising as one of the headwaters of the Claron river in the Secadura valley. The existence of this 'Four Valley System' has been proved by dye-testing, but so far the 17 km of cave explored within it have not yet been connected into a single entity. The Secadura rising yields a mean flow of around 0.5 cumecs and is the final outlet for the Matienzo drainage.

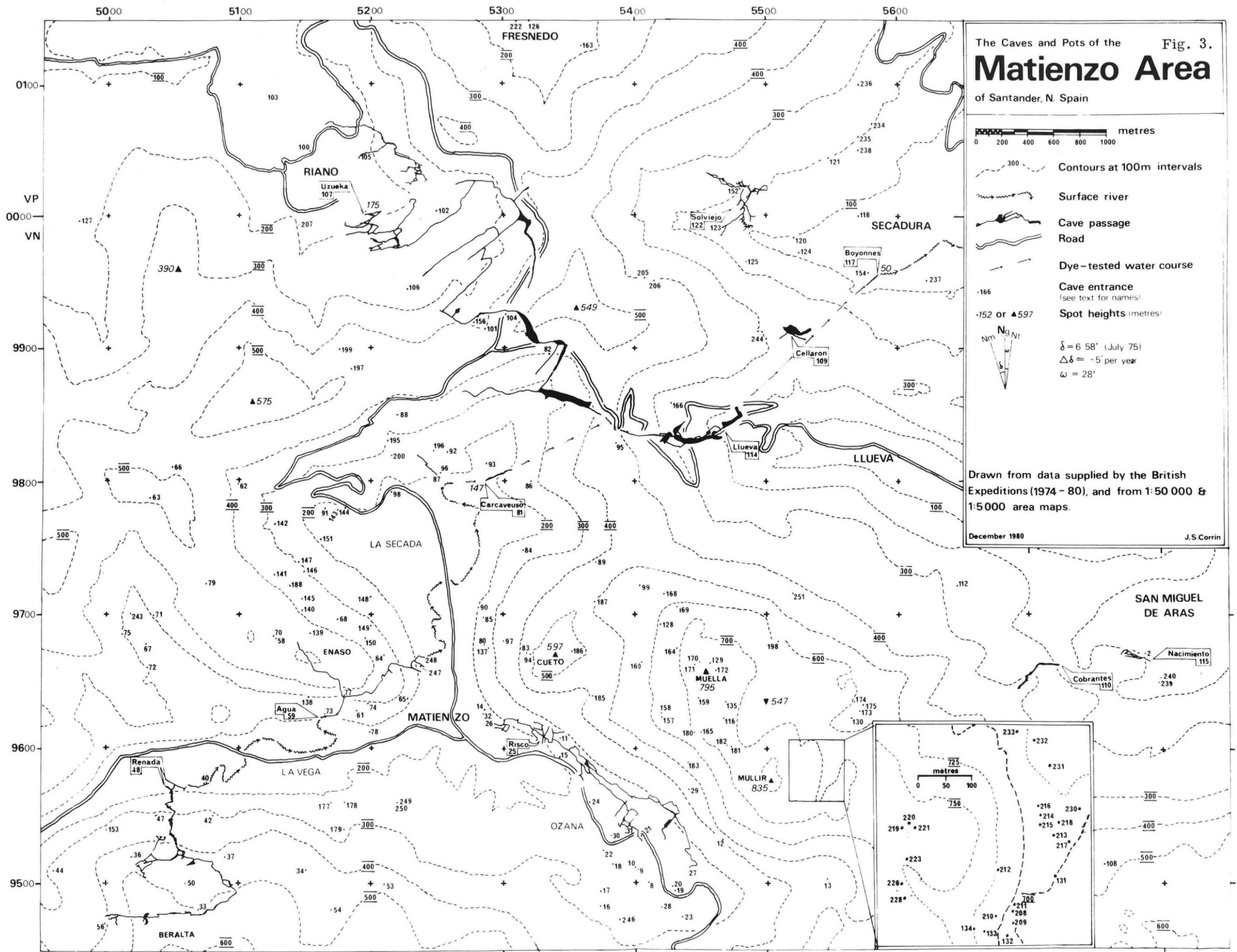
CAVES

There are now over 45 km of explored cave passage at Matienzo (including the whole Four Valley System but excluding caves which drain away from Secadura (Fig.3). Many of the large old dry caves have been known from time immemorial, but all the major exploration of the wetter caves is quite recent. The Ozana caves have been explored practically from sink to resurgence, and the major parts of the principal active caves through the valley are also explored. The main gaps in present knowledge are the upstream end beyond the Renada cave, and the segment of the Four Valley System between Llueva and Secadura. Obviously the fossil cave systems are not as completely known; nearly all the major passages end in great stalagmite, sediment or breakdown chokes, and their continuations remain untraced. In addition there must be segments of old abandoned cave of which no hint has yet been found, and the unexplored inlets in Cueva Uzueka give an indication of what young immature streamways must penetrate the hills as tributaries to the main cave drains.

The following descriptions of the caves are only intended to outline their main geomorphological features. Full descriptions of all the caves, and of many smaller discoveries, may be found in the expedition reports and publications of M.U.S.S., and brief descriptions form 'Matienzo Underground' by J. S. Corrin and P. Smith in the same volume as this paper.

Active caves of La Vega

Although it provides the main headwaters of the Vega valley the Cubio de la Reñada (Fig.5) is not an essentially active cave. Most of its 6.1 km of passage are abandoned phreatic caves which happen to have been intersected in a few places by the modern stream now mostly at a lower level. The main water emerges from a sump in Reñada 2, occupies half a kilometre of gallery downstream and then disappears in a choke. After passing through an aquatic series in the middle of the cave the watercourse is next known in the short resurgence cave of Comediate, separated from Reñada by a stalagmite choke. The rest of the Reñada cave is a phreatic complex ranging in altitude from 170 m at the rising to around 240 m excluding various vadose shafts breaking the roof. Spectacular joint and fault control is conspicuous in the entrance series, while most of the development in the central area (around Blood Alley) was enlarging on bedding planes which contain some magnificent anastomoses. Collapse is considerable in the larger passages, though there are also extensive sand deposits and some fine calcite formations, notably the red crystal pools which adorn Blood Alley. Much of the Stuffed Monk Gallery has a phreatic cross section in excess of 20 m², but flow directions are unclear and the patterns of phreatic movement are open to interpretation.



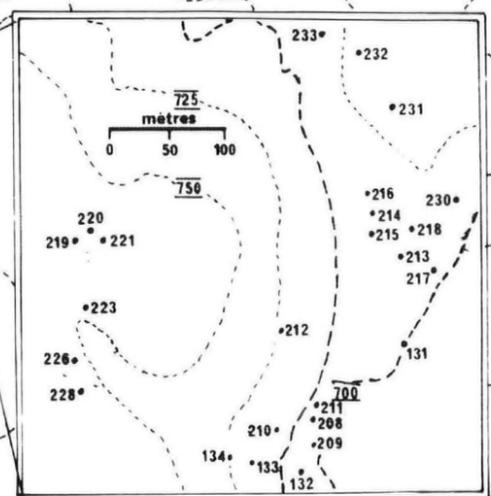
The Caves and Pots of the **Matienzo Area** of Santander, N. Spain Fig. 3.

0 200 400 600 800 1000 metres

- Contours at 100m intervals
- Surface river
- Cave passage
- Road
- Dye-tested water course
- Cave entrance (see text for names)
- Spot heights (metres)

$\delta = 6 \ 58'$ (July 75)
 $\Delta \delta = -5'$ per year
 $\omega = 28'$

Drawn from data supplied by the British Expeditions (1974 - 80), and from 1:50 000 & 1:5 000 area maps.
 December 1980 J.S. Corrin



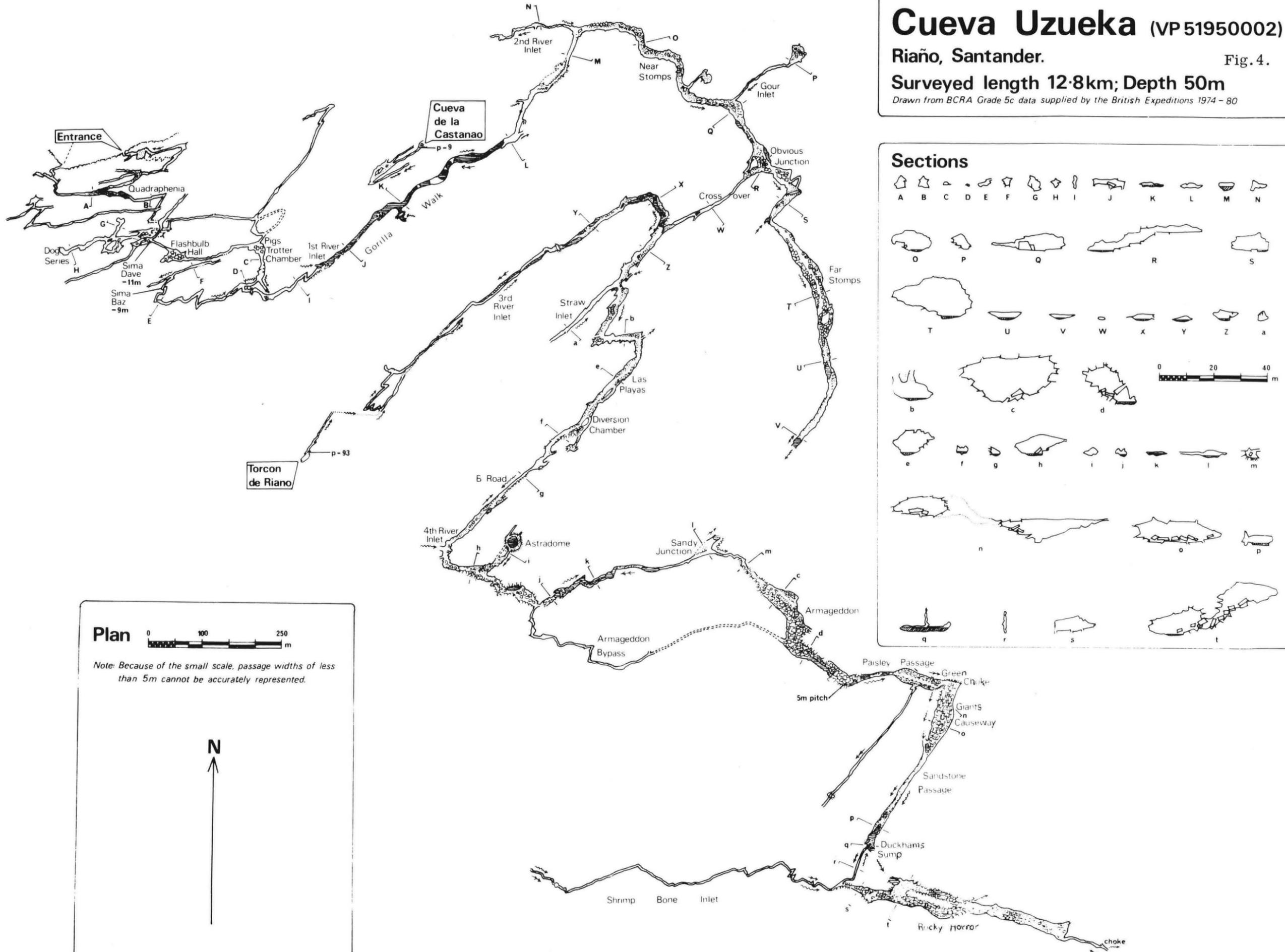
Cueva Uzueka (VP 51950002)

Riaño, Santander.

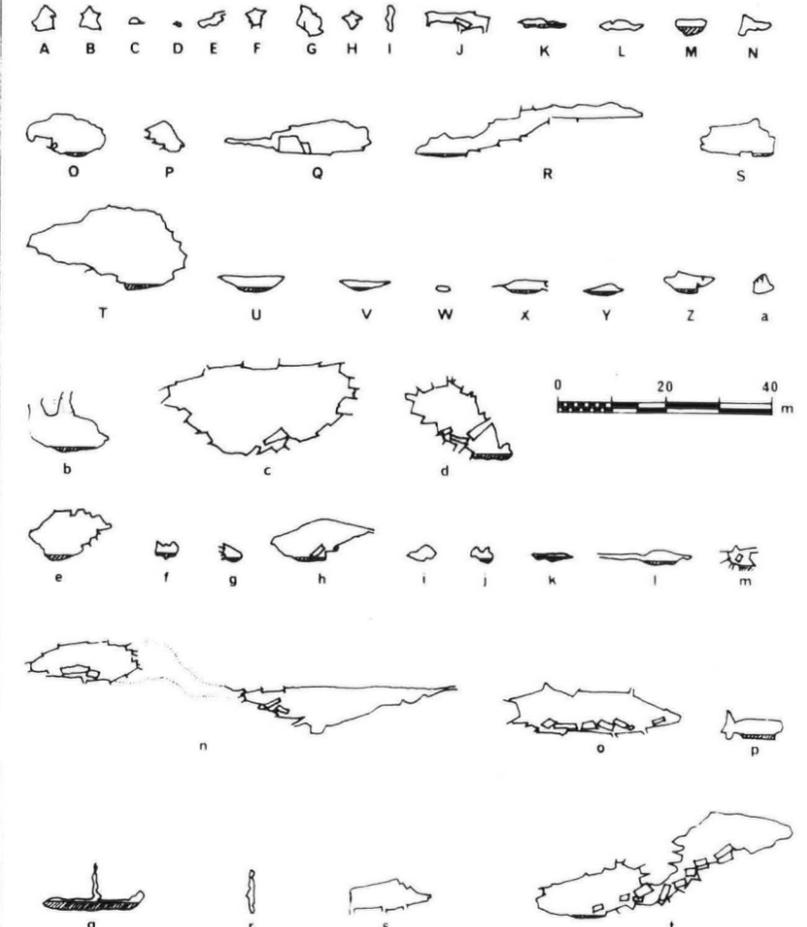
Fig. 4.

Surveyed length 12.8km; Depth 50m

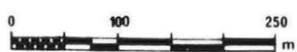
Drawn from BCRA Grade 5c data supplied by the British Expeditions 1974-80



Sections



Plan



Note: Because of the small scale, passage widths of less than 5m cannot be accurately represented.



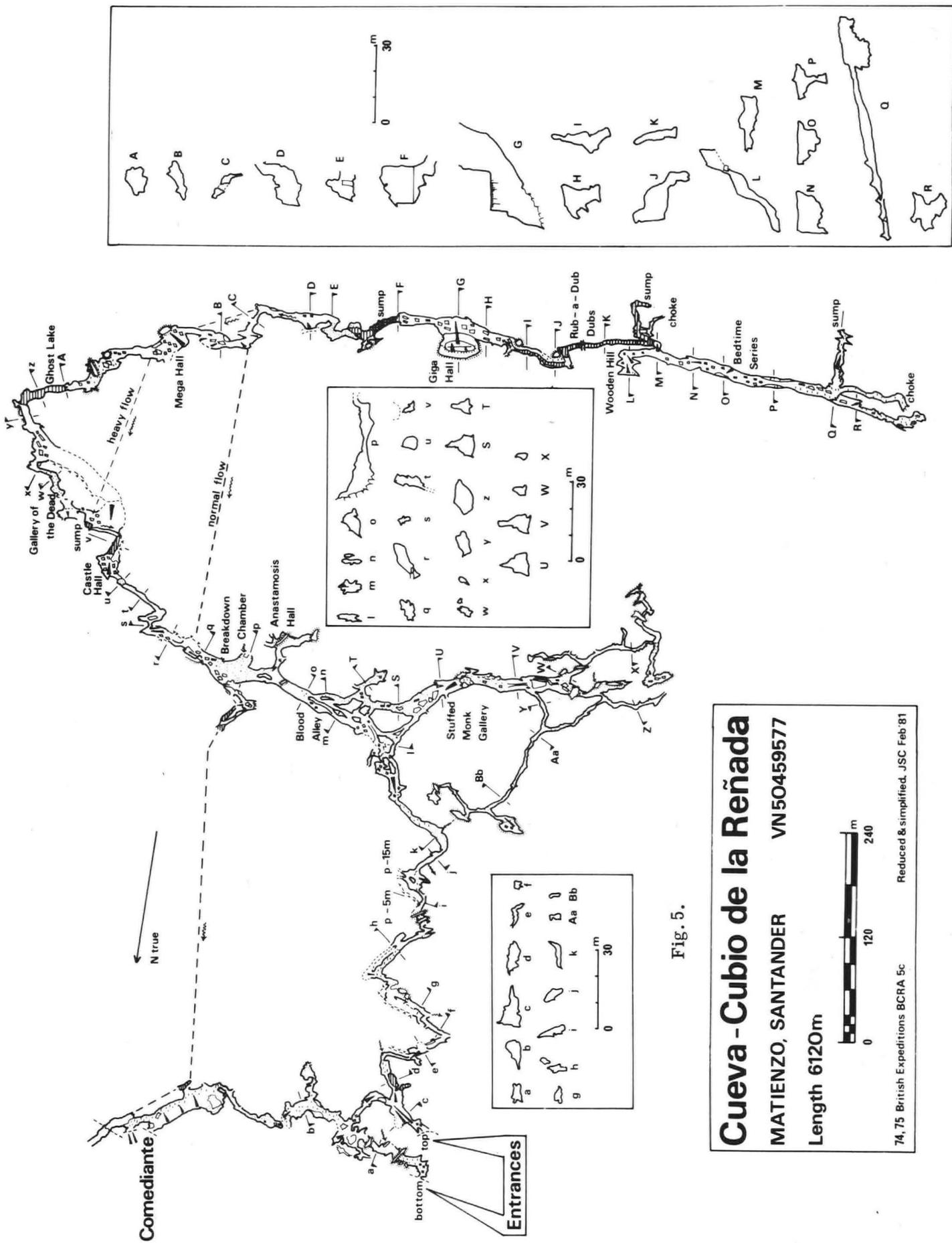


Fig. 5.

