NOTES ON CAVE DEVELOPMENT IN THE AUGUSTA-MARGARET RIVER AREA

Compiled by DC Lowry, TD Bain & LV Bastian
for the ASF CONFERENCE 1964-65
(supplement to the Western Caver, Vol 8, No 1)

The introductory section was OCR'd, but with difficulty due to poor quality original. The rest (cave descriptions) are simple page images.

Introduction:

The rocks of most caving areas o the world are hard jointed crystalline marbles and limestones, but in the South West of Western Australia, the rock is a soft limestone formed by the lithification of lime-rich sand dunes. The unusual cave features that are caused by this have been discussed by L. Bastian in a recent issue of 'Helictite" [*Helictite, 2(4): 105-119, 1964.*] and many of his ideas are used in this note.

Origin of the Limestone:

During the last 100,000 years or so, sand has blown to form sand dunes that have reached over 700 feet above present sea level. The sand is formed of grains of quartz and calcite, the latter being derived from foraminifera and fragments of algae and shells. With the passing of time the lime is redistributed; a soil of leached sand (up to 10 feet thick) is formed at the surface, and overlies a hard 'travertine "cap rock" (up to 15 feet thick) which has a flat upper surface and a lower surface that fingers down into cemented limestone.

A puzzling feature of the coastal limestone is the presence of vertical, travertine-lined "solution pipes" up to 4 feet in width which penetrate through the cap rock and reach down 20 or 30 feet into the dune. They are commonly associated with tree roots, but the causal relationship is not fully understood.

Elements of cave formation:

(a) *Solution at the top of the phreatic zone*. The dunes arc very permeable and rain falling on them descends slowly to the water table where cave formation by solution takes place.

(b) *Collapse*. Within any single dune there is a great variation in the hardness of the limestone. Much of the limestone is soft and collapses are common. Solution of the fallen blocks occurs and large caverns are formed. The collapses occasionally break through to the surface to form spectacular craters, e.g. Bride's Cave, Lake Cave.

(c) *Solution Pipes*. Solution pipes do not seem to reach caves at the water table, but are often seen intersecting the roofs of high collapse chambers. The sand and soil in and over the pipe then falls through to form a soil cone in the cave, and may provide access to the cave.

Influence of buried topography:

The coastal limestone in the Augusta-Margaret River area is piled on a ridge of Precambrian gneiss and granite. The topography of the gneiss before it was buried by the sand has a great influence on the morphology of any caves that develop. Two forms of cave can be

distinguished (here termed "stream" caves and "lake" caves), and the difference is attributed to the difference in the underlying surface of the gneiss.

(1) Where limestone is developed over a valley system of moderate relief, the water table coincides with the surface of the relatively impermeable gneiss. Rain water descends to the water table and then moves laterally into the old stream courses where, since the flow of water is concentrated, caves develop. A good example of this is in the Mammoth Cave area (see map). In this instance the dune limestone does not cover the entire catchment area of the old valley system, and several small streams are fed in from swamps on the gneiss. Several of the streams developed caves where they entered the limestone (Mammoth, Calgardup and Rudduck's caves). The streams flow westwards; the water from Calgardup, and possibly the others, passing through Connolly's Cave before reaching the coast - probably at Bob's Hollow Spring.

Features of the Stream caves are:

(a) the caves are linear,

(b) the caves have (flowing) streams,

(c) large caves are formed by collapse and the partial solution of the fallen blocks by the stream,

(d) the water has a relatively low salinity (150-300 ppm Cl),

(e) the stream is sometimes down cut into the gneiss,

(f) the passages usually end by being choked by collapses.

Examples of such caves are Strong's, Arumvale, Crystal, Rudduck's, Mammoth, Connolly's, Calgardup.

(2) Where the limestone is developed over an area of low relief, the water table lies within the limestone and also has a low relief. Rain water percolates down to the water table, and although lateral movement must then occur it is imperceptible (fluorescein placed in lakes in Jewel and Easter showed no signs of movement even after several months). Corrosion of the limestone occurs in the top foot or two of the phreatic zone, but its direction and effectiveness is haphazard as there is no jointing to give any control to the movement of the water. The best example of caves developed under these conditions are Easter, Jewel and The Labyrinth, all lying within a mile of each other. During the development of these caves, the water table has not fluctuated more than 3 feet above or below its present level, so that the cave passages lie in a thin sheet, with some vertical development caused by collapse.

The Lake caves show the following features:

(a) the caves have passages anastomosing in all directions,

(b) there are large lakes with no perceptible movement,

(c) high caverns can be caused by collapse, but most of the passages are low and irregular in width,

(d) the water has a relatively high salinity (500-1000 ppm Cl),

(e) the floor is usually formed of limestone or secondary calcite - only one exposure of gneiss is known (in Easter Cave, Gneiss extension),

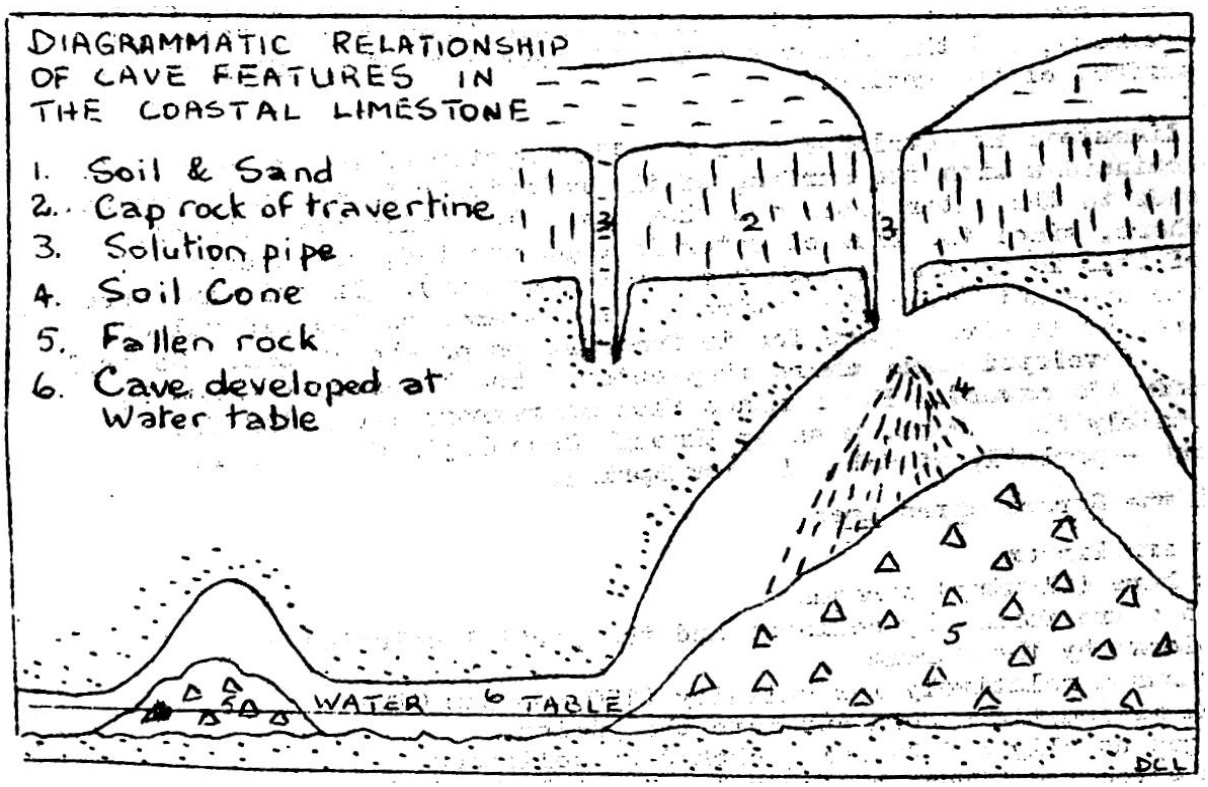
(f) passages usually end by passing under water or becoming constricted.