Cueva - Cubio de la Reñada

MATIENZO, SANTANDER VN50459577

Length 6120m



74, 75 British Expeditions BCRA 5c
Reduced & simplified. JSC Feb '81

CAVES OF MONTE ENASO

BCRA Gr.5c

1974, 1975

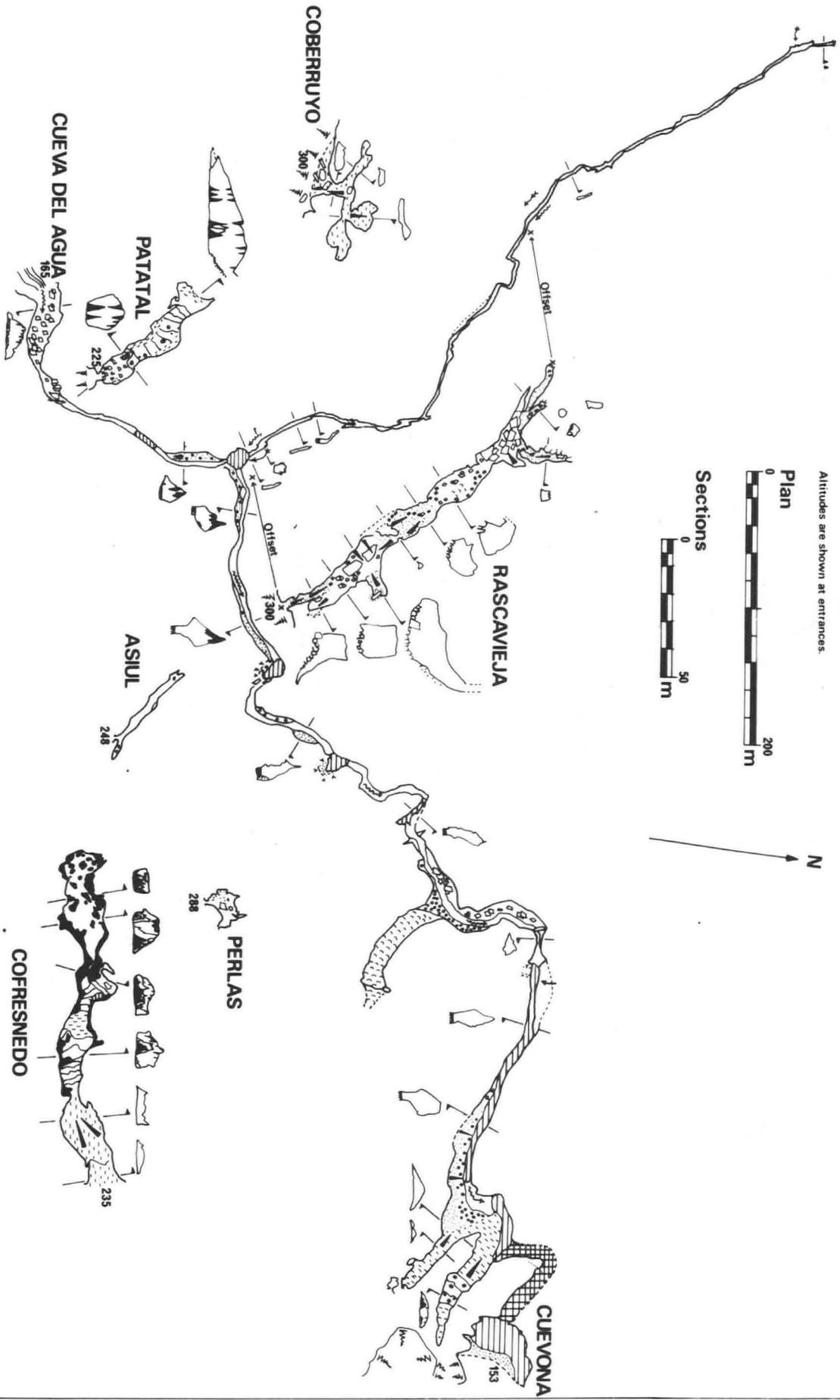


Fig. 6.

Cueva del Agua (Fig.6) is a complete contrast as nearly all of its 1900 m are active. The main river gallery, 1300 m long from the wide sink entrance is clearly of phreatic origin. It is nearly all five metres or more wide and twice as high, with the river partly dammed by breakdown and in places entrenched in the floor (it is a very sporting, wet cave). Downstream the water passes through an 87 m sump to the impressive resurgence pool of Cueva de Onite at an altitude of 153 m, 12 metres below the sink. Three inclined phreatic tubes leave the right bank of the river cave, one ending in a choke which extends to the surface, and the only other branch is the constricted vadose slot of the Rio Tuerto Inlet.

The Ozana Cave System

The active cave system draining beneath the Ozana valley has been almost completely explored from a number of sinks to the one resurgence (Fig.7). Some 11.1 km of cave are known over a vertical range of 80 m, in addition to some shorter isolated caves around the sinks. The main stream cave collects all its inlets from the left bank, or south side. From the Onite sink the essentially vadose canyon is gently graded except for an 18 m pitch where it crosses a fault. The Pinto and Tonto inlets cannot be followed to the surface but the Torca del Sedo is an open shaft, and the water is lost into a choke 200 m short of the resurgence. Old high level galleries are traceable for practically the whole length of the cave, and in the upstream minor caves, at levels between 10 and 30 m above the present streamways. Much of the fossil galleries in the upper part of the system are abandoned vadose canyon which fed down into a more complex phreatic zone which now form the roof passages at the lower end of the cave.

Geological control within the cave is spectacular. Old and young vadose passages are guided by the northerly dip down the main stream passage. In addition there are two important faults in the system. One is uncrossed by any explored passage where it cuts through the area of the upper sinks. A second marks the one waterfall in the active streamway and also marks a boulder choke in one of the high level passages.

The Four Valleys System

At the northern end of Matienzo, the four adjacent valleys of Matienzo, Riaño, Secadura and Llueva are interconnected by a magnificent underground drainage system. Although over 17 km of cave are already known through trips between the valleys are not yet possible.

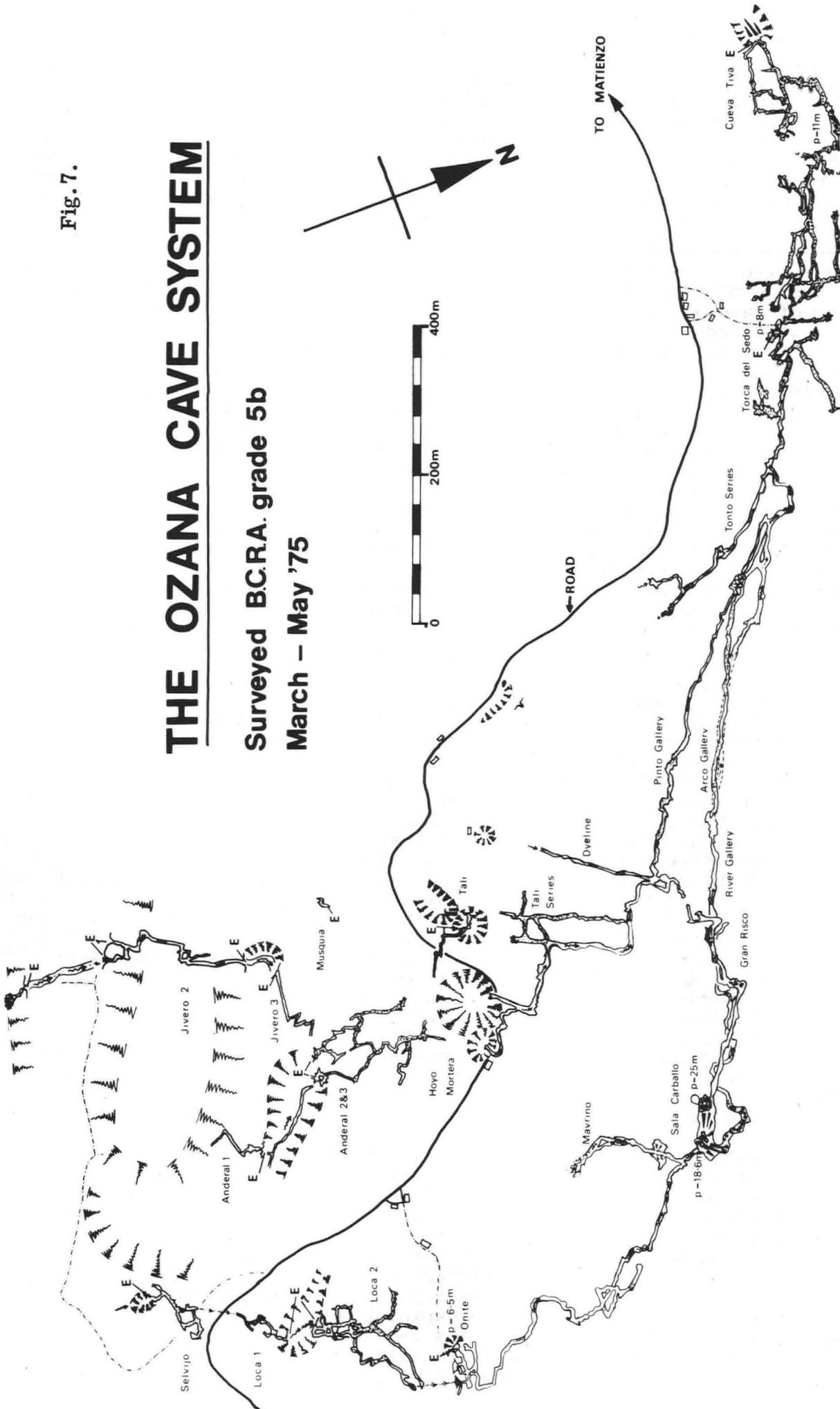
The Matienzo river finally sinks in a hopeless mass of vegetation, sand, mud, rubbish and boulders, and is hopelessly impenetrable. Not far above the sink however, the entrance of the Cueva de Carcaveuso leads to a few hundred metres of boulder strewn, heavily collapsed streamway which is sumped at both ends. Beyond the downstream sump the main water is next seen emerging from the upstream sump in Cueva Llueva, and flowing down a partially drained 5 m diameter phreatic tube (Fig.8). This breaks into a complex zone of high levels on a major cross cutting fault, beyond which lies the main passage. Llueva's main passage is magnificent (Plate 4, Fig.2); it is over 15 m high and 7 m wide, though the lower 5 m or so are mostly occupied by great collapse piles, the river threading its way through and round some phreatic oxbows. The passage roof is an almost horizontally bedded sandstone horizon which had guided the collapse, but the cave appears to be dominantly phreatic. Downstream, a hole in the roof leads to a tiny phreatic gravel and the entrance, while the river passes another smaller phreatic zone (Plate 1), a huge collapse area beneath the massive entrance doline and then sumps. The water is next seen in the enormous boulder complex of the Secadura resurgence where almost no solid cave passage has yet been found. Over a straightline distance of 3600 m the water drops from 147 m in Matienzo to 50 m in Secadura.

Cueva Uzueka (Fig.4) has an inauspicious entrance in the southern corner of the Riaño valley (Plate 5, Fig.1). Immediately inside is a complex maze of joint controlled phreatic rifts with the passages zig-zagging sharply but keeping an overall trend downdip to the southeast (Plate 4, Fig.3). The main cave follows a similar pattern on a much larger scale with its 12.8 km of passage taking a very devious route to the southeast but ending only 2350 m from the entrance, at almost the same stratigraphic level. The underfit stream in the entrance series is just one of three major inlets in the system which finally unite at Sandy Junction, though the explorable route uses various old phreatic crossovers to link the stream passages and avoid sumped and choked sections. Nearly all the main passages are essentially phreatic, with extensive collapse and little vadose trenching. Second River, the most easterly of the three,

Fig. 7.

THE OZANA CAVE SYSTEM

Surveyed B.C.R.A. grade 5b
March - May '75



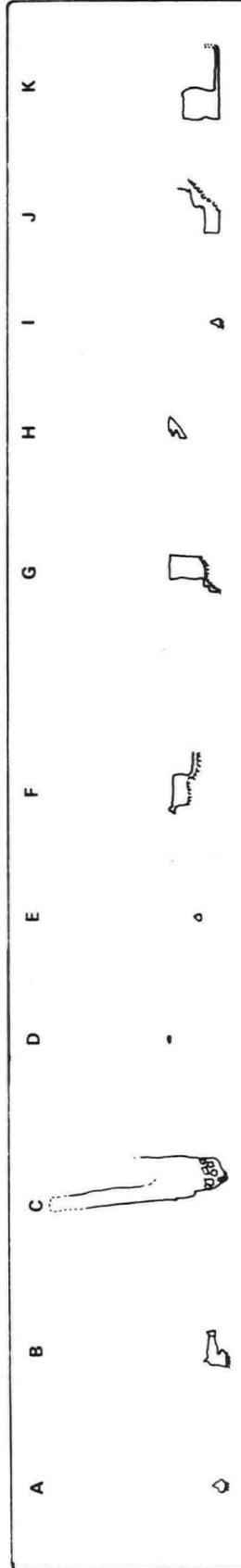
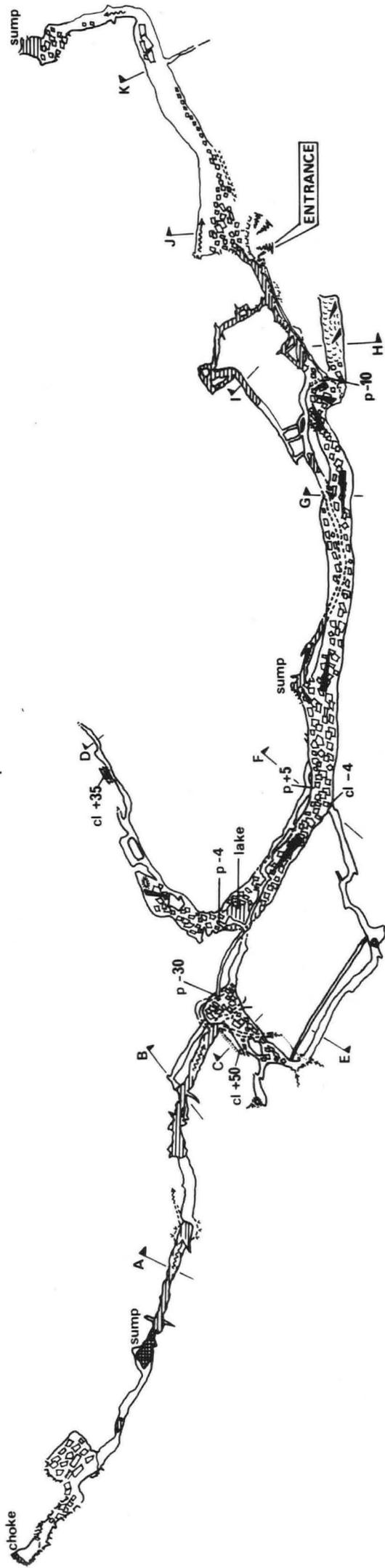


Fig. 8.

GUEVA LLUEVA

Llaveva, Santander

(VN 54689839)

Length 2.8km Depth 44m

Simplified survey. Drawn from
BCRA Gr.5b data. 1976 & 1980

flows through some of the largest passages - the Stomps, most over 10 m wide and rarely less than 5 m high. This sumps before Sandy Junction and the route round via the other streams is in passages not much smaller in cross section. Two other inlets are noteworthy. The Astradome is a magnificent 30 m diameter smooth-walled aven of enormous height, (Plate 7, Fig.4) and Shrimp Bone Inlet is a young vadose canyon streamway entering from the west and not yet explored to an end. The downstream passages of Uzueka increase still further in size, contain some gigantic boulder heaps and eventually end in an aqueous and strongly draughting boulder choke which cannot be far from the junction with the Carcaveuso - Llueva water. Although the Carcaveuso branch now provides more water, the relative passage sizes and forms suggest that Uzueka was the main upstream feeder when the main phreatic tunnels of Llueva were initially formed. Whether this initial route resurged in the Llueva or Secadura valley is not yet known, though the existence of the short but massive phreatic segment in Cueva de Cellarón suggests that the connection through to the Secadura valley was established at an early stage.

Fossil Caves

There are numerous isolated segments of abandoned cave at levels of 100 m or more above the present active caves, and it is obvious that much more fossil passage remains to be discovered. While it is admitted that any scheme of cave development in Matienzo must encompass all these caves, only the major ones, which can contribute to a hypothesis, are described here.

At the northern end of the valley, Cueva de los Emboscados (Pl.6, Figs. 2 & 3; Pl.7) is a joint- or fault-guided segment of level phreatic passage mostly 7 m or so in diameter, ending in a boulder choke. Its altitude is 220 m. Not far away and about 20 m higher, the main passage of La Cuvia is almost above the Carcaveuso stream passage. It is heavily modified by collapse and is choked at both ends, but is orientated very significantly towards the Llueva valley.

Monte Enaso contains a number of fossil caves above the Cueva del Agua (Fig.6). About 65 m up the hill, at an altitude of 230 m lie Cofresnedo and Cueva del Patatal. Both are completely fossil, very well decorated caves consisting of phreatic trunk passage 15 m or more in diameter. In both, the inner ends are blocked by massive stalagmite: 70 m higher still, the entrance of Rascavieja lies at the foot of the cliff formed by the Urganian limestone. The main passage is a large phreatic route which breaks up and down on an inclined fault but maintains an overall altitude of around 270 m. It is heavily modified by collapse, contains great banks of sand, and all its branches end in major chokes.

Torca de la Cabaña is entered high on the southern slopes of the Vega valley directly above the Reñada cave: 90 m of young vadose shafts drop through the roof of the main passage which is essentially level at an altitude of around 360 m. It is heavily modified by collapse; most passages end in boulder chokes and, though many now have flat collapsed roofs, there are enough segments of tube, some 3 - 5 m in diameter to prove the almost wholly phreatic origins. In plan form the cave shows a degree of control by major joints and faults, and overall constitutes an almost unbelievable mimic of the Stuffed Monk Gallery area of the Reñada cave some 100 m almost directly below.

The most important fossil cave in the Ozana valley is Codisera, entered at an altitude of 420 m high in the south west wall. The main passage is a massive dry canyon 20 m high and half as wide. Some 200 m from the entrance a distributary rises to the right, and the main vadose canyon continues down to the left eventually ending in a great pile of scree. It is probable that a downstream continuation of this old passage is the large phreatic high levels in Cueva del Coveron, now outside the Matienzo valley in the north slope of the Ason valley. These lie at an altitude of around 270 m and the vadose streams beneath them now drain away from Matienzo. On the eastern side of the Ozana valley, Cueva de Cuatribu is a segment of level phreatic tube with a cross sectional area of around 25 m², heading under the hill of Muela.

EVOLUTION OF THE MATIENZO DEPRESSION

It is difficult to establish the details of the earliest drainage patterns that must have been established in the Matienzo area, prior to the deepening and isolation of the depression (Fig.9). Mugnier (1969), from his work in the Ason region to the south, suggested that the River Ason once flowed across Matienzo from Arredondo; he proposed that it followed the line of Ozana and then Secada

and continued northwards to the coast via the Solorzano valley. This route would then have been abandoned with river capture and the diversion of the Ason into its present course down to Ramales. Evidence for this is a little tenuous - in graded profiles constructed from remnant segments and some terrace sediments apparently lacking imbrication. Furthermore it would seem more reasonable for the early drainage to have been based on a consequent river on the Gandara - Lower Ason line through Ramales, with a major subsequent river synclinally located flowing eastwards from above Arredondo to Ramales. This would then have had two secondary consequent tributaries - the Upper Ason off the San Roque - Ramales anticline and a southbound stream off the Matienzo anticline. Which of these two patterns dominated (for they could both have occurred in sequence) is open to speculation, but the end result was exposure of the massive limestone in the core of the Matienzo anticline.