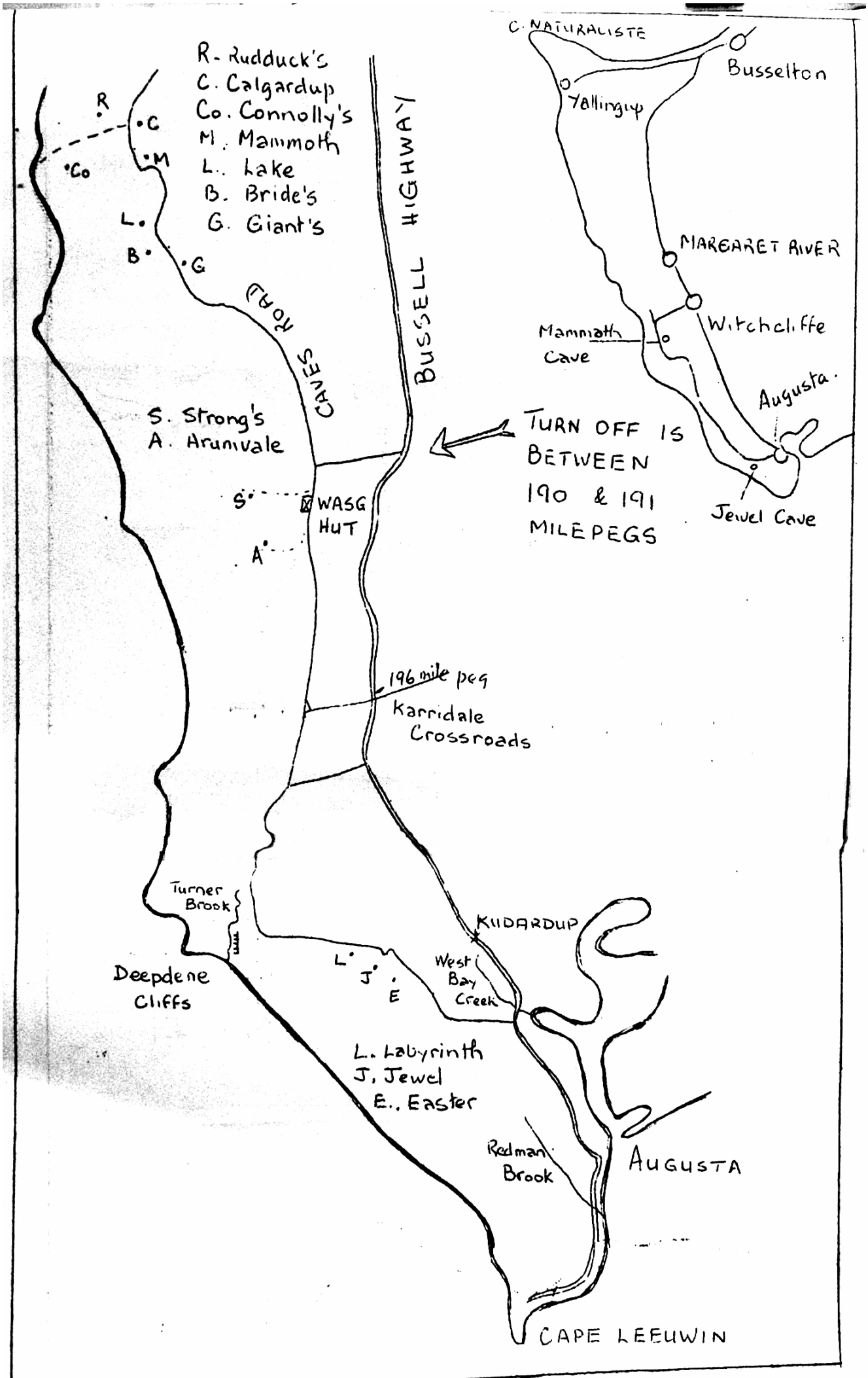
Numerous caves exist that cannot be fitted into either category because they consist of a collapse chamber; access to the water chamber is barred by fallen rock and washed debris, and it may be impossible to determine the conditions under which the original cave was formed, e.g., Bride's Cave. In some instances linearity of the cave may point to a stream origin, e.g. Giant's Cave.