An early consequence of the exposure of the limestone was the diversion of the drainage underground. This karstic river capture can only have developed when adjacent valleys had cut deep enough to expose the limestone away from the anticline axis; this would at the same time have given favourable underground hydraulic gradients. Being closer to the anticline, the Ason valley would have had a structural advantage in the process, encouraging early development of southward draining cave systems. Some time later it would have been followed by northward capture into either the Riaño, Llueva or Secadura valleys. The subsequent development of the different systems of caves is considered further below, but at this stage it is useful to attempt an understanding of the chronology of the early events.

The high cols and clearly defined limits to the Matienzo depression, combined with the lack of Pleistocene glaciation, make it possible to assess the age of its development by means of extrapolating erosion rates. The lowest col out of the Matienzo valley is the one to the south at an altitude of 347 m, so at a very minimum the depression below this level must have been excavated and then transported away by the underground drainage. The volume of the valley below the 347 m level is around 1200 million m^3 . Present erosion is dependant on an annual rainfall of 120 cm, of which about 50% is lost by evapotranspiration, over the basin area of 26.3 km^2 . This gives an annual outflow of 15.6 million m^3 or 0.5 cumecs, which is a roughly estimated annual mean flow through Cueva Llueva - now the sole outlet of the valley. The water in Llueva and at Secadura has not been analysed but figures from resurgences in adjacent areas suggest an average calcium carbonate pick-up of 130 ppm. This would give an annual solute transport out of Matienzo, through Llueva, of 2000 tonnes. And taking the density of the limestone as 2.7, this means that present erosion rates would have taken 1.6 million years to excavate the closed portion of the Matienzo valley.

This calculation makes a number of assumptions: that the volume of the caves is ignored, as they are trivial in comparison; that the climate remained constant, whereas during the Devensian and other cold stages of the Pleistocene the area was one of tundra with expectedly much lower solution rates, which would more than compensate for any wetter or warmer phases than the present; that there has been no mechanical removal of the limestone, which seems reasonable as there is no sign of there ever having been totally vadose drainage of the valley devoid of major phreatic loops which would act as sediment traps; that the valley floor was level at the present 347 m altitude at the time of karstic capture, which is most unlikely and the volume of rock removed from above this level must considerably lengthen the calculated time given the same erosion rate.

A minimum age of 1.6 million years, around the beginning of the Pleistocene, therefore seems very reasonable for the onset of karstic drainage in Matienzo. Bearing in mind the last of the above assumptions, the depression can reasonably be dated back between 2 and 3 million years. Even older must be the phreatic caves at altitudes greater than 347 m and, preceeding even these, the establishment of the Ason valley in its present course must have been even further back in the Pliocene. It is this long period of karstic development, uninterrupted by glaciations, which has allowed the Matienzo valley to develop on such a spectacular scale unmatched in the glaciokarst regions further north in Europe.

A minor feature in the development of the Matienzo depression has been its division into the three sub-basins which now exist. This was probably fairly recent, even though other different patterns of surface watersheds may have existed at times well into the past. The present geography is merely a result of reduced surface lowering, and hence the development of cols, in the valley floor sections where the main drainage has been diverted underground into the Agua and Ozana caves.

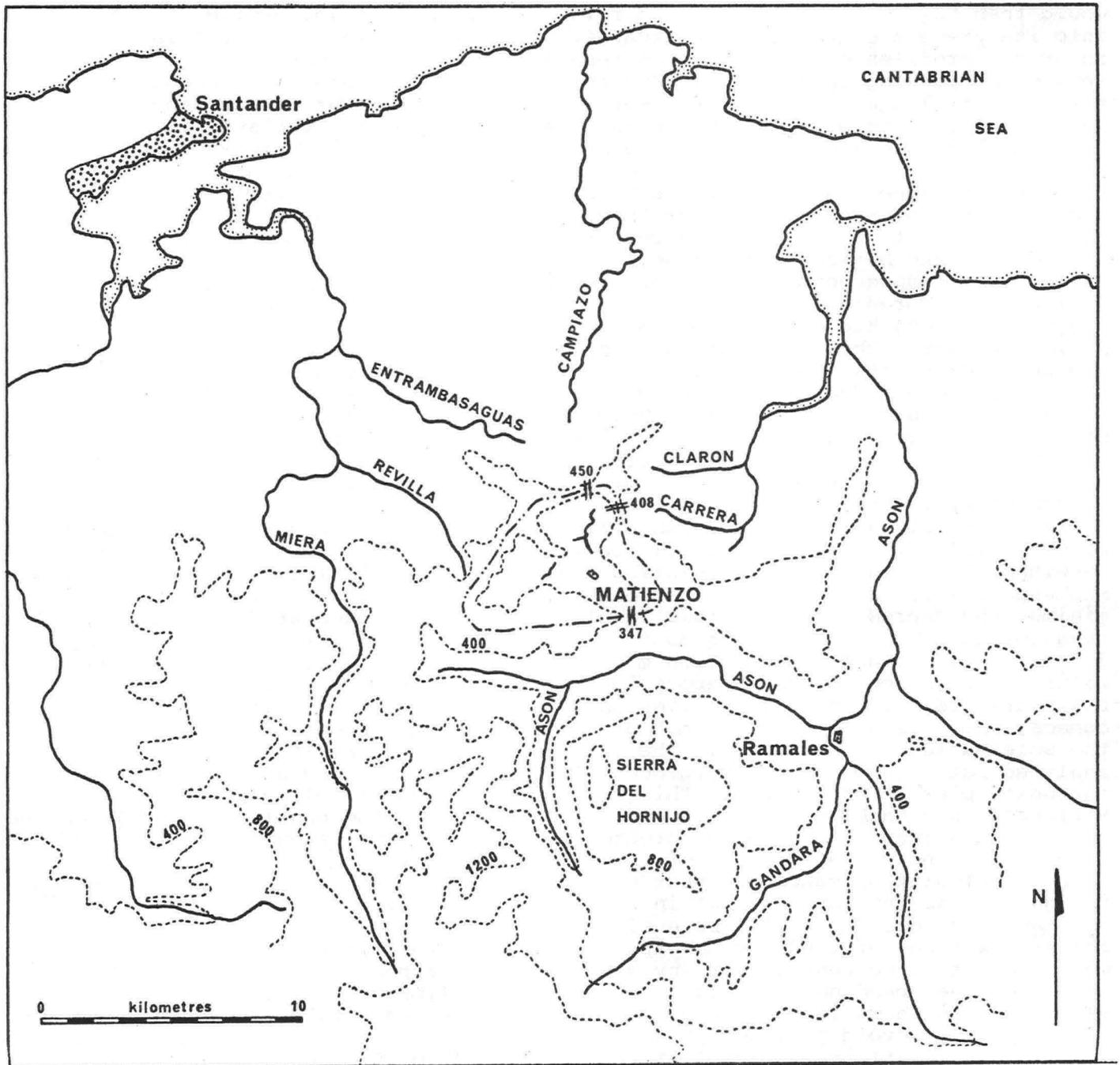


Fig. 9. Drainage Patterns around Matienzo.

SEQUENCE OF CAVE DEVELOPMENT

With its great, high altitude, vadose canyon, Codisera must be one of the oldest caves in the valley, dating back to the early stages of southerly drainage in the newly exposed Matienzo anticline. The subsequent development of phreatic caves in the southern end of the valley are not easily placed in a chronological sequence unless one subscribes to the theory that they were all developed as shallow phreatic routes - and there is little positive evidence for this. It is, however, reasonable to suggest that Rascavieja, the Cabaña and Reñada caves (whether separately or as one integral system) and then Cofresnedo, belonged to the earlier phases of development and were followed by development of the Agua

cave and the high levels of the Ozana system. By no later than this stage the main karstic drainage of the anticline must have changed from southwards to northwards, and then later modifications included the vadose entrenchment in Ozana, Agua and Refñada. Superimposed on this outline sequence were many minor changes; the scale of these is only hinted at by the great number of false floors in all the caves which must correlate with differing rates of stalagmite deposition through the climatic fluctuations of the Pleistocene.

At the northern end of the valley, development appears to have started rather later. There are no high level caves, but the phreatic remnants of Los Emboscados and La Cuvia almost certainly pre-date the formation of both the Agua and Ozana routes. Where this early drainage from the north end of Matienzo was headed for, is difficult to assess, but a major early development in the area was the Uzueka cave. It would appear that the initial cave was an entirely phreatic system incorporating Uzueka and Llueva and so draining the Riaño valley to a vauclosian rising in the Llueva valley. How and where the Matienzo water joined this cave in its early stages is uncertain, but eventually the present route in from Carcaveuso was established. Another feature at this stage was the loss of much of the Uzueka catchment. Incision of the Riaño valley took more water away to the west and even captured and reversed the drainage of Cueva de Riaño which was possibly once a tributary to Uzueka; the result of all this is the modern underfit stream in Uzueka. The present drainage now avoids the Llueva valley and emerges at the Secadura rising. This third sub-ridge connection is relatively unknown; the modern drainage is only known from the dye-trace and the Cellarón cave (cover ph) contains only a massive chamber which may represent part of the high level fossil route downstream of Llueva. The Cellaron chamber does not preclude the possibility of an ancient resurgence in the Llueva valley before diversion to Secadura, but equally the Llueva valley could just have cut down to the fossil levels of an older Matienzo to Secadura route.

PATTERNS OF CAVE DEVELOPMENT

The earliest control on cave development at Matienzo was the surface topography in that caves were formed where and when blocks of limestone gained adequate hydraulic gradients through them. In this way the uncapping of the Matienzo anticline and the deep incision of the Ason valley were of prime importance. Once underground drainage could be established, geological factors influenced the details of the cave development, but the topography continued to have a major overall effect. The influence of the Ason valley diminished as the Llueva and Secadura valleys formed and so captured the Matienzo drainage. It is possible that the Riaño valley could have been important in an intermediate phase, taking water out through the Cueva de los Emboscados, but the valley now has only an input role in the Matienzo system. While much of the Llueva valley cutting must have preceded the cave drainage into it, in order to successfully capture it, a degree of interdependence between the caves and the valley cannot be denied. There is no way that the excavation of the Llueva valley can be attributed to the drainage from the Cueva Llueva before its diversion to the Secadura rising, but a larger river must have aided the removal of the products of the surface wasting processes which were primarily responsible for the erosion of this short but very large valley. The great depths and widths of both the Llueva and Secadura valleys are mainly due to their closeness to their sea-level outlets, and not to the cave drainage inputs.

The prime factor in this topographic control of cave development is not the surface patterns of the valleys, but is their depths. There is consequently no necessary tendency for the caves to follow the patterns of the surface thalwegs. In a style diagnostic of karst regions, the original north to south, or south to north, drainage across the Matienzo area has been replaced by underground drainage which is west to east, and the Uzueka to Secadura water now manages to pass beneath three surface 'watersheds'.

Superimposed on these topographic influences, are the geological controls of cave development. On the large scale, the existence of the Matienzo anticline and the favourable cave development in the Urgonian limestones, still leave their mark on the geography of the caves. Equally important, though on a smaller scale, is a conspicuous stratigraphic control throughout the limestone succession. The great majority of the caves of Matienzo are along the bedding of the limestones, and the bedding commonly controls the details of cave passage shape. Bedding planes commonly mark the roofs of vadose passages, the widest axes of phreatic passages and the roofs or sloping walls of caves subject to extensive collapse. In addition the caves show a larger scale control by the bedding.

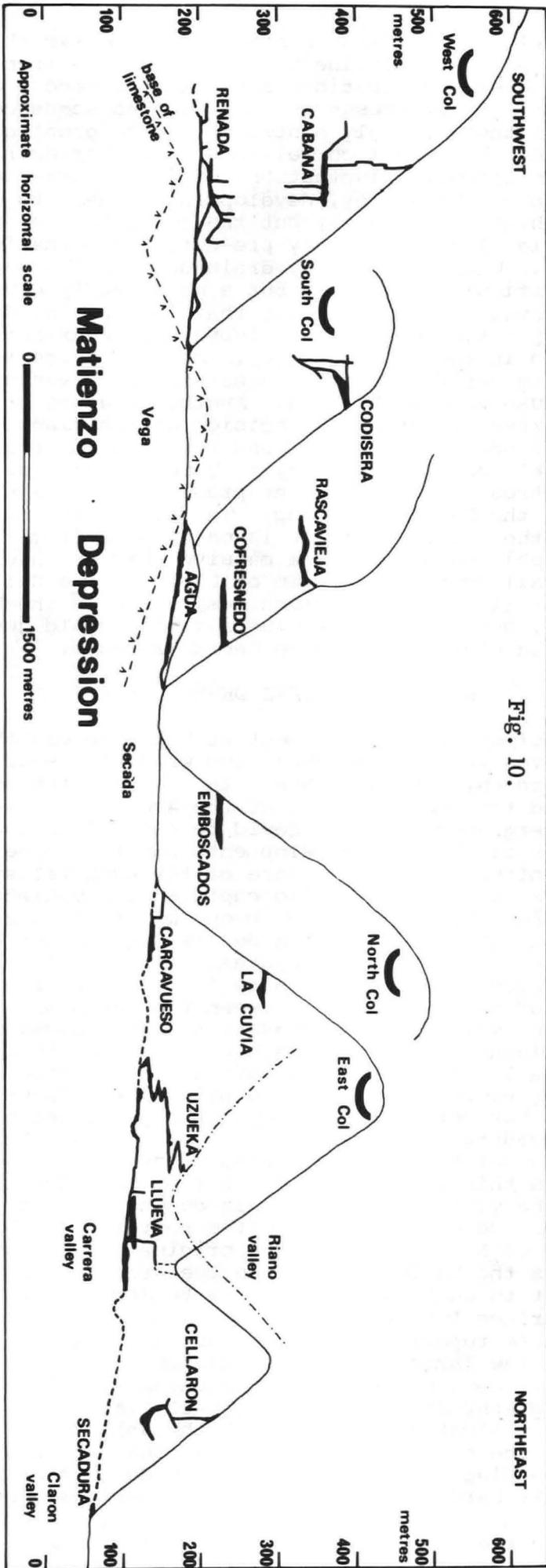


Fig. 10.



1. Looking west over Riano. The entrance to Cueva Uzueka is at the base of a sloping maize field (J.S. Corrin)



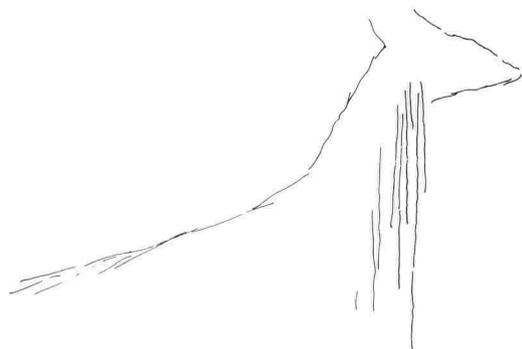
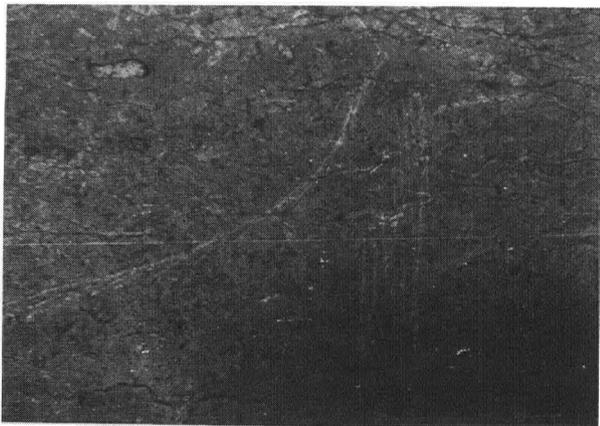
2. A typical view of the 1 kilometre long Gorilla Walk in Cueva Uzueka. (L.D.J. Mills)



3. The Armageddon boulder choke, Cueva Uzueka. (J.S. Corrin)

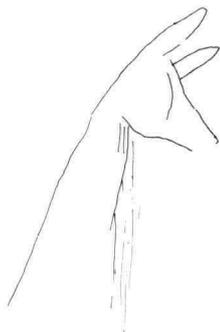


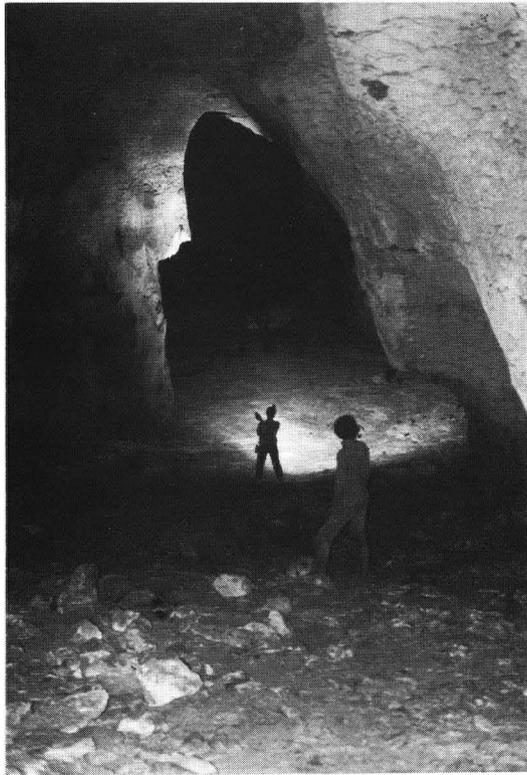
1. The wide bedding which forms Paisley Passage in Cueva Uzueka. (J.S. Corrin)



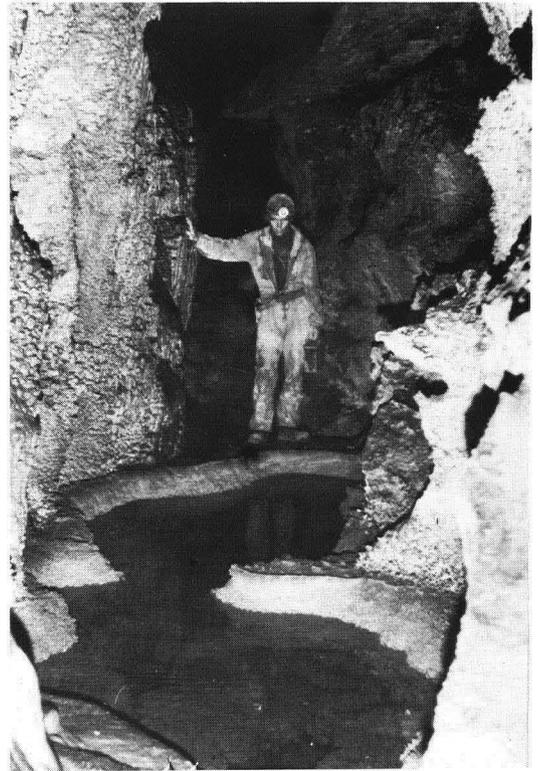
2. & 3.

Deer engravings from Panel 1, Cueva de los Emboscados. (P. Smith)

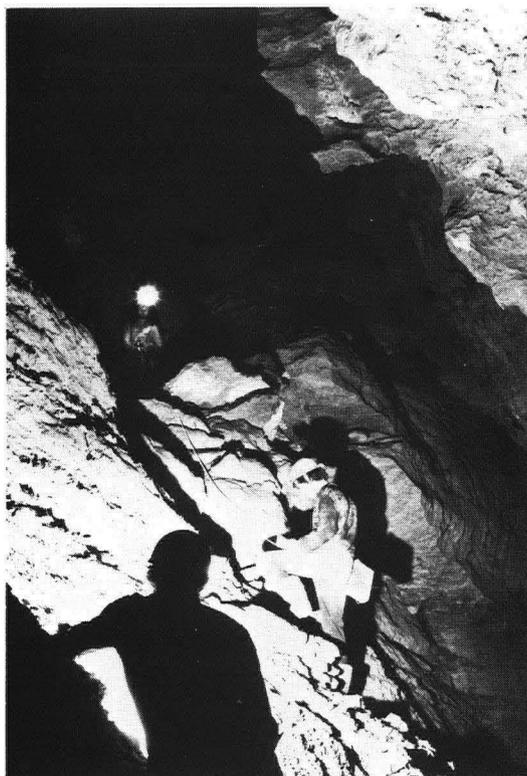




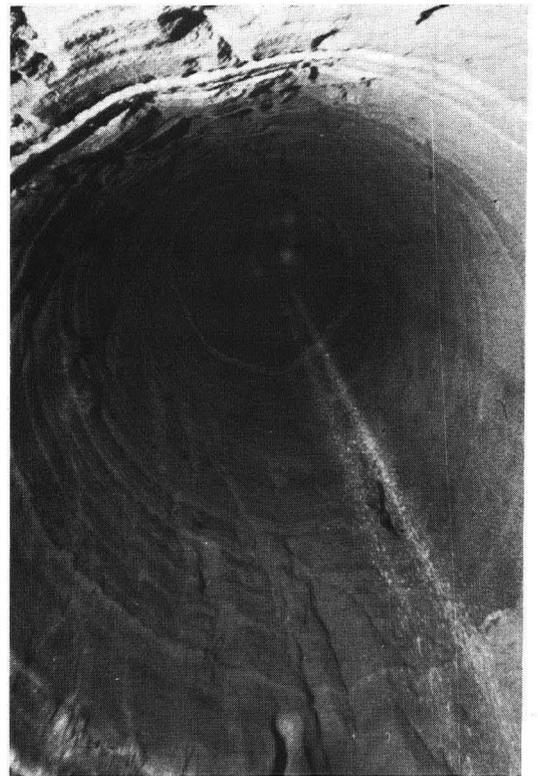
1. The phreatic remnant of Cueva de los Emboscados. (J.S. Corrin)



2. Bright red gour pools in Blood Alley, Cubio de la Renada. (L.D.J. Mills)



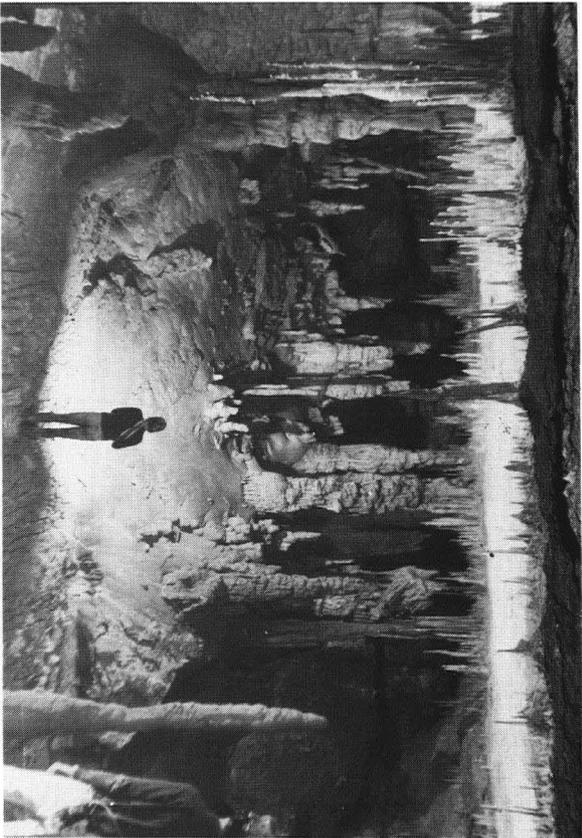
3. Surveying in Gran Risco, Ozana. (L.D.J. Mills)



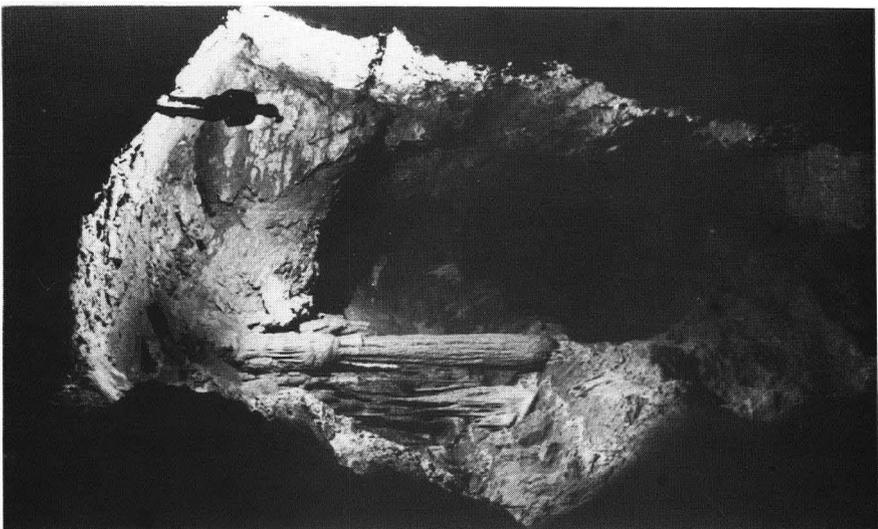
4. The circular, 101 metre high Astradome in Cueva Uzueka. Circles near the top are multiple images of a helium balloon. (J.S. Corrin)



1. Formations in Fuente de la Cuvia, Riano (J.S. Corrin)



2. Formations in Cueva de Solviejo, Secadura (J.S. Corrin)



3. ... In Stuffed Monk Gallery, Cubio de la Renada.
(L.D.J. Mills)

The Ozana and Uzueka caves, for example, maintain remarkably constant stratigraphic levels in their inclined courses in the dipping limestones, and many segments of horizontal passage, for example in Cabaña and Reñada, are orientated on the strike of the bedding. The control therefore seems to be due to both thin shale partings in the bedding planes and also preferred solution of some limestone beds.

In addition, strong control is exercised by both the thin sandstone beds and the horizons of Orbitolina marl. The latter is a thinly bedded impure limestone crowded with the foram fossils which give it its name, and it guides a number of caves. Its main underground exposures are in the Uzueka cave where it lies just above a sandstone and the relative importance of the two horizons is confused. The thin sandstone beds are important stratigraphic controls which influence many lengths of passage notably in the Ozana, Uzueka and Llueva caves. Being resistant to erosion they commonly form the floors of the passages, both phreatic and vadose development being perched on them and the cave streams breaking through the sandstones on faults or major joints. In Llueva the main phreatic cave developed below the sandstone and roof collapse has worked upwards leaving the sandstone as a strong roof in the main passage.

The persistent stratigraphic controls in the Matienzo caves mean that the major folds achieve their own significance, with synclines tending to gather any vadose drainage. The Four Valleys System is located in the northern syncline with water collecting from both limbs and then draining east roughly along the axis. However, this is not a classically simple case of synclinal vadose control, for nearly all the known cave passages have clearly phreatic origins. There is no clear reason why a syncline should collect phreatic drainage, though the transfer to the modern vadose phase subsequent to a rejuvenation at the resurgence would have been aided by the synclinal form. Synclinal controls of the phreatic caves could have existed if the caves were merely flooded conduits within an essentially vadose zone - prior to their enlargement when true vadose conditions could progressively take over. But the large cross sectional passage sizes, notably in the Uzueka and Llueva caves, would have required inconceivably enormous flows to maintain totally flooded conduits over the gradient present. There are no signs of local constrictions in the passages which could have developed a staircase-like series of perched phreatic zones down the dip of the limestones. Instead, the location of the Four Valleys System in the syncline appears to be a fortuitous result of the incision of the Llueva and Secadura valleys so close to the fold axis.

Faults and joints have had a considerable influence on plan forms of the caves, as is well revealed by the cave surveys; perhaps the zig-zag maze in the Uzueka entrance series shows the best. However, the control is only secondary to the stratigraphic control; passages are aligned along fracture/bedding intersections but usually break from joint to joint while still remaining at the one bedding level. The situation is different in much of the Renada cave where the drainage is against the dip and the cave has developed in a more complex maze using both bedding and the faults and joints; many of the major fractures have been picked out into enormous solutional rifts. Faulting in the Ozana cave has mainly had the effect of inducing collapse, to the extent that most of the fault/passage intersections are now lost in impenetrable boulder piles. Even though they clearly represent a weakness in the limestone there has been no preferential cave development along them; in fact the opposite is true, as nearly all the passages are in the bedding between the faults.

It is an almost perpetual debate, in cave regions, how much a base level or a water table has controlled cave development. The same question must be raised at Matienzo, and unfortunately the answer is still not clear, (Fig. 10). The evidence for such a control is always in the form of "levels of development". In the Matienzo valley, many of the caves are close to the present valley floors, but then the Codisera, Cuatribu, Rascavieja and Cabaña caves, together with some lesser ones are all at altitudes around 400m. Does this represent an old level of the valley floor which was constant for a period of time and at which cave development stabilised? Beyond the general coincidence of levels, there seems little real evidence for this. The only accurate way of recognising the altitude of an old water level (whatever that may be related to) is by locating a cave passage which changes from vadose to phreatic along its length. Codisera includes a section of massive vadose canyon (with phreatic features high in its roof) which appears to continue as the entirely phreatic passage in Cueva del Coveron, and the morphological change is at a level of around 320 m in the short inaccessible section. In a single passage this could represent only a local water level of no regional significance and anyway it is related to

drainage to the Ason and not the Matienzo basin.

It therefore sheds no light on the significance of the development within Matienzo at around 400 m. All the fossil caves at around this level are phreatic, and there is no indication of how their level related to any contemporary valley floor. In detail, all the cave passages show local control by geological features and consequently range over considerable variations in altitude. It is reasonable to suggest that they represent a single phase of development, formed long ago during a period of relative stability when the valley floor was somewhere above them and much higher than it is now. But they provide no precise data on the actual level of the contemporaneous valley floor. Any concepts of "levels of development" must only be applied in very broad terms.

It is instructive to examine how any "level of development" is manifesting itself in the currently active caves. The main river caves are all close to valley floor levels. They range in altitude across the area from about 250 m (in Ozana) to less than 100 m (in Llueva and Secadura). They are nearly all locally controlled by stratigraphy. While most are vadose and therefore above valley level, some, such as the downstream sumped sections in Reñada, are below valley level. The overall picture is therefore one of a zone of development with a restricted altitude range, close to the present valley floors. It is debatable, however, whether the valleys control the caves or the caves control the valleys. The main caves of Agua, Carcaveuso, Uzueka and Llueva are old phreatic systems which merely happen to carry the present drainage but were formed initially long ago when valley floors were higher than they are now. In the Vega valley surface erosion of the weak Wealden sediments is now controlled by the level of the Agua outlet. Rapid downcutting of the valley is now restricted to the low rate of solutional downcutting in the limestones within the Cueva del Agua, and the result is a planation of the valley floor. The same applies to the Carcaveuso outlet of the Secada valley, and in neither case has the valley level exercised any control over the cave level. The converse has occurred. Similar must apply to any coincidences of cave and valley levels in the past, except that the valley floors would have been limestone too and there would have been greater scope for deep phreatic drainage.

In conclusion, the Matienzo depression appears to represent a fine example of cave and karst development where the patterns of drainage and evolution have been subject to a variety of interacting geological and topographical controls.

ACKNOWLEDGEMENTS

The great majority of the cave exploration and surveying at Matienzo has been carried out by a series of expeditions organised by the Manchester University Speleological Society. Without this fieldwork, this paper could never have been written, and the authors therefore gratefully acknowledge the support of these many cavers.

One author (L.D.J.M.) spent seven summer seasons at Matienzo, as the leader of the earlier expeditions, while the second author (A.C.W.) visited the area as a guest of the 1977 expedition.

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Note: The four English reports contain descriptions and surveys of many of the Matienzo caves, mostly in the 1975 report except for the caves noted above described in the other years reports. All the reports are available from L.D.J. Mills at the address below.

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PREHISTORIC REMAINS AND ENGRAVINGS DISCOVERED
BY THE BRITISH SPELEOLOGICAL EXPEDITIONS TO MATIENZO

P. Smith

ABSTRACT

A possible hand axe, a human skeleton, a bone arrow or spear head and a bronze sword have been discovered by the expeditions. Six engravings have also been found, although some doubt remains about their authenticity.

The British expeditions to Matienzo have made some significant additions to the original discoveries made by the Spanish cavers to the area and described by Begines (1966). His article is mainly concerned with Bronze Age pottery found in Cueva de Cofresnedo. Recent visits have revealed more pottery in nine different places within the cave which still remain to be studied.

The main discoveries by our expeditions have been in four caves.

Cueva de los Emboscados

A possible hand-axe was found in the form of a large iron-ore nodule. This is an oval stone, 125mm long, 90mm wide and maximum thickness 40mm, which weighs some 645g. Both ends display fractures, although it is hard to say if these are intentional or due to use by man, or to natural causes. Also, as with all the archaeological finds within Matienzo, it is difficult to date as it was found on the cave floor without stratigraphic remains which could establish its chronology.

Cueva de Rascavieja

In this cave, where the Spanish cavers found Iron Age pottery, a human skeleton was discovered in a low alcove off the first chamber. Probably belonging to a male youth, the bones - part of the skull, the jaw and teeth, vertebrae, ribs, etc. - were separated among boulders. Possibly they date from the Bronze Age. They were collected by Regino Rincon, and will be described in his forthcoming publication on the Bronze Age in Santander.

Cueva del Risco

A bone arrow or spear head was found near to the end of the Galeria de Pinto in this cave. Although 88mm long, it is scarcely 5mm in diameter, reaching a fine point. The base has been bevelled where it fitted on to the shaft. It must come from the Old Stone Age, either the Solutrean or Magdalenian periods. The arrow head was found close to where the Spanish cavers discovered remains of the giant deer, *Cervus megacervus*, and where we encountered antlers, probably of red deer, in 1978. All these finds, a kilometre into the cave, indicate there must have existed another entrance which is now blocked.

Cueva de la Espada

In 1975 a bronze sword-blade was found in the stream passage near to the lower entrance. This is 610mm long and still contains two of the rivets with which it was fitted to the handle. It was studied in detail by M. Almagro (1977) who dated it in the Late Bronze Age. Currently on display in the Museo de Prehistoria (Santander), it is considered one of the finest examples discovered in the province, although in the past three swords were found in Cueva Collusa, Ogarrio.

The dry entrance to the right of the resurgence was inhabited by early man and contains substantial prehistoric remains. A trial dig here revealed several flints, probably belonging to the Magdalenian period.

Cave engravings in Matienzo

During the last two years we have found two caves in Matienzo with what appears to be Prehistoric Art. (Plate 6, Figs. 2 & 3). Neither of them has

been studied by a qualified archaeologist, which explains the reserved opinion about their authenticity.

The first examples were found in the Cueva de los Emboscados (La Secada), a cave which had first been explored by the Spanish cavers in the 1960's - their report includes a sketch survey (1966a).

We returned to the cave in 1975, producing a survey in our report of that year (KCC/MUSS, 1975). Nevertheless the engravings were only noticed in March 1979, when the three drawings in Panel I were recognised. On a later visit with J. Leon and M. A. Puente (Asociacion Cantabra para la Defensa del Patrimonio Subterraneo) the two drawings of Panels II and III were identified.

The second cave was Cueva del Patatal (La Vega), which had similarly been explored by the Spanish cavers in the 1960's and by us in 1975. The single engraving it contains was found in July 1980.

Cueva de los Emboscados

All the engravings are found in the second passage of the cave which, apart from the entrance crawl, is high, wide and comfortable to explore. Panel I lies on the left hand wall, near to a large boulder which stands in the centre of the passage. It represents the body and head of a deer, 79cm long by 57cm high. The front of the chest is drawn with multiple parallel lines, giving the effect of shading. The second drawing is of the head of a deer 52cm high, and the third is more difficult to interpret, but it is probably another deer or horse, 58cm long by 54cm high. This is different from the other four drawings in that it is shown looking towards the left. These three drawings of Panel I are similar in that the fronts, necks and chests are represented by the multiple lines.

Panel II is found a little further along the same wall. Here there is a single drawing of a deer, 53cm long by 28cm high, being drawn with single lines representing the back, chest, head and antlers. Panel III lies on the opposite side of the passage, in a small alcove, and the drawing is similar to Panel II - a deer 42cm long by 40 cm high.

All the drawings have been done with light scratches on the wall, probably with a stone. In technique they are similar to the engravings in Cueva de Cobrantes (San Miguel de Aras), and their style - of multiple lines - is typical of engravings found on the walls, and on bone objects, in many Cantabrian caves, including Altamira and El Castillo (Puente Viesgo), where they are attributed to the Solutrean or early Magdalenian Age.

Cueva del Patatal

The engraving is found in an alcove on the right at the end of the main passage. About 25cm long, it possibly represents the body of a deer, although this is hard to say as it has been drawn without a head. Also a vertical line down from the centre of its body could represent a spear.

It is different to the engravings in Emboscados both in technique - it is drawn with a deeper and firmer line - and in style, remember that the engravings there especially emphasise the head.

Perhaps the spear was drawn for magical purposes, to demonstrate the vulnerable point of the animal, in which case the head would become less important and so be omitted. Following Leroi-Gourhan's classification, this engraving can perhaps be included in his style II, within the Gravethian or early Solutrean periods. This means that it is somewhat older than the engravings in Emboscados.

Conclusions

Regarding their authenticity, the drawings the Emboscados lack the 'patina' usually found on prehistoric engravings, and differ very slightly from modern scratches made on the wall. Nevertheless, it is a cave which has never been visited very much, unlike Patatal which is one of the caves most frequently visited by the locals. On the other hand the engraving in Patatal does have the patina, taking on the same appearance and colour as the rest of the wall. One point in common between the two caves is their position. Both their entrances face south and are about 50m above the valley floor, close to a river.

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MATIENZO UNDERGROUND

Compiled by J.S. Corrin and P. Smith

ABSTRACT

A cavers guide to the caves and potholes in and around the Matienzo region of Santander, Northern Spain. Over 240 sites are described, giving grid reference, altitude, depth and/or length and a reference to where further information can be found.