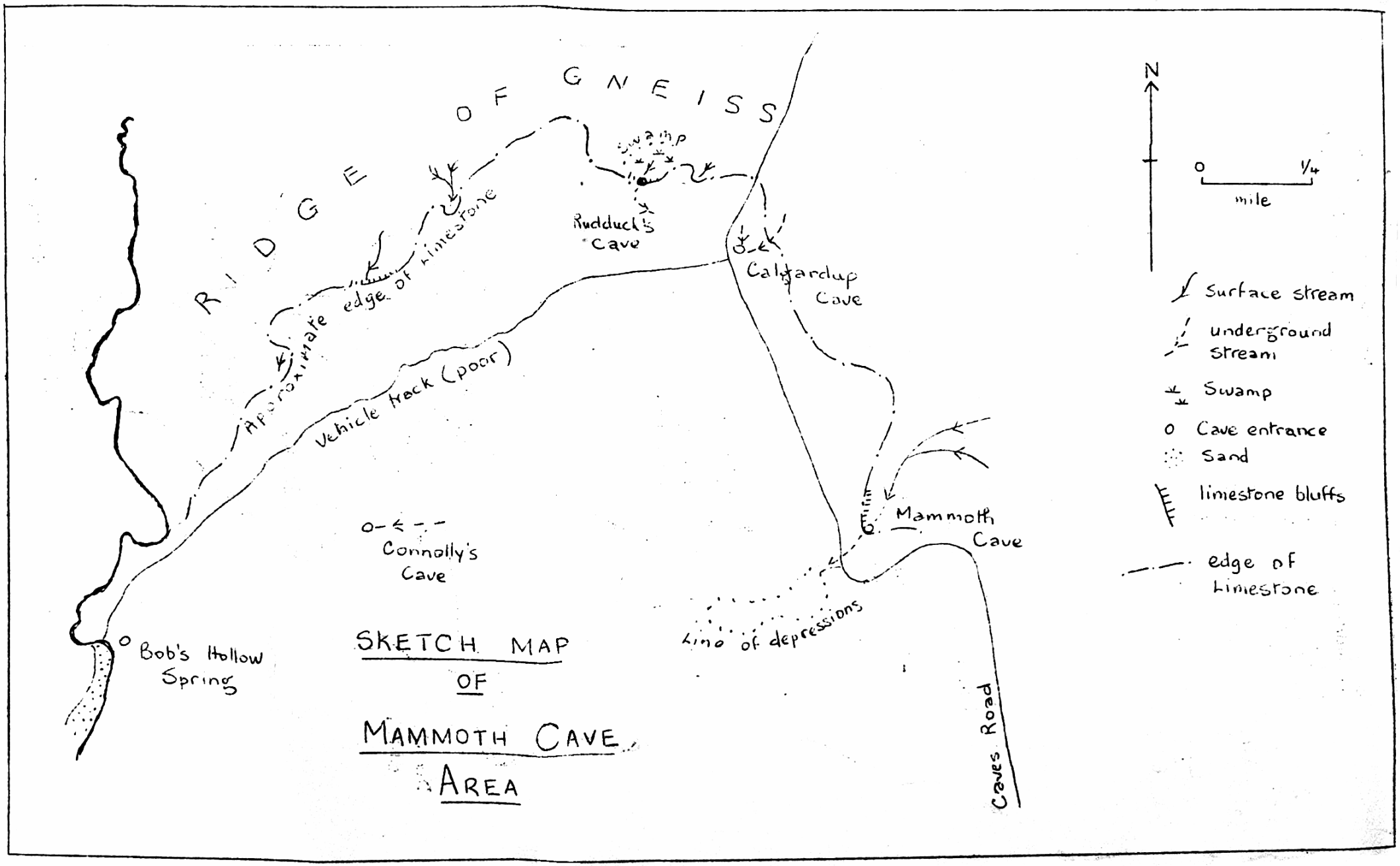
Decoration:

In common with some limestone areas elsewhere in the world, the abundance of secondary calcite is connected with the amount of vegetation growing above the caves, and the annual rainfall. (Augusta receives 37" p.a.; Margaret River receives 46" p.a.; Karridale receives 48" p.a.; the milder temperatures result in less evaporation, the region receiving as much as 7" water surplus in winter - the effective amount of rain). This is the highest rainfall of any area of coastal limestone and results in the heaviest vegetation. Rainfall, vegetation and secondary decoration tail off as one moves north from Margaret River. Straws and helictites are particularly abundant in the lower South West. An example of the high rate of deposition is a nest of cave pearls in Easter Cave which started growing in Easter 1958. The abundance of secondary calcite in all forms is greater than in many other limestone areas in the world with similar climate and vegetation, and this is probably due to the greater intergranular porosity and permeability of dune limestone than marine limestone, so that descending rainwater has every opportunity of becoming saturated before reaching the cave roof.