NOTES: The numbers after the cave names are those plotted on the Matienzo Area map (to be found in 'Geomorphology of the Matienzo Caves' in this Transactions). Some of the caves lie outside the area covered by the map. These are marked with an asterisk (*).

(i) The grid references were obtained from the following maps:

- (a) Villacarriedo 1953 Scale 1:50000 Contours at 20m intervals.
- (b) Santander 1975 Scale 1:50000 Contours at 20m intervals.
- (c) Sheets VIII-30, VIII-31, VIII-32, IX-30, IX-31, IX-32, X-31, and X-32 from the ariel survey of Santander 1976. Scale 1:50000 Contours at 5m intervals.

(ii) Where entrance positions are accurately known, then an eight figure grid reference accurate to 10m is given. Altitudes are then accurate to 2m. Where the 1:50000 maps had to be used, a six figure grid reference is given accurate to 100m. Altitudes are then accurate to about 20m.

ACKNOWLEDGMENTS

Many of these descriptions have been condensed from those found in the Journals mentioned in the bibliography. We wish to acknowledge the hard work of the authors of these articles, and also express our appreciation of the cavers who originally wrote cave descriptions into the expedition Log Books.

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The subscript 's' denotes the inclusion of a survey as well as a description.

Cueva de A.B.I. (No. 58) Enaso.

VN51289682 Alt. 478m Length 50m

The initial, strongly draughting squeeze leads into a large, steeply descending, boulder floored chamber. Ref. C.

Cueva del Abono (No. 33) Beralta.

VN507948 Alt. approx. 500m Length 120m Depth 30m

Walk-in entrance to a 16m pitch. Gour floored chamber at base leads immediately to greasy calcite slope where ladder is useful. Ends at a chamber with avens. Ref. A F

Cuevas de los Adillos (No. 34) Beralta.

VN515951 Alt. approx. 450m Length 20m

First cave is choked with clay, the second is unexplored beyond the first few metres. Ref. As.

Cueva del Agua (No. 59) Enaso.

VN51619622 Alt. 165m Length 1900m Depth 12m Fig. 6

The sink for La Vega river. Large, impressive entrance at end of stream bed leads to large, rock-strewn chamber at the end of which the water is met. The remainder of the main line cave is sporting stream passage - a mixture of wading, clambering and swimming. The large sump pool at the end of the passage has been dived through to La Cuevona, the resurgence.

On the left of the first lake, 200m from the entrance, is a strongly draughting inlet which has been followed for 600m until it becomes rather small.

Just upstream of the sump are two calcite ramps with fine coloured formations. (Plate 1, Fig.1; Plate 4, Fig.1). Refs. As Bs Cs Es.

Alpine Cough Pot (No. 99) Muela.

VN54049721 Alt. 578m Depth 70m

Single pitch leads to silted chamber.

Cueva del Anderal 1 (No. 8) Ozana.

VN54109501 Alt. 249m Length 80m Fig. 7

Roomy passage meets stream and soon becomes too low. Ref. As Cs

Cueva del Anderal 2 (No. 9) Ozana.

VN54029510 Alt. 240m Length 300m Fig. 7

Complex entrance leads to low crawl in liquid mud and, after 50m a junction at a pool. The way to the left enters varied passage ending at a draughtless low airspace. To the right the passage divides and chokes. Ref. As Cs.

Cueva del Anderal 3 (No. 10) Ozana.

VN54009512 Alt. 255m Length 150m Fig. 7

Directly above Anderal 2, the entrance leads to a junction. The right hand passage soon chokes while the left hand passage also chokes after passing over numerous blind pots. Ref. Cs.

Sima del Andrés (No. 80) Secada

VN52869678 Alt. 245m Depth 20m

Single choked shaft. Ref. As.

Cueva de Año (No. 151) Secada.

VN51629756 Alt. 175m Length 30m

Short choked cave.

Torca de Arnilla (No. 60) Enaso

VN500964 Alt. approx. 300m Depth 20m.

Choked shaft. Ref. C.

Cueva de Asiul (No. 61) Enaso

VN51899628 Alt. 248m Length 80m

Entrance is small and near to large limestone boulder. A well decorated passage ends at a flowstone blockage. Ref. As Cs.

Torca del Avellano (No. 55) Beralta*

VN500945 Alt. 460m approx. Length 100m Depth 43m

Five metre ladder climb leads to steeply sloping rubble heap. A 7.6m pitch follows and a steeply inclined bedding passage leads to a 7.3m pitch. Passage then lowers to a strongly draughting 4cm airspace over water. Ref. Hs.

Cueva del Arenal (No. 35) La Vega*

VN492950 Alt. approx. 200m Length 200m

There are three entrances below a cliff face. The outer two holes soon choke. The middle entrance emits a strong draught from its sizeable ellipse. Cave ends at solid, draughting boulder choke with much potential. Ref. A C.

Torca de las AVeras (No. 108) Muela
VN57559514 Alt. 460m Depth 80m
Single shaft. Entrance has a tree growing across the top.
Ref. Grupo Espeleologico 'Torca', Loreda.

Torca de la Babosa (No. 62) Secada
VN51099798 Alt. 320m Depth 20m
A single tight, slimy shaft which is choked with calcite. Ref. C.

Cueva de Basura (No. 100) Riano
VP51540049 Alt. 157m Length 180m
Entrance slope is a pile of festering rubbish. This leads to two circular halls, one contains a 7m blind pot. Routes become too low after splitting into two parallel passages. Ref. Ds.

Torca de Beralta (No. 51) Beralta*
VN520944 Alt. 625m Depth 65m
Entrance in a shakehole on some level ground near the top of Beralta. A single shaft with a small amount of passage at the bottom.

Torca de Bosmartin (No. 63) Enaso
VN50329787 Alt. 512m Depth 25m
Entrance pitch of 13m lands on boulder slope which leads to 8m pitch which chokes, as does a 6m alternative pitch to the right. Ref. C.

Los Boyonnes (No. 117) Secadura
VN55859955 Alt. 50m Length 100m
Resurgence for the water found in the caves of Uzueka, Carcaveuso and Llueva. Cave is 5m above the main resurgence and emits a strong draught. A 5m pitch leads to a hole down into the boulder choke. Draught can then be followed through the boulders to the river at the base of a steep mud slope. Various climbs at the top of the slope close down and the draught is lost. Ref. F.

Sima del Burro (No. 1) Ozana*
VN540943 Alt. 335m Depth 50m
Shaft with window into second shaft. Both choke at about the same level. Ref. As.

Torca de la Cabaña (No. 36) Beralta
VN502952 Alt. 420m approx. Depth 160m Length 500m
Holly trees surround the top of the roomy 27m entrance pitch. The landing is on a boulder slope which chokes at its base. Way on is through a slot on the right. Following the inward draught through tight passage leads to the constricted head of a 21m pitch. The third pitch of 7.5m follows immediately, as does the fourth pitch of 38m. Passage at the bottom stretches in both directions.
The East Wanders is reached by ascending a 10m wide sand-floored passage. A side passage descends to a series of partially collapsed phreatic tubes (which eventually join up with the pitch chamber) and a passage which leads to a large hall half full of house-sized blocks. Back in the main phreatic level a four ways junction is reached. The right hand passage soon closes down at a well decorated chamber and rift; straight ahead is a sandy crawl under stalactite grills to a well-decorated chamber after 100m; straight ahead is the main way on. This leads to a continuation of the large chamber mentioned before. Turning right here leads, via various boulder scrambles, to the final choke after 120m.

West Wanders starts from the base of the fourth pitch and traverses the same phreatic level as the East Wanders for 150m to a T junction. Both branches choke. There are a number of shafts along this level ranging from 15m to 70m in depth, some of which are unexplored. The deepest descended shaft is situated in sandy hollows to the right of the main bedding. These shafts could well connect with avens seen in Cubio de la Renada. Ref. Bs.

Sima de la Cabritilla (No. 37) Beralta
VN509952 Alt. 410m approx. Depth 25m
A 25m pitch to a series of incompletely explored phreatic passages. Ref. As.

Cueva de Calleja Rebollo (No. 38) Beralta*
VN491952 Alt. 250m Length 70m
A low entrance leads to a chamber and single fossil passage, passing under an open shaft. The cave was inhabited during the civil war.

La Cuevona del Camino (No. 85) Secada
VN52859698 Alt. 240m Length 10m
Little more than a rock shelter, some 20m wide and 10m deep. Ref. As.

Sima del Cañado (No. 251) Muela

VN55209717 Alt. 420m.

An undescended shaft of about 30 to 50m depth.

Cueva de la Canal (No. 101) Riaño

VN52879914 Alt. 405m Length 235m

Entrance is resurgence at the head of the wooded valley behind Fuente las Varas Bar. The whole of the cave is stooping or crawling in water, and the 'end' is where the going becomes flat-out. This point could be near to the bottom of Fuente las Varas Pot.

Cueva de los Caracoles (No. 247) Secada

VN52379662 Alt. 170m Length 20m

The dug entrance at top of field leads to flat out bedding which becomes too low at a point which must be very close to the ramps in Cueva del Agua.

Cueva de Carcaveuso (No. 81) Secada

VN52879800 Alt. 147m Length 300m

All of the water in the Matienzo depression sinks in a mass of boulders. A dry stream bed beyond this leads to an area of draughting boulders, and this is the entrance to the cave. The first hundred metres is a complicated collapse zone with rifts above which eventually breaks out into the high rift river passage. More boulder chokes have to be passed before the sump pool is reached. This has been dived to a boulder choke and holes directly above the sump have been maypoled - there is a possible draughting continuation here. The water is next seen in upstream Cueva Llueva, over 800m away. Ref. Bs F P.

Cueva de Carrasquilla (No. 11) Ozana

VN53439608 Alt. 245m Length 30m

Low crawl which becomes too low. Winter resurgence. Ref. A.

Cueva de la Castaña (No. 102) Riaño

VP52500003 Alt. 207m Length 250m Depth 30m Fig. 4

A chestnut tree filled depression contains a number of entrances all of which unite at a 9m pitch. Thirty metres of walking leads to a climb of 7m and then varied going to a large chamber. From here an inlet can be followed for 60m to its end at two large avens. Downstream the passage closes in and ends at a strongly draughting, tight, muddy crawl. This could connect with the Gorilla Walk in Cueva Uzueka. Ref. Cs.

Torca de Cellarón (No. 109) Secadura

VN55239909 Alt. 282m Length 620m Depth 107m (cover photo)

Entrance is in a walled, wooded depression. A fine shaft of 47m lands on a festering heap of remains. To the east, the walking sized passage ends at a calcite choke after 100m. In the opposite direction, a gradually enlarging passage leads to a veranda looking down into a large chamber. Just back from here on the right a narrow, calcite-floored rift eventually closes down. On the left before the veranda, a large passage ascends over boulders to a steep calcite slope. At the top of this, a well decorated section has a 30m choked pitch through a window on the left hand wall, and a 15m choked pitch at its end.

The easiest way down into the blackness at the veranda is by stooping under the left hand wall to a boulder slope down to the right. The way on gradually enlarges until the passage attains a width of 50m. At this point a stream, cut into the sediment, sinks at a 15m choked shaft under the left hand wall. The main passage gradually ascends to a calcite choke after a further 180m. Water draining from the lower reaches of this cave must drop into the unexplored streamway on the far side of the downstream sump in Cueva Llueva. Ref. Fs P.

Cueva Chica (No. 83) Secada

VN532967 Alt. approx 450m

Short choked cave. Ref. A.

Cueva de la Chora (No. 113) Llueva*

VN59029966 Alt. 50m Length 40m

Entrance, closed with green, wooden door is in a small limestone face. First chamber contains passage on right which closes in. Excavations revealed remains dated to the Late Magdalenian Period. Ref. Echegary, Guinea and Begines, Excavaciones Arqueologicas en Espana, No. 26.

Sima de la Chova (No. 64) Enaso

VN521967 Alt. 350m approx. Depth 15m

Straight pitch to chamber. Ref. C.

Cueva de Churro (No. 118) Secadura

VN55700000 Alt. 65m Length 460m

Entrance is resurgence upstream of open air laundry area, pipe supplies water to a house. Stream passage ends at sump. Upper level passage also ends at a sump. Water comes from Torca de Simon. Ref. Fs

Sima de los Churros (No. 82) Secada

VN53369896 Alt. 395m Depth 27m

Straight pitch to possible draughting dig.

Cueva de Coberruyo (No. 138) Enaso

VN51539639 Alt. 300m Length 50m

Large cave entrance leads to goat shelter where it is difficult to leave daylight. Ref. Cs.

Cueva de Cobrantes (No. 110) San Miguel

VN57239662 Alt. 155m Length 472m

Entrance is situated at the head of a steep grassy field and is about 35m wide and 5m high. Very large passage for 200m leads to where a climb up greasy calcite stops at the head of a sloping 25m pitch. The easy way at the bottom leads to two grottoes. More interesting way is a greasy climb back up to the level of the head of the pitch where the passage continues. A couple more climbs over calcite give access to a boulder slope down and then a calcite climb up to the final wall. Passage may exist at the top but all attempts at climbing and maypoling have failed due to the fragile nature of the calcite.

Cave has probably served as a resurgence for the pots and caves of Muela. The water now resurges at Nacimiento, 100m below. Ref. A Fs H.

Cueva de la Codisera (No. 39) Ozana*

VN53379430 Alt. 450m Length 1500m

Large entrance leads into enormous vadose canyon. A ledge on the left after 200m provides access to a high level gallery running off on the right. This reduces in size until a 90m shaft is reached. At the base is a narrow streamway. An awkward traverse over the pitch leads to a continuation of the passage which soon chokes.

Back in the main passage, the floor slopes down to a 25m pitch which lands in another large level. The westerly direction chokes under the entrance series, the easterly direction passes into a draughting bedding and thence to a choke in a small streamway. Much potential remains. Refs. As C.

Cueva de Cofresnedo (No. 65) Enaso

VN52289637 Alt. 235m Length 275m

One large dry passage with plenty of calcite formations. Ends at a calcite slope which meets the roof. Refs. As Cs.

Cueva Collusa (No. 3) Ogarrio*

VN576939 Alt. 500m

Three bronze age swords were found in this small cave.

Ref. M. Almagre, La Espada de Entrambasaguas, XL Aniversario del Centro de Estudios Montaneses, Vol. 2-3, Santander 1977.

Cueva del Comediante (No. 40) La Vega

VN50799575 Alt. 170m Length 300m

The resurgence cave for much of the water sinking on Beralta. The streamway is soon left inside the entrance and the large passage eventually closes down and chokes a few metres from Reñada. The water is seen again in Reñada. Ref. As Bs.

Cueva del Concejo (No. 12) Ozana

VN54659532 Alt. 425m Length 80m

Large (15m x 8m) entrance soon diminishes to a 3m x 2m passage and then closes down. Ref. Cs.

Cueva de Coreano (No. 137) Secada

VN52899675 Alt. 260m Length 20m

Short crawl into small chamber with deep pool.

Cueva las Cosas (No. 84) Secada

VN53159748 Alt. 255m Length 70m

Small entrance leads to 60m diameter chamber. Ref. As Cs.

Cueva del Coveron (No. 2) Ozana*

VN54319378 Alt. 300m Length 2500m

A complicated cave of great variety, Entrance leads to large chamber. First sloping exit on the right provides access to a long series of phreatic domes. The apparent end of Tree Gallery is bypassed by a squeeze at roof level.

Further squeezes lead to a continuation of the domes, a division of the ways and two chokes. Just back from the junction a rift descends to a three ways junction, one passage containing a long pool.

At the far end of the entrance chamber a rift on a rock slope provides entry to Nuts Passage, a series of tubes and phreatic chambers.

The main way on is down through a squeeze on the left of the entrance chamber. Large phreatic chambers soon close down to the right and straight ahead, while to the left a 5m climb leads to the head of a 20m pitch. At the base of the pitch is the complicated Mini Maze, the route on being a tight squeeze to walking passage which runs to the top of a 17m pitch. This drops straight into the vadose section of the cave. Upstream leads to a 4m climb and drop down over a barrier. The next obstacle is a 16m high climb over greasy calcite where, near the top pits are useful. A 12m pitch back to the stream follows immediately. The passage then continues for 200m to a tortuous route in rotten rock until it becomes too tight.

Downstream the cave passes the odd obstacle in a mainly narrow streamway to end after a couple of hundred metres at a calcite choke. Ref. A Cs.

La Coverona (No. 112) Llueva
VN56459722 Alt. 265m Length 337m

Remnant of large fossil passage perched high above Llueva Valley. Thirty metre wide entrance slopes down to large boulder and calcite floored passage with some fine formations. A junction is met after 180m. To the left the passage ascends over boulders to a chamber, while to the right, greasy calcite descends to an old lake with false floor remains around the side. The passage then soon closes down in small phreatic tubes. Ref. Ps.

Torca de la Cruz de Llorada (No. 66) Enaso

VN50499811 Alt. 487m Depth 50m

Elliptical shaft with small hazel tree. Twenty metre shaft leads to boulder slope at the base of which is a small hole and the second pitch of 18m. Boulder floor slopes down to an easy dig. 'Upstream' quickly chokes. Ref. C.

Cueva de Cuatribu (No. 13) Ozana

VN55459503 Alt. 415m Length 230m

Entrance is well hidden by trees. The passage starts as a 9m high and 4m wide jog, but stalagmite columns and gours slow down progress. Passage then develops into a high rift and ends at a blind 6m pot after passing some fine helictites. Ref. As Cs.

Cubio de Cubija (No. 243) Enaso

VN50189701 Alt. 268m Length 50m Depth 15m

The entrance is a sink behind the house. A couple of rope climbs and crawling leads to a draughting unpushed tight passage.

Torcon de Cubija (No. 67) Enaso

VN50309678 Alt. 260m Length 400m

The small entrance is in a large, steep-sided shakehole, which acts as a wet weather stream sink. Fairly small passage to a 4m climb down and then a squeeze into 100m of alternating walking and crawling. After an oxbow the passage enlarges and a route to the right ends in a muddy choke after 50m. The other direction leads to a chamber which carries a stream in wet weather. The stream bed can be followed to a small tube at the far end of the chamber. Dangerous climbs above this tube lead to 70m of passage which close down in a heavily pocketed area where the draught is lost. Ref. Cs Es.

Sima del Cueto (No. 41) Beralta*

VN494936 Alt. 700m Depth 150m

Large single shaft which is choked at the bottom. It could possibly drain to Cubio de la Reñada.

Cueva 77 A (No. 154) Secadura

VN55779957 Alt. 53m Length 40m

To the right of the main rising, the cave emits a good draught, although this is lost in the dank, dismal passages above deep water.

La Cueva (No. 248) Secada

VN52429667 Alt. 153m Length 87m Fig. 6

The resurgence for Cueva del Agua. The sump is an easy dive and at no point is deeper than 10m. Ref. A Bs Cs Es.