(DCL/TDB) 20/12/64




R - Rudduck's
C. Calgardup
Co. Connolly's
M. Mammoth
L. Lake
B. Bride's
G. Giant's
R
C
Co
M
L
B
G
CAVES ROAD
BUSSELL HIGHWAY
S. Strong's
A. Arumvale
S
A
WASG HUT
196 mile peg
Karridale Crossroads
C. NATURALISTE
Busselton
Yallingup
MARGARET RIVER
Mammoth Cave
Witchcliffe
Augusta
Jewel Cave
TURN OFF IS BETWEEN 190 & 191 MILEPEGS
Turner Brook
Deepdene Cliffs
KUDARDUP
West Bay Creek
L
J
E
L. Labyrinth
J. Jewel
E. Easter
Redman Brook
AUGUSTA
CAPE LEEUWIN


RIDGE OF GNEISS
Swamp
Approximate edge of limestone
Rudduck's Cave
Calfardup Cave
Vehicle track (poor)
Connolly's Cave
Bob's Hollow Spring
Mammoth Cave
Line of depressions
Caves Road
SKETCH MAP OF MAMMOTH CAVE AREA
N
0 1/4 mile
Surface stream
Underground stream
Swamp
Cave entrance
Sand
limestone bluffs
edge of limestone

THE LABYRINTH, Augusta ASF CONFERENCE, 1964-65

Location: The Labyrinth lies 600 yards northwest of Jewel Cave.

History: The entrance was located in June 1960 when a small hole was enlarged after a draught had been noticed. The first party investigated a couple of hundred yards of well-decorated passages with some water in them. In 1961, WASG used gelighite to clear the shaft of dangerously-poised rubble and re-entered the cave. They started a series of exploratory trips that continued for the next two years and resulted in a considerable extension of this very interesting cave. A survey was begun by Bastian and continued by Lowry.

Geology & Geomorphology: Labyrinth has great similarities with both Jewel and Easter Caves, lying as it does in the same belt of aeolian limestone. The cave passages are formed by solution at the top of the water table which lies about 80 feet below the surface. There is no obvious control on the direction of the ground water movement or on the amount of rock it has dissolved, and this has resulted in a cave with a multitude of haphazard anastomosing tube-like passages with rapidly fluctuating diameters. A general drop of 6 or 8 feet from the water table since the beginning of cave development has drained many of the passages, but several are still partly or completely filled with water. As in Easter Cave, there is an annual variation of the water table level of about 2", while corroded formation, drowned formation and false floors show that there has been a complex history of fluctuations on a large scale. There is vertical enlargement by collapse and where solution pipes have intersected the cave, the cave is partly infilled with cones of red soil. There is an abundance of secondary calcite including some high quality straws and helictites. Access to the cave system is gained by a "solution pipe" that penetrates the roof of a collapse chamber.

Interesting Features:

Getting Lost. Getting lost in this cave is extremely easy and is achieved to some extent by most parties. Touring parties usually require more than 6 hours, so spare food and carbide must be carried. Much of the cave can be seen without getting wet beyond the knees.

Trends. The cave is conveniently divided into 2 main trends - the West End and Northwest End (incl. Northeast End). A large number of passages and chambers have been named, though only a few have appeared on the map.

Elfin Hall is a small blind passage with delicate crystal pools, helictites and straws.

Winged Eagle's Nest contains excellent decorations that are reached by wriggling through a passage that is largely water-filled.

White Chamber contains excellent decoration on a large and small scale.

Sump Extension. A maze of partly water-filled passages where exploration still continues.

The Ripper is usually a needle-n-cotton job.

False Floor is an extensive sheet about 4" thick of crystalline calcite which formed on the surface of the water when its level was higher than at present.

Fat Man's Misery is a narrow, steeply-inclined slot with water to receive you should you slip.

Sewer & Gurk are named appropriately for a short water-filled pool followed by an awkward wriggle through "gurk"-like liquid mud.

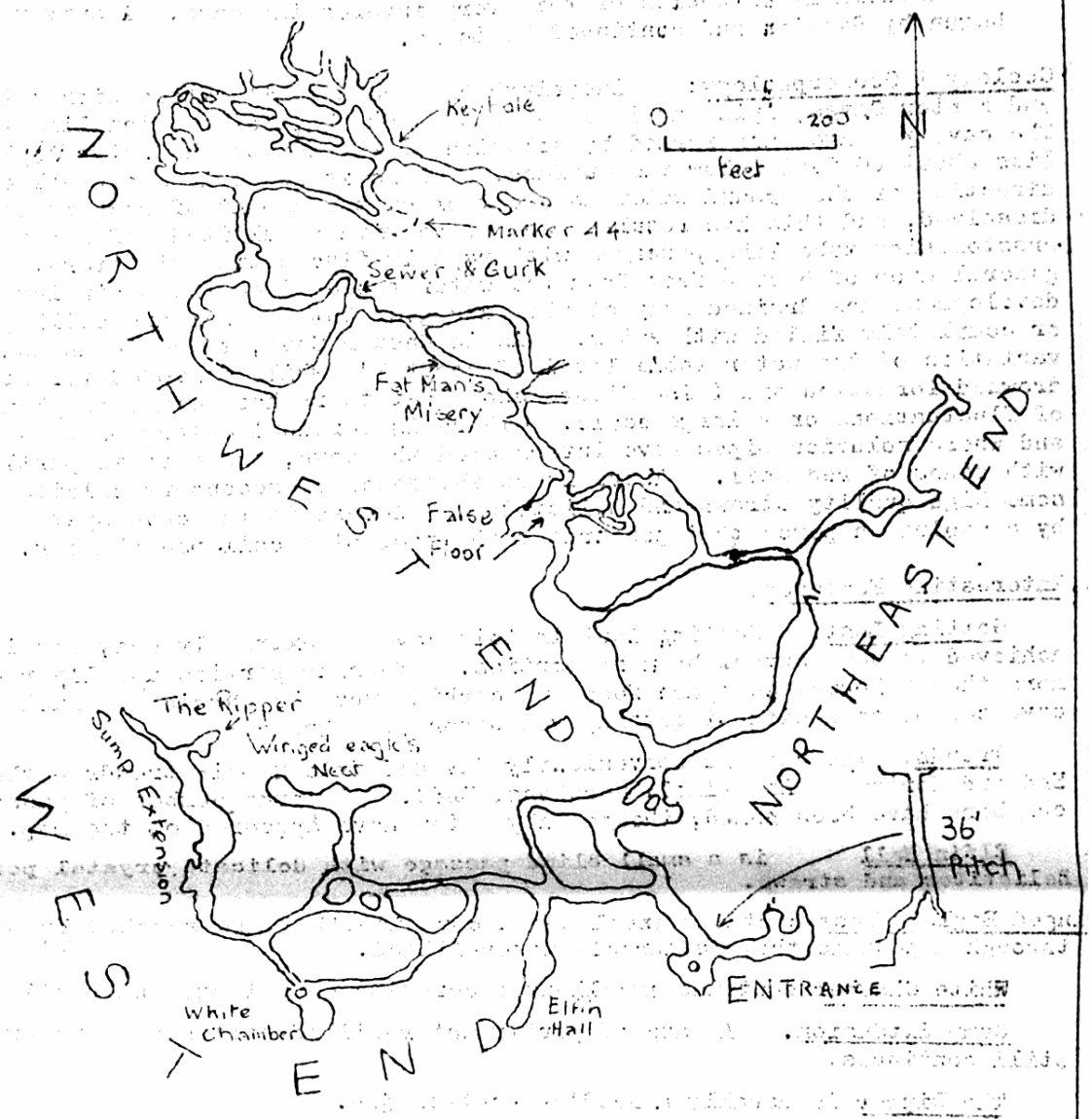
Keyhole is an awkward wriggle through fallen blocks.

Marker 44 marks a large soil cone of red soil which can be followed back up to a travertine lined pipe choked with soil, stones and roots. An attempt was made to clear out the pipe from below but was given away as being too dangerous. An attempt was made to locate the point on the surface above the pipe by surveying and conductivity measurements. A hole was sunk to 8 feet before the attempt was abandoned. However, there still remains a possibility of clearing the pipe and making a second entrance.

Other interesting features include Artistic Chamber, Bastian Network, Lighthouse, Piccadilly, sections of eroded stalagmite, scallop marks, dune bedding, jepygids (in The Ripper), etc.

17/12/64(DCL/TDE)

THE LABYRINTH



Sketch Map drawn up from Grades 2 & 4 Surveys

The purpose of this map is to give the caver an idea of the relative positions of the various features and passages and the 3 main trends. Many passages, especially in the West End, contain water up to 2 feet deep. Points of geological and palaeontological interest have not been added (so reducing confusion) but can be done on personal request.

(NB. Metal Markers are NOT IN SEQUENCE!)

EASTER CAVE, Augusta. ASF Conference 1964-65

Location: The entrance lies hundred yards southeast of Jewel Cave near Augusta.