La Cueva (No. 177) Beralta

VN517956 Alt. 250m Length 150m

A small entrance just above Cueva del Haya leads to slope down into chamber containing a tight squeeze into a well decorated chamber. On the right parallel passages quickly choke.

La Cuvia (No. 86) Secada

VN53229800 Alt. 193m Length 200m

Steps lead down into the cave which contains two water troughs in its entrance. A climb down on the right of the chamber leads to a choke, while the obvious way on leads after 20m to a junction. The passage to the right closes down after 24m. The main passage continues through a crawl to a well decorated chamber and a pitch of 13m. At the base of this is a large chamber and a superb 7m high column. The cave then becomes small after passing through three chambers and ends at a choke of boulders. The cave could once have drained the Matienzo depression. Ref. Cs.

Cueva de Dofrades (No. 42) Enaso

VN508955 Alt. 300m approx. Length 320m

The entrance is a scalloped, phreatically enlarged rift which slopes steeply downwards. After 20m a 10m pitch drops into a roomy chamber. A squeeze through at floor level leads to a 5m pitch. To the right is a greasy climb to a draughting choke but at the bottom of the pitch the passage continues walking sized with several levels that unite in a sandy chamber, extensively pocketed. The way on leads after 50m to a 15m diameter chamber with a deep pool. A squeeze at floor level under an incredibly scalloped wall gives access to a traverse to the cave's second entrance at a lower level than the first. Ref. Hs.

Cueva de los Emboscados (No. 87) Secada

VN52509805 Alt. 220m Length 180m

Entrance is at the head of a steep wooded slope under a rock shelter. Goats are kept out of the cave by rocks which have to be removed to reveal a small draughting hole that leads into a fine 12m wide passage. The calcite slope levels out at a blind pit in the floor and then zig-zags to a gentle ascent to a draughting boulder choke. Emboscados could well have drained the Matienzo depression in the past. (Photographs: Plates 6 & 7). Ref. As Cs H P.

Sima de Escajadillo (No. 88) Secada

VN522985 Alt. 370m approx. Depth 18m

Straight shaft to grotto. Ref. As

Cueva del Escarabajo (No. 43) Beralta*

VN511941 Alt. 650m approx. Depth 50m

A 15m walk leads to a 20m calcite slope where ladder is required. Landing is on a large ledge. A 10m pitch then lands on another calcite slope which ends at a calcite choke. The alternate way down from the ledge also chokes. Ref. A.

Cueva de la Espada (No. 103) Riaño

VP512009 Alt. 120m approx. Length 600m.

A stream passage through trip. Twin top entrances unite in the streamway. Passage chokes 90m upstream while downstream the water occasionally disappears under the right hand wall until about 180m from the entrance, the stream's route chokes. The way on is a climb of 4m up a cross joint and then a 4m climb down into deep water. This can be left immediately to join walking-sized, dry passage. Two sandy inlets on the right choke and the main passage continues increasing in size until a climb over boulders and a sandy ramp is reached. This sandy passage on the right ends at an upwards boulder choke. The streamway now becomes more aqueous, passing two short inlets on the left and then encountering a large boulder choke. A couple of squeezes and then a canal is reached which joins a higher sandy level after 20m. The left way soon chokes but the right hand route reaches daylight after 50m. Ref. Cs.

Torca de la Espina (No. 128) Muela.

VN54199693 Alt. 615m Depth 76m

A 29m pitch lands in a large chamber which then descends over mud and calcite to a choke. Ref. Ps.

Sima Fiesta (No 68) Enaso

VN51759697 Alt. 355m Depth 25m

A straight shaft into a choked, 20m diameter chamber. Ref. Cs.

Cueva de Fresnedo (No. 126) Fresnedo

VP532015 Alt. 140m approx. Length 300m

Bottom entrance is at end of dry stream bed. Top entrance is in a brambly shakehole 20m behind. Both entrances draught out strongly. Cave is basically developed on two levels - the lower stream level soon degenerates into a two dimensional maze of cobbled crawls. Twenty five metres inside the bottom entrance a crawl off to the left unites with the higher level. Emerging up through a rift, the top entrance (a 7m pitch) is 5m to the left. To the right various shuffles and crawls lead to a large chamber with three exits. All routes appear as a maze and connections can be made with the lower series.

A frustrating cave, as its position and draught indicate a large amount of unexplored passage. Refs. H Ps.

Fuente de la Cuvia (No. 207) Riaño
VN51459987 Alt. 190m Length 735m

Draughting entrance is above the resurgence and is a tight squeeze downwards into a low streamway. Crawling soon gives way to walking in a small vadose stream passage, and, by keeping to the right, a largish chamber is reached 80m from the entrance. Just back from here on the left, is the passage that carries the draught. This has been followed in a lowering streamway for about 200m until a calcite blockage stops progress.

Two routes are possible out of the main chamber. The right hand passage is walking and then a low crawl into a chamber; the left hand passage is lower and wider and contains some fine gour pools. This passage emerges in the roof of the chamber and it is possible to climb down. A couple of routes from here eventually combine in a cracked mud floor chamber which leads to 250m of walking and stooping in a well decorated passage. This ends at a low wide bedding. About 80m back from the end is a well decorated alcove containing a large number of goat skeletons beneath a blocked off surface shaft. (Photograph: Plate 8). Ref. Ps.

Cueva de Fuente las Varas (No. 104) Riaño
VN53009925 Alt. 440m Length 200m Depth 30m

Entrance is at the end of a drainage ditch, 1m from the road. The entrance crawl reaches a junction after 10m. Upstream to the right eventually becomes too low after 120m. The left hand passage, after various contortions at roof level, drops into a washed out shale band and then ends at the head of a 27m pitch. The landing is in a high, sandy-floored rift. Upstream narrows down, but downstream carries a draught which seems to disappear in a phreatic spongework. Water could feed Cueva Uzueka or it could be the water seen in Cueva de la Canal. Ref. F H.

Cubio de la Gatuna (No. 127) Hornedo
VN49789996 Alt. 146m Length 164m Depth 20m

The initial chamber leads to a series of loose cross jointed passages. A sandy crawl then leads to a length of nicely decorated passage which ends at two large chambers. There are holes between the boulders and one has been descended to 19m. Ref. Hs.

Cueva de Gonzalo (No.14) Ozana
VN52869629 Alt. 180m Length 30m

A short resurgence cave that ends at a sump. Ref. As.

Cueva de los Grajos (No. 89) Secada
VN537974 Alt. 410m Length 40m

A single large chamber, some 15m high, with old, fossil formations.

La Gracial (No. 69) Enaso
Not known to any accuracy Alt. 300m? Depth 20m

Fifteen metre ladder pitch drops into a small chamber with a constricted 5m slit at the bottom. Ref. C.

Refugio de la Guerra (No. 15) Ozana
VN53429590 Alt. 200m Length 10m
Small shelter Ref. A.

Cueva del Haya (No. 178) Beralta
VN518956 Alt. 240m Length 40m

Entrance is by a small sink in field next to barn. Streamway eventually becomes too low.

Torca del Higuera (No. 222) Fresnedo
VP531015 Alt. 160m approx. Depth 10m.

Five metre pitch lands on boulders which slope down in a wide rift to a choke. A very tight hole at the base emits a strong draught. Ref. P.

Horses Head Cave (No. 194) Alisas*
VN482956 Alt. 520m approx. Length 30m Depth 10m

A rift at the side of the road necessitates a climb down onto rotting horse carcasses. A 6m pitch follows immediately. A traverse over a large block leads to the continuation of the passage which then doglegs round to the right and becomes very tight in a descending, draughting rift.

Simas de Hoyo de las Puchas (No. 44) Beralta
VN496951 Alt. 300m approx. Depth 15m and 22m

A large depression which contains both holes. First on S side, second on N. Both blocked.

VN503966 Alt. 280m Depth 25m

Twenty three metre straight pitch lands on boulders. Down to the left enters a large, well decorated chamber while skirting boulders enters a low bedding into another large chamber. This contains a scree slope rising to the roof. To the right a low bedding becomes too low. Ref. C.

Cueva del Humo (No. 45) La Vega*

VN492953 Alt. 250m Length 45m

To the east of Cueva de Calleja Rebollo. Small entrance slopes down into chamber and squeeze into well decorated passage. Leads to base of an open shaft.

Torca de Jaime (No. 70) Enaso

VN51269684 Alt. 467m Depth 53m

The entrance pitch is of 8m followed immediately by one of 5m. A sloping rocky tube leads to the head of a 30m pitch which is followed by a 10m pitch landing in a small chamber with no way out. Ref. C.

Cueva de Jivero 1 (No. 16) Ozana

VN53739483 Alt. 260m Length 34m Fig. 7

Walking and wading to a sump. Choke above draughts strongly. Ref. As C.

Cueva de Jivero 2 (No. 17) Ozana

VN53739494 Alt. 265m Length 250m Fig. 7

A through trip. Bottom entrance immediately enters a superb phreatic tunnel containing the river. A sandy gallery on the right soon closes down. The streamway continues well decorated in places, to emerge at the twin openings of the upper entrance. Ref. As Cs.

Cueva de Jivero 3 (No. 18) Ozana

VN53839514 Alt. 255m Length 150m Fig. 7

Large entrance into which the water from Jivero 2 flows. Passage is a narrow rift which finishes at a deep water sump. Ref. Cs.

Cueva Llueva (No. 114) Llueva

VN54689839 Alt. 147m Length 2800m Depth 44m Fig. 8

The entrance is in an impressive depression, partly lined by overhanging limestone beds. An insignificant hole 3m up from the base of the depression gives access to 80m of sandy passage, the final section being a flat out crawl and then a squeeze through a blow hole to the head of a pitch. Three ladders are required although the vertical element of the pitch is only 10m.

The landing is on a sloping boulder pile. A climb upwards leads to an ascending and very greasy calcite ramp which closes down after 40m. A steep climb down the boulders leads to the river. Downstream the water enters a high phreatic maze which requires swimming or a dingy to pass. The length of this section is 100m and half way along it, on the left hand side, a similar phreatic passage leads back to the free flowing river just upstream of the boulder pile at the pitch. The downstream phreas stops at a boulder choke where a climb up to the right and through the boulders leads to a 'pop out' into a large passage. The river is then rejoined by walking down a boulder slope and then a pleasant stroll in a 10m high passage leads to a boulder pile after 200m. On the other side is the downstream sump which has been dived to a depth of 22m, the way on still being open.

Following the water upstream from the base of the pitch leads to 100m of swimming which halts at a boulder where it is possible to climb up to the high level passage. Entry to this passage is normally gained by ascending a rock pile to the left immediately after first meeting the water. At the top of the boulders a superb tunnel rises and falls over boulders for 300m until the final descent into the lake. A swim across to the right of the lake leads to an ascending boulder pile beyond which is a sandy crawl which closes down after 60m. On the left of this crawl is a climb up through boulders for 35m where a solid roof is met and no further rise possible.

80m back from the lake, a hole 5m up on the right hand wall can be reached by lassoing a boulder. A smallish sandy floored passage branches after 80m, the right hand branch leading to a 5m pitch onto the boulders at the right of the lake, the left hand branch leading to a 30m pitch into a large fault chamber.

The easiest way of reaching this chamber is by following the Left Hand Bypass. This starts as a slot down by the wall of the main high level passage, opposite the right hand wall hole. A mixed 200m of stooping, walking and climbing leads to a couple of inlets which cross the passage. By keeping to the left hand side and crawling under the wall a high boulder filled section on the fault can be entered, but by missing the crawl a veranda is reached with a view out into the main fault chamber. The left wall at this point has been climbed for about 50m but no obvious way on at the top exists.

The main fault chamber is reached by climbing down over boulders to the right of the veranda. A large phreatic tube on the right of the chamber pops out 10m

above the lake. The way to the river is down through the boulders in the chamber. The 200m of upstream passage is swimming in a large phreatic tube apart from 30m in the middle where the water rushes over a resistant band of rock and walking is necessary. The upstream sump has been dived for 30m to a bouldery chamber. The route on is through a very complicated boulder choke, the final secrets of which have yet to be revealed. The cave ends 170m from the boulder choke and stream at the end of Cueva Uzueka. (Plates 1 & 4). Ref. Ds F Hs Ps.

Cueva de la Loca 1 (No. 19) Ozana
VN54309495 Alt. 250m Length 100m Fig. 7

A stream resurgence. A wet crawl reaches a sump after 30m but a bypass can be entered 13m back on the right. The passage eventually becomes too low in the water. Ref. A Cs.

Cueva de la Loca 2 (No. 20) Ozana
VN54289498 Alt. 250m Length 900m Fig. 7

Entrance is above stream sink. A crawl to the left just inside the entrance leads to a streamway which descends with some traverses to a sump after some 250m.

By carrying straight on in the entrance, a maze of passages is entered which eventually reach a roomy gallery. To the left are a couple of short choked passages. 80m further on a sump is reached after some crawling. This sump is at the same altitude as the first and both are connected by a short, constricted passage. A round trip is therefore possible. Ref. As Cs.

Cueva de la Mantequilla (No. 90) Secada
VN52819705 Alt. 200m Length 15m
A single choked gallery. Ref. As.

Cueva del Mar (No. 4) Riba*
VN537166 Alt. 110m approx. Length 20m
Cave entrance is in the north bank of the Ason. It is best approached by swimming across from the south bank. Landing is on mud. A squeeze on the left enters a rift which leads to a second, higher entrance.

Sima de la Mortera (No. 21) Ozana
VN54049534 Alt. 225m Depth 17m
Straight shaft to a choked chamber. Entrance has now collapsed. Ref. As.

Cueva del Mortiro (No. 236) Secadura
VP557010 Alt. 280m approx. Length 80m
The entrance is in an impressive depression. Climb up a wall enters an ascending streamway with walking and stooping for 80m to a draughting easily dug boulder choke. Stream is used for a water supply. Ref. P.

Cueva del Mortiro (No. 5) Ozana*
VN54769332 Alt. 155m Length 770m
A through trip described from the bottom entrance. The first 200m in the water are the most awkward and after 300m a one metre long duck has to be negotiated. The passage then continues with wading in places until a boulder pile is reached. The surface can then be reached by a climb or by carrying on in the streamway for a few more metres. A wet and sporting cave. Ref. Cs.

Torca del Mostajo (No. 71) Enaso
VN50359699 Alt. 312m Depth 59m Length 325m
A 22m pitch drops onto a slope of boulders which leads immediately to a ropeclimb onto another boulder slope. Passage is now 7m square and to the left chokes after 50m. The gentle slope to the right reaches a short ladder or rope drop and then a steep slope descends to a pool. Partway down to the pool are a couple of routes down to another similar chamber. Ref. Fs.

Torca de Muela (No. 129) Muela
VN54579664 Alt. 793m Depth 58m
The entrance is 3m lower than the summit! A fine straight shaft lands in a pool. Ref. Ps.

Torca de Musa (No. 52) Beralta*
VN509933 Alt. 440m Depth 20m
A 10m entrance pitch leads to a large (60m x 30m) chamber with formations.

Torca de la Musguía (No. 22) Ozana
VN53769524 Alt. 265m Depth 18m
A clean washed shaft of 18m connects with an aven via a crawl. Ref. As C.

Nacimiento del Rio Clarin (No. 115) San Miguel

VN57929665 Alt. 55m Length 400m

This cave is the probable resurgence for much of the water that sinks on the Muela range. The entrance contains a still pool in the summer, the active resurgence being in the streambed to the south. In winter the cave is very forthcoming.

A 12m sump at the entrance leads to a 20m section of canal and the second sump of 2m. Scaling poles are then necessary to reach a number of different levels. The cave ends at two deep sumps. Ref. Cs.

Cueva Nonimportante (No. 156) Riaño

VN528992 Alt. 390m approx. Length 37m.

A wet resurgence cave that becomes too low.

Torca del Omoplato (No. 57) Beralta

VN488930 Alt. 400m approx. Depth 25m

A 7m drop is followed by a 12m pitch that lands in a choked chamber with a very tight continuation. Ref. H.

Cueva Oñite (No. 27) Ozana

VN54419511 Alt. 254m Length 8000m (incl. Risco and Tiva) Fig. 7

Entrance is a pitch of 6.5m that can be free climbed. This leads into the streamway or a few high level chambers can be reached. After a short crawl, water from a sumped passage on the right is met and for the next 500m the cave is a sporting vadose streamway. At the end is an 18.6m pitch into the final chamber of Sima-Cueva del Risco. On the left of the streamway, 30m before the pitch, a smallish passage leads into a large fossil gallery which soon chokes. Ref. A Bs Cs

Cueva de la Orilla Mijeo (No. 91) Secada

VN51659780 Alt. 195m Length 35m

Entrance at top of field with several chestnut trees leads into a long chamber sloping down to the left.

Cueva del Orillón (No. 23) Ozana

VN54359475 Alt. 275m Length 400m

The cave has three entrances and it is normally entered via the middle one as this requires no tackle. The passage degenerates into a low rift which soon meets a streamway that runs from west to east. Upstream leads to the Malbujero entrance while downstream, the passage is high with a couple of cascades until a large passage is met on the left. This leads to the base of the pitch from the third entrance. The remaining 250m of the cave is mainly walking. At the end the stream filters away through the floor, with a small amount of high level passage above. Ref. As Cs.

Cueva del Otero (No. 119) Secadura*

VP574003 Alt. 60 m Length 30m

At top of small wooded hill, entrance closed with gate. Excavated in 1963. Remains dating from the Musterian to the Azilian Periods were discovered. Ref. Echegaray, Guinea, and Begines, Excavaciones Arqueologicas en Espana No. 53.

Cueva del Patatal (No. 73) Enaso VN51659625 Alt. 225m Length 100m (Fig. 6)

Steep boulder slope for 30m leads to a 20m square passage with some 15m high formations. The cave ends at a calcite blockage. Ref. A Cs.

Cueva de las Perlas (No. 74) Enaso

VN51989634 Alt. 288m Length 20m

A very well decorated cave with an easy to miss, very small entrance. Ref. A Cs.

Peter Crawl (No. 240) San Miguel

VN57999653 Alt. 55m Length 20m

Short cave ending at a sumped bedding plane. Associated with Nacimiento del Rio Clarin.

Peter Plummet (No. 239) San Miguel

VN57989650 Alt. 60m Length 15m Depth 38m

Short cave ends at a boulder slope into deep water. Sump has been dived to a depth of 12m with an estimated 22m still to go. Ref. C P.

Simas del Picón (No. 75) Enaso

VN50129686 Alt. 300m Length 450m Depth 60m

There are three entrances, each being a pitch (26m, 20m, 20m). Boulder slope at bottom runs down to a choke at the deepest part of the pot. A climb up through boulders leads to a higher level running off in two directions. The easterly direction leads to a climb down onto the boulders at the entrance. The westerly

direction leads to a 30m diameter chamber, 75m of smaller passage, and then a similar chamber and two short choked passages. Ref. Es.