History: The first chamber of Easter Cave was used as a tourist cave in the early part of this century. In Easter of 1956, some cavers (later to form the WA Speleological Group,) followed up a draught by tunnelling horizontally from the lowest part of the cave, to enter a hitherto unknown system containing much decoration. In January 1964, the First Duck was forced by members of WASG who are still engaged in exploring, surveying and photographing the cave.

Geology: The caves (Easter, Labyrinth, Jewel, etc.) all lie in a fairly narrow strip of limestone between the Precambrian granite, granitic-gneiss and allied rocks, on the one hand, and fresh sand dunes (probably overlying limestone) on the other.

The main part of the cave has been formed by solution of the aeolian limestone at the top of the water table. Parts are modified by rockfall, and the entrance is formed by a travertine-lined pipe penetrating the roof of a rockfall chamber. The bedding in the limestone dips north-eastwards and this seems to control the development of the cave passages; the major development parallelling the strike and minor development at right angles. False floors, water marks, and corroded formation indicate a complex history of fluctuations of the water table.

Features of the Cave: The most striking feature of the cave is the large number of lakes. Continual immersion in them makes it a difficult cave to explore or tour; warm clothing (preferably a frogman suit) and food are necessary for penetrating beyond the First Duck. A trip could be any thing up to 12 hours in length. There is no danger of sudden flooding as there is no direct connection between any surface drainage and the lakes. In fact, the water table starts to rise 6 months after the start of the winter rains.

The porous limestone and the high rainfall allows a great deal of solution and precipitation of calcite. As a result there is a great profusion of straws and helictites - certainly the best display found in WA and probably one of the best in the world. Near the "Y" Junction many cubic yards of flowstone were deposited and it appears to have collapsed under its own weight.

Cave Pearls seen on the right hand side of the first tunnel started forming in 1958. HANDS OFF!!!

Epstein Sculpture (actually more Moore) is a curious massive helictite. A little farther on is a good display of helictites and straws easily accessable to the photographer.

Beach marks farthest point reached dry shod. From here on its wet.

First Duck is a highly unpleasant watery passage about 2 feet high, 2-6 feet wide and 30-40 feet long. Air space is commonly less than 6 inches, and in one spot is less than 1 inch. First Duck should be tackled only by the experienced caver. A water proof torch is essential.

Tom's Folly is a large area of mud-covered crystalline calcite. Tom suggested we wash the mud off.

The Feature is a photogenic mound of coloured decoration.

Tutaokuri is a misnomer for a serigs of passages with good decoration.

Bristles 1 & 2 are magnificent masses of millimetre thick helictites.

The Answer.....no comment.