Cueva del Portón (No. 76) Enaso
VN513959 Alt. 200m approx. Length 40m
A single choked gallery. Ref. A.

Cueva del Prado (No. 54) Beralta
VN517948 Alt. 460m Length 40m
In wooded shakehole in middle of field. A boulder slope leads to chamber and passage on right, with possibly another high level passage unexplored.

Cueva de la Puerta (No. 24) Ozana
VN53639558 Alt. 215m Length 10m
Small entrance leads to climb down into small chamber with strong draught. Ref. A.

Cueva de Rascavieja (No. 77) Enaso
VN51799638 Alt. 300m Length 300m Fig. 6
Small (4m x 4m) entrance at the base of a cliff leads to a steep boulder slope and 30m wide passage. This closes down in a couple of strongly draughting boulder chokes. Refs. As Cs.

Torca del Rayo de Sol (No. 123) Secadura
VN54679990 Alt. 155m Length 730m Depth 52m
Entrance is at the left hand bank on a stream bed and is a 7m pitch with a tight take-off. Landing is in a 5m diameter chamber with a short crawl on the left leading to the head of a 15m pitch which lands in a hading fault passage. To the southwest, the passage descends three steps and enters an aven. Three metres up the left hand wall, a crawl goes off and branches. The left hand passage closes down while the right hand branch has not been pushed to the limit over cobbles. To the northeast of the pitch the high and narrow passage heads down the fault for 90m until it breaks out into a lofty chamber. Holes above here connect with Solviejo. On the right of the chamber a low crawl leads into a seemingly endless series of dusty phreatic chambers joined by low crawls. Ref. Ds Fs.

Sima de Reguilon (No. 46) Beralta*
VN489945 Alt. 440m approx. Depth 70m
A single choked shaft. Ref. As.

Sima de los Rellanos (No.47) Beralta
VN50389550 Alt. 290m Depth 120m
Three entrances: highest entrance is a 9m pitch the base of which can be reached by entering the middle hole and climbing down 3m. A steep slope leads down to a window into the main pitch which descends about 30m to a slope of unstable boulders and then a drop of 60m to a rubble floor in a large chamber. The third and lowest entrance leads directly to the unstable slope via a sloping pitch of about 40m. Ref. Es.

Cueva -Cubio de la Reñada (No. 48) La Vega
VN50459577 Alt. 180m Length 6120m Fig. 5
A strongly draughting entrance in the trees leads, via old phreatic walking passages to a junction. Straight on ends very close to Comediante while to the right a passage slopes down to the base of a steep boulder slope, at the top of which is the second entrance. Down to the right of the boulder slope is a periodic lake and just beyond, the blowhole. A complex series of muddy calcite climbs then lead to a pitch of 5m and almost immediately the second pitch of 8m and the sloping third pitch of 15m. At the base a low wet, strongly draughting crawl (which sumps in wet weather) enlarges as it reaches a boulder slope. By keeping to the right at the top of the slope Stuffed Monk Gallery is entered.

This is a 300m long and very well decorated gallery which finishes at a red earth choke. Numerous side passages end at chokes or high avens.

Near the start of Stuffed Monk Passage, on the left, a large passage runs into the top of Blood Alley. To the left is a veritable maze of sand and calcite-floored passages. To the right, up Blood Alley, is the main way on and the whole of this section is endowed with fine red and orange pool formations. One hundred metres after joining Blood Alley the passage splits - the right hand branch enters Anastomosis Hall with its deep phreatic pocketing and fine helictites and the left branches unite in False Floor chamber where a thin layer of calcite can give way under foot. A short distance beyond this chamber, a crawl on the left is the start of Squirrel's Passage which joins the main stream after a 6m climb down. Upstream a sump is met after 20m, while downstream the passage continues as a series of swims and cascades to a sump after a couple of hundred metres.

The main route continues over holes in the floor to Castle Hall. A delicate climb down over boulders leads after a small streamway to a huge sloping rift. Large passage at the head of the ramp and the smaller Gallery of the Dead to the

left unite at Ghost Lake. Sixty metres of wading or swimming lead to Mega Hall - a large boulder floored chamber and thence, straightforwardly to the main, large river passage which ends at a sump after 120m.

The sump descends to 8m and is 30m long. It rises in a large, boulder-strewn streamway. To the right is the massive run in of Giga Hall followed by 200m of large vadose canyon. The stream emerges from a passage on the left which sumps after 60m. A high level series can be entered on the same line as the vadose trench, although this eventually chokes after branching.

Reñada is the 'master cave' of the southern side of Beralta and as such still has much to offer in the way of extension, especially in Reñada 2 beyond the first sump. (Plates 7 & 8). Ref. As Bs Cs P.

Cueva de Riaño (No. 105) Riaño

VP51910044 Alt. 175m Length 3200m

The strongly draughting entrance is in a tree-filled depression. Low crawling for 50m meets a small inlet on the right. The way on gradually enlarges until, 250m from the entrance, a 7m pitch is reached. This can be free climbed. The main stream is then met and the passage size increases.

Upstream the passage continues for 200m until an inlet is met on the right. At least 1km of maze passage has been explored up this inlet and surface debris at the end indicates its closeness to another possible entrance. Back in the main passage there is a choice of ways but after 150m they unite in an area of breakdown. Soon afterwards the cave turns sharp right and splits into a bewildering maze of 2m high and 1m wide passages which have not been fully explored.

Downstream from the entrance inlet the passage is 2m wide and 4m high and runs for 100m until cascades of 2m, 3m and 4.3m are met. At the base of the last pitch the stream runs off to the right and the passage lowers to a crawl. After 200m of easy going, another pitch of 8m is met with an awkward crawl at the bottom. The cave sumps 200m from this point and is then 500m from its resurgence near to Cueva Espada. Ref. Bs.

Torcon de Riaño (No. 106) Riano

VN52289945 Alt. 265m Depth 95m Length 120m

Large walk-in rift entrance slope meets trickle of water from a pipe which flows down the pitch. First drop of 3m is followed immediately by the main pitch of 91.5m. At the base, a narrow vadose streamway sumps after 100m. This is about 50m from the upstream sump in 4th River Inlet in Cueva Uzueka and they presumably connect. Ref. Cs.

Sima-Cueva del Risco (No. 25) Ozana

VN53309604 Alt. 196m Length 8000m incl. Onite and Tiva. Fig. 7; Plate 7

The entrance is situated behind a group of houses at Sedo. The 8m pitch drops onto a rubbish pile containing assorted redundant drugs - the doctor lives nearby. At the base of the pitch two ways are possible. Following the stream down leads to the Tiva system (q.v.), while a 2m climb in the opposite direction leads into the entrance series of Risco.

After 100m of large passage the stream is met and wading in 1m deep pools is needed. To the left are two high level passages both of which choke after about 100m. Straight ahead the streamway continues high and wide to a junction with a passage on the right. This leads to several dismal chambers and no way is possible. The main streamway continues on through deep pools and mudbanks until the Tonto Series is met on the right. This uninviting, low passage splits after 200m and then chokes. The main passage runs for 100m beyond the Tonto Inlet before reaching the most important junction in the cave.

At this junction the right hand, narrow and very wet passage can be followed up to the superb Pinto Gallery. This vadose passage contains a large stream and can be followed for almost 2km until it splits into the various feeder inlets which have their origins in the Jivero/Tali/Anderal complex of caves. Although there is much evidence of surface debris, as yet no surface connection has been made.

Back at the main junction it is possible to climb up straight ahead into a large boulder chamber. From here two routes are possible. The fine Arco Gallery goes off at high level and is typically 3 - 5m wide and 15m high. This runs for 400m until it breaks out into the roof of the Risco River Gallery and progress is halted. In fact the Arco Gallery is the old abandoned route and the present stream has cut down to a lower level. This can be joined from the boulder slope at the start of the Arco Gallery and is easy going except for the occasional climb over boulder piles.

The Risco River Gallery continues for approximately 1km until it emerges into the impressive Sala Carballo which is a large boulder filled chamber. The main inlet tumbles down from high up on one wall and this is the 19m pitch down from Cueva Onite.

On the opposite side of the Sala Carballo, a large dry passage (Gran Risco) heads off above the main river and probably originally connected with the Arco Gallery. After 300m it becomes choked with calcite deposits. Ref. As Bs Cs.

Sima de la Roca (No. 53) Beralta

VN521950 Alt. 440m Depth 40m

By a prominent rock next to track. 15m pitch lands on slope to head of the second 15m pitch. This is choked with flowstone.

Sima de Rocabado (No. 92) Secada

VN52589822 Alt. 240m Depth 76m

The entrance pitch is of 8m metres in a shakehole. A climb and crawl up through a window on the right leads to head of the second pitch. This is 70m deep and is choked at the bottom with silt and cobbles. There is a strong inwards draught that becomes lost on the descent. Ref. Cs.

Salamander Pot (No. 56) Beralta

VN500947 Alt. 380m Length 50m Depth 10m

Two pitches of 5 and 3m lead to a slope of boulders and a squeeze through to a walking sized passage that is soon halted at a boulder choke. Ref. H.

Cueva del Selvijo (No. 28) Ozana

VN54209482 Alt. 267 m Length 100m

An uninspiring wet cave. Ref. As Cs.

Torca del Serruco (No. 50) Beralta

VN506950 Alt. 480m Depth 55m

Large entrance chamber is hidden behind large limestone block at base of small cliff. The floor slopes away to the head of the choked pitch. Ref. F.

Torca de Serramiania (No. 6) Ogarrio*

VN558939 Alt. 300m Depth unknown.

An undescended shaft. Probably between 30 and 50m deep.

Cueva Seta (No. 93) Secada

VN52889813 Alt. 168m Length 85m Depth 10m

Tight entrance slope leads immediately to a 9m pitch. The small, occasionally wet, streamway ends at a draughting but narrow and sand-choked rift on the left. There are possibilities of a connection with Carcaveuso or the passage beyond its sump. Ref. Cs. Entrance now obliterated by bulldozing.

Cueva de Sierra Salces (No. 234) Secadura

VP558007 Alt. 200m approx. Length 30m

The entrance stoop leads to a short sandy-floored passage which then rises on slippery calcite to a choke. Ref. Ps.

Cueva del Sifón Claro (No. 120) Secadura

VN55219983 Alt. 63m Length 60m

The presumed resurgence for the water seen in Solviejo. Low stoop into entrance chamber which contains the sump pool. A large sump passage that is infested with cross rifts. Possibilities of extension still exist. Ref. Fs.

Torca de Simón (No. 121) Secadura

VP55480044 Alt. 190m Length 330m Depth 69m

Entrance is a pitch of 11m. A stream enters from an unexplored passage 5m up the right hand wall. The water then pours down a blind 10m pot and the way on is over this to a small vadose passage which leads after 75m to a small climb and pitch of 6m. A small zig-zag passage then runs to the head of a 25m pitch. At the base, the passage slopes down to a tiny static sump. A hading rift from here ascends to an aven where it is possible to get a voice connection with the top of the 25m pitch.

A dry crawl under the north wall of the entrance chamber leads to a blind 10m pot.

By using a different belay point a second series of seemingly unconnected passage can be reached by penduluming on the ladder to a passage in the west wall of the chamber. A short passage ends at a fine 23m pitch which is followed by 40m of tight canyon to a 6m pitch. This leads almost immediately to a rather loose undescended 4m pitch. Ref. Fs.

Cueva de Solviejo (No. 122) Secadura

VP54860013 Alt. 185m Length 3400m(Incl. Rayo de Sol) Depth 111m

A sloping walk in entrance leads after 25m to the head of a 20m pitch from a ledge on the right. Landing is in a large chamber on a slope of boulders. Downhill, the floor levels out and chokes with some possible climbs above.

The way to the bottom of the pot is on the right of the top of the slope, and is down through a hole with a short greasy climb to the head of the Greasy Slope

Pitch. At the base of this 20m, laddered slope, the only exit leads to a lofty chamber via a couple of short climbs over boulders. The passage type then changes completely as it swings back on itself and heads towards the entrance for 150m. This rift passage ends at a 4m pitch and 7m climb into the sandy Campsite Chamber.

The main route then reverses direction again and passes underneath the previous rift to a 6m rope pitch. By heading North for 100m, the head of Pool Pitch is reached. This is an impressive circular 20m deep pitch with water falling in from the opposite side. The small outlet passage drops down a 4m pitch and then the final 20m pitch which ends the cave at a miserable and final sump.

Chocolate Crunch Series leads off in the southerly direction from the base of the rope pitch. The phreatic half tube gradually changes to the classical keyhole shape. Turning left at a junction after some 200m leads to some low crawls, while to the right, the top of a hading rift is reached which drops into Torca del Rayo de Sol via a 20m pitch.

Back at the Campsite, a short passage to the right leads to two high avens while straight ahead is a hading rift that ends at an aven. To the left is a large passage that divides after 100m with both branches soon choking.

At the head of the boulder slope in the entrance chamber there are three greasy calcite climbs. The right hand climb leads into Misty Passage - 200m of well decorated passage containing an 18m pitch followed by a 17m pitch into the chamber at the base of the Greasy Slope. The middle climb leads to a veranda that overlooks the same chamber, while the left hand climb leads to a completely different series.

At the top, an impressive tunnel leads to boulders which rise up to Brain Cell Hall which contains a large skirtable pit. A few metres further, on the far side of the pit, is a climb down in the boulder chaos which leads to the base of the pit and a 180m long passage that contains three shafts which are presumably the avens seen off the Campsite. By continuing north west from Brain Cell Hall under a large, cracked roof slab, and past two small grottoes on the right, access is gained to Quick Trip Passage. This is mainly walking for 400m to the head of an 18m pitch which drops into a small stream that soon closes down. On the right of Quick Trip Passage it is possible to climb up to a parallel high level passage that contains some fine formations and cracked mud floors. (Plate 8, Fig.2). Ref. Fs.

Torca del Somo (No. 49) Beralta*

VN509940 Alt. 660m approx. Depth 77m

The entrance is a 15m pitch over some precariously poised boulders to a ledge. Pitches of 9 and 7m then follow immediately, landing on a scree slope which descends to a narrow passage on the right. After 15m and a couple of short climbs, the narrow and sharply fretted head of a 23m pitch is reached. A 10m deep hole from the final chamber chokes, as does a large rising boulder slope. Ref. Ds.

Cueva Subterránea (No. 29) Ozana

VN544957 Alt. 430m approx. Length 70m

Entrance leads down over gour pools to a well decorated, 30m long chamber. Ref. As Cs.

Surgencia de las Crecidas (No. 124) Secadura

VN55259972 Alt. 60m Length 150m

A 70m swim leads to sump of 20m. A short squeeze over a silt bank leads to a T junction. Downstream to the left is walking for 30m to a choke near to the surface. Upstream ends after 15m at a second sump which gets too low after 3m. This could be a flood rising for Los Boyonnes but could also be a flood resurgence for an unknown system. Ref. Anon. 1977. KCC Journal 9 pp.19-20 and survey.

Cueva de los Tablons (No. 242) Ozana

VN 530955 Alt. 200m approx. Length 30m approx.

Excavated hading rift with loose walls and roof but with a strong draught.

Cueva de Tali 1 (No. 30) Ozana

VN53829536 Alt. 234m Length 10m Fig. 7

Small stream sink. Ref. As C.

Cueva de Tali 2 (No. 31) Ozana

VN53929537 Alt. 235m Length 100m Fig. 7

Passage to the right of entrance chimney leads to drop into walking size passage and thence to a passage of pools and mudbanks. A short swim leads to a narrow canal with deep water and a sump. The other direction from the entrance involves crawls and squeezes to a chamber. Ref. As Cs.

Cueva de las Tejas (No. 163) Fresnedo
VP536013 Alt. 200m approx. Length 50m

Walking-sized resurgence cave that ends at a water logged rift. Ref. Ps.

Cueva de Tiva (No. 26) Ozana

VN52929620 Alt. 175m Length 8000m (incl. Risco and Onite). Fig. 7

The impressive twin entrances lead to a series of dry, abandoned passages that eventually unite, the way on being through a draughting bedding plane on the left. This passes under several avens before increasing in height at the top of a steep slope. This leads down to water level and, although the way on is sumped, a climb of 10m up a strongly draughting climb of 10m; to a chamber with sandstone walls. At the far end, a pitch of 11m drops into an impressive streamway carrying the water from Sima Cueva del Risco. The 1.5km of passage in this area are like a three dimensional maze and almost impossible to describe. Eventually though they all unite and the way on is in chest deep water up several cascades until daylight can be seen from the Torca del Sedo entrance. This is an 8m pitch and cannot be free climbed. Ref. As B Cs.

Cueva de los Tizones (No. 78) La Vega

VN51999612 Alt. 174m Length 125m

The entrance is a sink for a small stream. The route is at water level until a squeeze over a block leads to walking sized passage for 75m. A short duck with minimal airspace is followed by walking passage and a short wet crawl or alternative dry oxbow to deep water, where progress is stopped by a large block. The resurgence is 350m away but there is no draught. Ref. As Cs.

Cueva del Transformador (No. 32) Ozana

VN52859625 Alt. 160m Length 15m

The overflow resurgence for Sima-Cueva del Risco. Ref. C.

Cueva del Triangulo (No. 94) Secada

VN532967 Alt. 450m approx. Length 5m

A little higher than Cueva Chica at the base of limestone cliff. The entrance is triangular. The single passage chokes after a few metres. Ref. A.

Cueva de la Uzueka (No. 107) Riaño

VP51950002 Alt. 175m Length 12800m (Fig. 4)

A cave of great variety, potential and in places, complexity. All the water met in the cave drains to Cueva Llueva and then resurges at Los Boyonnes in the valley of Secadura. If the route through the cave is known then a quick trip to the end and back will take about 9 hours. The route is known to sump in at least two places and so the cave should only be attempted in dry and settled weather. Route to the end: Three entrances are known. The one normally used is a couple of metres up a wooded slope at the bottom of a maize field. A constricted draughting entrance is followed at roof level by a short crawl into a small chamber. A descending passage to the right is the start of a maze where carbide arrows point back towards the entrance. This section ends at a tight sideways squeeze into Quadraphenia. The way on is to the right and this generally walking-sized passage lasts for 560m of superb sandy-floored tunnels. Large junctions from the squeeze are negotiated by four left hand turns until a final right hand turn leads to a low section into the stream in Pigs Trotters Chamber with its fine roof pendants. Crawling downstream for 40m leads to an inlet passage on the right where very low crawling over silt is needed to a small chamber. This section often needs digging out and sumps in wet weather. The way on is up to the left and consists of a series of phreatic chambers connected by low holes in the floor which can also sump in wet weather. Some nice zig-zag passage leads to a small boulder choke where the only way on is down into a low wet crawl that lasts for only a few metres. First River Inlet is then past on the left and the way enlarges. Boulder collapse necessitates leaving the stream but a very narrow slot behind a block drops back into the stream.

The next 1000m of passage - the Gorilla Walk - is generally stooping-sized passage with a metre or more of water to wade through. At the end a major junction is met. Second River Inlet comes in from the left while the way on is to the right. The route for the next 500m is obvious through the Near Stomps, a large stream passage, the way being mainly over large sand banks. Gour Inlet is passed on the left and 100m further on, Obvious Junction is met. The river is left behind as twin passages on the right soon unite at the start of Crossover Crawl. This is a generally low sandy passage which ends after 160m at a walk down into the Third River.

Carrying on downstream the next 540m are easy walking through Las Playas, the last 200m or so being on sand. The main route is then blocked but a small passage with deep water (the B Road) sets off on the right and the large main passage is soon rejoined on the other side of the collapse. One hundred and forty metres further on, Fourth River Inlet is passed and after another 100m of walking the Astradome junction is met on the left.

By continuing downstream, 44 Chamber is reached and then the streamway becomes small phreatic passage for 340m to Sandy Junction, where the stream left at Obvious Junction enters on the left. The way on is downstream to face a boulder choke and the entry to Armageddon.

Armageddon is a 260m long heap of boulders, the first 20m of which are negotiated by following road works bunting through the pile over drops into the stream below. By then striking out and up (generally to the east) a large passage - the entry to the Armageddon Bypass - is met and ignored and a climb to the east leads to a ladder pitch of 5m down through the precariously perched boulders to the stream. Armageddon is left behind and the water followed down into Paisley Passage, a 20m wide and 4m high bedding plane that terminates at Green Choke after 200m.

The way on is up over fallen slabs and scree to the left and all routes unite at the head of a roomy bedding plane - Giants Causeway. Walking down over large slabs leads to a pool and the stream. This is followed for 160m in a boulder floored streamway to where the water drops over a small cascade. For the next 150m, the water becomes deeper as Duckhams Sump is approached. The way on is along the right hand wall to a small rift and then out into deep water for 5m with a small amount of airspace until a hole in the roof is seen. This area sumps in wet weather. After climbing up through the hole, an awkward rift passage is pursued for 100m upstream until it is possible to climb up on the left into an area of sand and boulders. The passage then becomes increasingly larger until a descent is made to a high inlet on the right. This marks the start of Rocky Horror.

Route finding on this 200m long pile of immense blocks can take a couple of hours, although it is generally best to keep fairly high up on the right hand side. Passage walls eventually appear out of the gloom and the passage then gradually rises to the roof. The way on is a few metres back from this point on the right hand side and is a drop down into a comparatively small and well decorated passage that meets the stream after 80m.

A draught whistles out both at stream level and through a higher boulder choke but all routes appear to choke within about 170m of the upstream end of Cueva Llavea.

Other passages are now described by working through the cave from the main entrance.

By carrying straight on at the first dogleg in Quadraphenia, a second entrance is reached after passing through liquid mud. A small passage to the right just after this crawl leads to daylight above, although this pitch has not been descended or indeed found on the surface.

At the next junction in Quadraphenia, a right turn leads into 400m of smallish phreatic passage that can be followed to a number of branches, all of which choke.

Just before Pigs Trotters Chamber, on the left, two passages set off. The first chokes after 300m, the second swings back to Pigs Trotters Chamber. On the right hand wall of Pigs Trotters Chamber is 100m of mineret type passage that lead to Flashbulb Hall, a shattered area of massive block collapse. Carrying straight on through the hall leads to an unstable boulder area with deep holes in the floor. By traversing to the right a hundred metres of passage is entered that chokes. On the opposite wall to the point of entry, Dog Series starts and is a complex series of tubes and avens. By laddering one of the 11m deep holes an immature steam way is entered and also a small passage that pops out 4m up the wall in Quadraphenia.

By continuing upstream at the first wet crawl, walking sized passage is reached. The stream is left where it emerges from a low section and the higher level phreatic tube entered. Awkward progress is stopped at a 9m pitch that enters an immature stream that sumps 50m downstream and becomes too tight after 100m upstream.

Second River Inlet is 200m of mixed caving ending at a low crawl with powerful draught blowing out of the cave.

The next feeder is Gour Inlet which ends after 150m at a bouldery chamber. By continuing downstream at Obvious Junction, Far Stomps is entered. This large passage runs for 550m over large blocks to a sump - the water passing through to Sandy Junction.

Third River enters at the end of Crossover crawl and is 800m of fairly unpleasant passage. About 200m in a deep pool has to be negotiated followed by 300m of crawling and rift passage to where the water emerges from a sump. This point is about 50m from the down stream sump in Torcon de Riaño although a human connection is unlikely. The rest of this uninspiring section of the cave lies up on the right and ends at a couple of avens apparently over the top of the crawl traversed before.

Straw Inlet starts as walking passage but degenerates to a low crawl over mud.

Fourth River Inlet has yet to be pushed to a conclusion. Eighty metres further on downstream the insignificant entry to the Astradome is seen on the left hand wall. A short walk up and along breaks out into a magnificent circular aven. Single voices sound like cathedral choirs as they rebound off the walls of this 30m diameter and 101.6m high feature.

95 Inlet can be entered on the right of the main river just after passing through 44 Chamber. Fifty metres in, an elliptical tube in the roof can be

entered which leads to an increasingly muddy section of phreatic cave. The area appears flood-prone as a sump is bypassed via a muddy tube. The passage then slowly ascends to a 5m climb up to the boulders half way along Armageddon. This partial Armageddon Bypass is 500m long.

A small inlet on the right of Paisley Passage has been pushed for 250m to a large aven, while the final inlet of note is the one entered by keeping in the small streamway met above the hole at Duckhams sump. This passage - Shrimp Bone Inlet - has been explored for 700m and there is no real problem in continuing.

A number of passages both mentioned above and unmentioned have yet to be pushed. Also, there are about 2km of passages unsurveyed and not included in the length. (Plates 1,4,5,6,7). Ref. Bs Cs Ds F Hs Ps.

Sima de la Vaca (No. 95) Secada
VN53859828 Alt. 430m Depth 24m
Single shaft which is choked at the bottom.

Cueva Vecina (No. 96) Secada
VN52539806 Alt. 220m Length 20m Depth 20m
Short passage leads to a 20m shaft which draughts but is choked. Ref. Cs.

Covacho de la Vera (No. 97) Secada
VN530968 Alt. 340m approx. Length 5m
A small chamber 8m wide by 3m high. Ref. A.

Torca de la Vera Negra (No. 153) Beralta
VN500954 Alt. 300m
Undescended shaft of about 30m depth.

Cueva de Volvo (No. 98) Secada
VN52159793 Alt. 170m Length 225m
The cave acts as a resurgence and floods completely in wet weather. A descending rift leads to a mixture of walking and muddy crawling for 70m until a chamber is reached. By sliding down to the left, deepening water leads to a supposed sump although this has not been fully pushed. To the right, a tight squeeze at floor level on the left of the passage leads to a succession of muddy chambers. One impassible crawl at floor level in this section has a very strong draught.
Ref. As Cs.

Sima Wendy (No. 79) Enaso
VN50759723 Alt. 465m Depth 10m
The entrance shaft has a large rock bridge and is 10m deep. At the base is a squeeze into a well decorated chamber with no exit. Ref. C.

West Ozana Pots (No. 7) Ozana*
VN536943 - 542943 Alt. 380m approx. Depth up to 60m.
A series of five shafts. Four soon choke but the fifth is 60m deep and requires blasting as a larger passage at the base can be seen through a constriction.
Ref. C.

Torca de Yusa (No. 116) Muela
VN54679623 Alt. 720m Depth 140m
Entrance pitch of 110m leads to second of 35m. Choked at the bottom. Ref. C.

125 Secadura VN54859965 Alt. 174m Length 100m
Walk-in top entrance leads to climb down and short crawl underneath the entrance passage to emerge at a lower entrance.

130 Muela VN55649622 Alt. 554m
Unexplored shaft of about 20m depth.

131 Muela VN55509576 Alt. 698m
Unexplored shaft of about 30m depth.

132 Muela VN55409565 Alt. 696m
Unexplored cave.

133 Muela VN55369566 Alt. 713m
Unexplored shaft.

134 Muela VN55349567 Alt. 723m
Unexplored shaft.

135 Muela VN54689635 Alt. 725m Depth 20m
Single choked shaft. Marked 'PD12'.

139 Enaso VN51549686 Alt. 435m Depth 10m
Single choked shaft.

140 Enaso VN51489703 Alt. 388m Depth 15m
Single choked shaft.

141 Enaso VN51279730 Alt. 370m Depth 14m
Entrance pitch leads to two slippery chambers. Ref. Ps.

142 Secada VN51279768 Alt. 280m Depth 22m
A short squeeze into a draughting entrance leads to head of pitch. The belay is 2m down a tight rift and pitch is 19m deep landing on a roomy ledge. A 3m climb down enters enlargement that chokes in both directions, the draught being lost. Ref. Ps.

143 Secada VN51759778 Alt. 198m Depth 10m Length 20m
The entrance is in a fresh depression. Tight take off at the head of a 6m pitch which leads to a short well decorated cave and a choke.

144 Secada VN51819780 Alt. 198m Depth 11m
Entrance has sloping soil covered ledge at head of drop which is a 9m pitch into a choked chamber. Tight hading rift on the left could be pushed.

145 Enaso VN51489712 Alt. 360m Depth 6m
Single choked shaft.

146 Enaso VN51499732 Alt. 303m Length 10m
A 10m diameter chamber

147 Enaso VN51459739 Alt. 295m Length 6m
Low entrance slopes down to a low muddy passage.

148 Secada VN52009714 Alt. 250m Length 40m
A low passage opens out into a well decorated chamber.

149 Enaso VN52009692 Alt. 325m Length 15m
Several small openings unite in a passage which turns left and becomes too low.

150 Enaso VN51969682 Alt. 375m Length -
Four short caves. There is a sloping chamber in one.

152 Secadura VP548002 Alt. 200m approx.
Unexplored shaft.

157 Muela VN54209624 Alt. 643m
Unexplored hole under boulder. Marked 'PD1'. Rocks drop for 4m.

158 Muela VN54209627 Alt. 645m
Unexplored shaft of about 10m.

159 Muela VN54489638 Alt. 720m Depth 10m
Three parallel shafts that all choke. Marked 'PD4'.

160 Muela VN54059665 Alt. 570m
Unexplored cave. Marked 'PD5'.

161 San Miguel* VN58249822 Alt. 190m
Possible cave dig.

162 San Miguel* VN58479811 Alt. 160m
Unexplored shaft.

164 Muela VN54329675 Alt. 678m
Draughting hole that can be dug. Marked 'PD8'

165 Muela VN54509613 Alt. 705m
Unexplored shaft of about 12m depth. Marked 'PD9'.

166 Llueva VN54269859 Alt. 265m Length 5m
Small room sized chamber.

- 168 Muela VN54229716 Alt. 578m Depth 12m
Single choked shaft. Marked 'JC1'.
- 169 Muela VN54329706 Alt. 635m Length 80m
Bedding plane slot leads to large sloping chamber that veers down to the right.
Ref. Ps.
- 170 Muela VN54499665 Alt. 783m Length 80m
Small crawl to draughting blockage. Marked '170'.
- 171 Muela VN54459663 Alt. 783m Depth 20m
Series of three pitches to choked rift.
- 172 Muela VN54619659 Alt. 778m Length 50m
A crawl leads to a choke. Marked '172'.
- 173 Muela VN55709628 Alt. 552m Depth 20m
Near to base of large depression. Main hole about 10m deep. Small side shaft
about 20m deep.
- 174 Muela VN55669635 Alt. 587m
Undescended shaft of about 50m.
- 175 Muela VN55679635 Alt. 587m
Undescended shaft of about 20m.
- 176 San Miguel* VN588972 Alt. 60m
Twin resurgences. The southerly one has a draughting choke above flowing water.
The northerly resurgence has a short length of non-draughting passage.
- 179 Beralta VN518954 Alt. 300m Length 50m
Easily seen entrance above Cueva de Haya. Two passages soon choke.
- 180 Muela VN54459612 Alt. 716m Depth 20m
Single choked shaft. Marked 'PD11'.
- 181 Muela VN54739602 Alt. 728m Depth 15m
Pair of shafts which both choke. Marked 'PD13'.
- 182 Muela VN54709603 Alt. 735m Depth 17m
Straight choked shaft. Marked 'PD14'.
- 183 Muela VN544959 Alt. 520m approx.
Recent collapse which is unexplored.
- 185 Muela VN53689640 Alt. 404m
Unexplored shaft of about 10m depth.
- 186 Muela VN53529673 Alt. 565m
Stones rumble down for 6 seconds although the entry is too small.
- 187 Muela VN537971 Alt. 500m approx.
Line of pits, about 10m deep, which are unexplored.
- 188 Enaso VN51379722 Alt. 360m Depth 6m
Single choked shaft.
- 189 Alisas* VN482956 Alt. 520m approx. Depth 34m
Small entrance at head of narrow rift. Ladder can be threaded through to other
sections of the rift but all ways close down. Marked 'PD19'. Draughts inwards
at the bottom. Ref. Ps.
- 190 Alisas* VN482956 Alt. 520m approx. Depth 12m Length 14m
Short pitch or climb into a chamber with a hole in the boulders on the right.
A six metre ladder descent through here leads to very tight rifts that draught
inwards. Marked '1'. Ref. Ps.
- 191 Alisas* VN482956 Alt. 520m approx. Depth 21m
A choked shaft. Marked '2'.
- 192 Alisas* VN482956 Alt. 520m approx. Depth 15m
Choked shaft. Marked '3'.
- 193 Alisas* VN482956 Alt. 520m approx.
Undescended shaft of about 15m depth.

- 195 Secada VN52139831 Alt. 295m
Draughting hole which needs digging.
- 196 Secada VN52449823 Alt. 273m Depth 10m
A two metre climb onto boulders and then a tight take off at head of small choked shaft. Ref. P.
- 197 Secada VN51859884 Alt. 484m Depth 45m
A twenty metre pitch lands on a boulder slope down to the head of the second pitch. This is 8m deep and chokes. Ref. Ps.
- 198 Muela VN551968 Alt. 600m approx.
Series of draughting holes which can be dug.
- 199 Secada VN51769899 Alt. 440m Depth 27m
Initially tight, 25m choked shaft. A parallel shaft appears to be slightly deeper but is too tight. Ref. P.
- 200 Secada VN52169819 Alt. 258m Length 5m
A wet weather stream sink. Two metre high passage has a strongly draughting hole at the end.
- 201 Muela Uncertain Alt. about 500m Length 20m
Short crawl into well decorated chamber.
- 203 Muela Uncertain Alt. about 500m. Depth 18m
Straight pitch into a well decorated chamber.
- 205 Secadura VN54089953 Alt. 400m Depth 20m
Fifteen metre pitch leads to a further 5m drop. A stemple is required for the undescended continuation in a tight rift. Ref. P.
- 206 Secadura VN54159951 Alt. 410m Depth 30m
Single choked shaft. Ref. P.
- 208 Muela VN55429570 Alt. 693m Depth 55m
A single choked shaft. Marked '208'
- 209 Muela VN55419568 Alt. 695m Depth 55m
A calcite wall at the base of a choked shaft prevents further progress. It might be possible to bolt. Marked '209'.
- 210 Muela VN55389569 Alt. 708m Depth 43m
A 20m pitch drops onto large ledge. Two passages off this choke as does a second pitch of 20m. Marked '210'.
- 211 Muela VN55429571 Alt. 695m Depth 8m
A small cave entrance leads to 8m pitch and small chamber. Marked '211'.
- 212 Muela VN55399577 Alt. 720m Depth 152m
Probably the deepest shaft in the area, on a par with Sima del Cueto. Two climbs at the bottom are impassible. Marked '212'. Ref. P.
- 213 Muela VN55499584 Alt. 683m Depth 7m, 10m.
Two holes. The upper hole is a straight 7m pitch to a choked abandoned streamway. The lower hole is a climb down of 10m to a visible though unattainable continuation.
- 214 Muela VN55479588 Alt. 680m Depth 32m Length 15m
A 25m pitch lands on boulder slope with short climb down to abandoned streamway. Twelve metres further on the passage chokes at a 15m high calcite wall.
- 215 Muela VN55479586 Alt. 678m Depth 43m
A straight pitch into a large chamber. Two climbs lead to parallel shafts but all choke. Marked '215'.
- 216 Muela VN55469589 Alt. 673m Depth 46m
Straight shaft ends at calcite choke. Marked '216'.
- 217 Muela VN55539585 Alt. 694m Depth 15m
Straight 15m pitch into a chamber. Short passage leads to a calcited aven. Marked '217'.
- 218 Muela VN55509586 Alt. 683m Depth 9m
A choked shaft.

219 Muela VN55209585 Alt. 754m
Unexplored cave. Marked '219'.

220 Muela VN55219587 Alt. 754m
Unexplored cave. Marked '220'.

221 Muela VN55239585 Alt. 754m
Unexplored cave. Marked '221'.

223 Muela VN55219579 Alt. 754m
Small undescended shaft. Marked '223'.

226 Muela VN55209575 Alt. 755m
Small undescended shaft. Marked '226'.

228 Muela VN55209572 Alt. 755m
Small undescended shaft. Marked '228'.

230 Muela VN55549588 Alt. 687m Depth 27m
A 13m shaft with a similar shaft in lower corner of the boulder floor.
Marked '230'.

231 Muela VN55499597 Alt. 655m Length 4m
A small choked resurgence. Marked '231'.

232 Muela VN55469601 Alt. 668m Depth 46m
Choked shaft. Marked '232'.

233 Muela VN55439604 Alt. 683m
Undescended shaft of about 50m depth.

235 Secadura VP557006 Alt. 200m approx. Depth 15m Length 20m
A short downhill walk and then crawling to head of 10m pitch which descends
through boulders to a minute streamway. Ref. Ps.

237 Secadura VN56229951 Alt. 53m Length 10m Depth 5m.
A draughting entrance leads to steep descending tube to deep water with an
impossible bouldery mess above. Ref. Ps.

238 Secadura VP557005 Alt. 180m approx. Depth 5m
Choked shaft.

241 San Miguel VN57889671 Alt. 65m Length 3m
Small chamber.

244 Secadura VN55009907 Alt. 290m Length 20m
Entrance has been partially walled up and is used as a manure store. Small crawls
lead off at the back of the entrance chamber.

245 Secada VN530980 Alt. 200m approx. Depth 13m
The entrance emits a strong draught at times. A 6m pitch over boulders leads
to a short crawl to a 2m deep rift, choked with boulders, which emits the draught.
Ref. P.

246 Ozana VN53889473 Alt. 260m Length 10m
Strongly draughting hole that lowers to a crawl that could be dug.

249 Beralta VN522956 Alt. 250m approx. Length 100m
Small entrance leads to large passage which chokes. An arch to the right leads to
a parallel large passage choked in both directions. The haunt of many bats.

250 Beralta VN521956 Alt. 250m approx. Length 40m
Walking sized passage at stream sink gradually lowers to a crawl which becomes
too low.

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