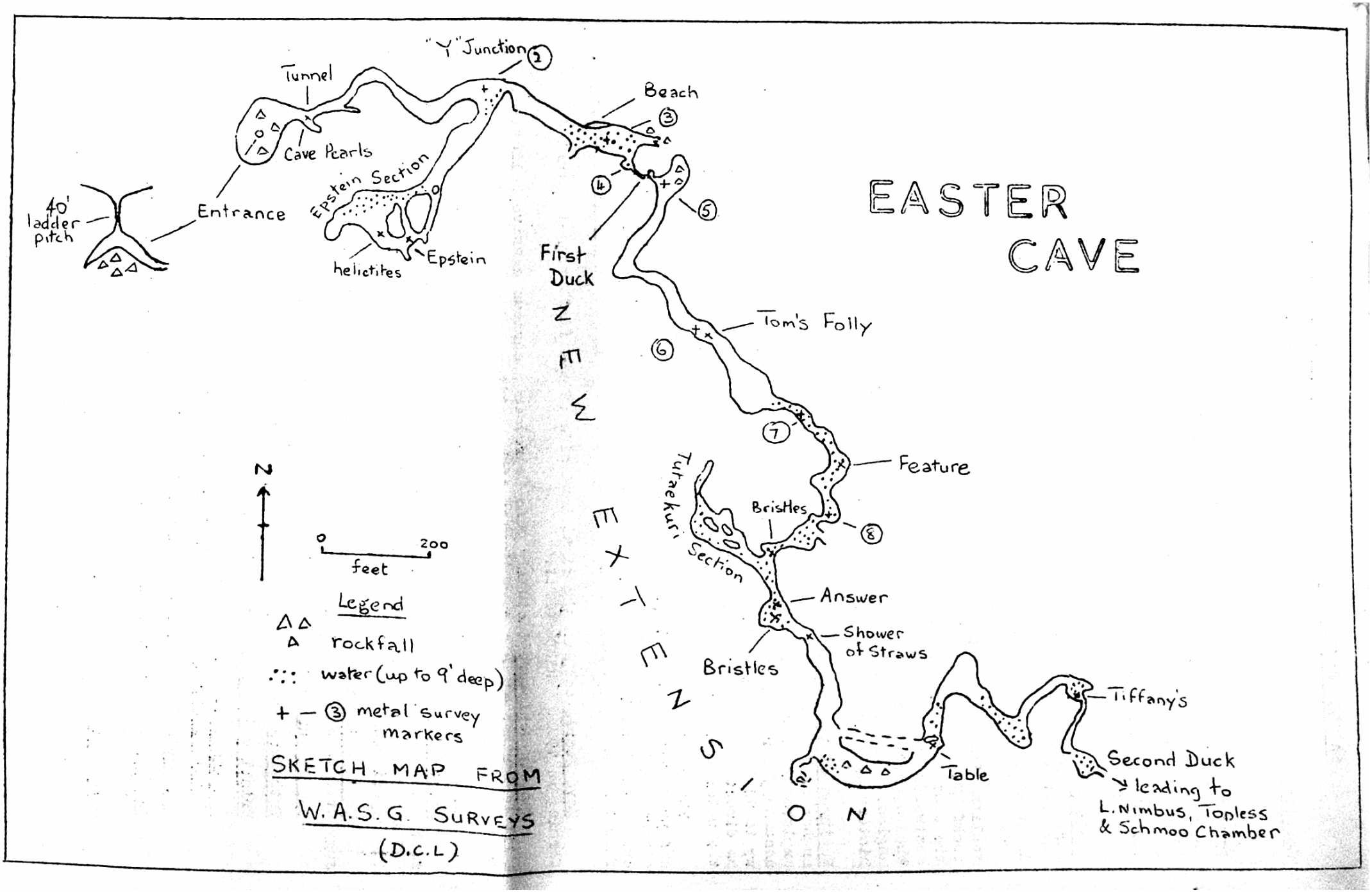
Shower of Straws is a display over a shallow lake.

The Table is an elevated mass of helictites up to 15" long

Tiffany's is a large dried up crystal pool with excellent calcite crystals up to 2" long.

Second Duck has only a few inches of air space for a feet or two but is not as awkward as the First Duck. Leads to Lake Nimbus, Lake Topless, Schnoo Chamber and points beyond. Farthest points are unexplored especially in the vicinity of the largest rockfall-cum-roof collapse in the system.

(TDB/DCL)
15/12/64


EASTER CAVE
"Y" Junction
Tunnel
Beach
Cave Pearls
Epstein Section
40' ladder pitch
Entrance
helictites
Epstein
First Duck
Tom's Folly
Feature
Bristles
Tutaekuri Section
Answer
Shower of Straws
Bristles
Tiffany's
Second Duck
leading to L. Nimbus, Topless & Schmoo Chamber
Table
EXTENSION
N
0
200
feet
Legend
rockfall
water (up to 9' deep)
metal survey markers
SKETCH MAP FROM W.A.S.G. SURVEYS (D.C.L)

Location: The caves lie a short distance from a track and about ½ mile from Caves Road immediately south of Overtime Lodge. Arum Pipe lies close to the head of Breakneck Gully, while Arumvale Cave is about 150 yards to the northwest.

History: Arum Pipe was first reported during a survey of caves reserves in 1960. Arumvale Cave was not reported in the 1960 survey, but was probablyfound during the timber milling days, as this region was cut over by the Karridale Mill. It was located by cavers (later to form WASG) in March 1958 and successfully bottomed in June of that year. Since then, both caves have been entered by WASG, but great care has had to be taken with the cave because of the overhangs guarded by dangerously-wedged loose boulders.

Geology & Geomorphology: Breakneck Gully drains into a 50 ft cliff from a stretch of low swampy country to the east. In times of heavy rain, a considerable stream flows in the Gully to vanish into two impenetrable holes in its bed. This stream reappears (?) in both Pipe and Cave indicating that it drains the swamp at water table level. (Cf Rudduck's Cave) The Gully has precipitous sides and would appear to have been a cavern with a stream flowing into it. Collapse of the major part then took place.

The Pipe leads to a steeply-sloping collapse fissure and finally to the stream which vanishes under a huge rockfall beyond which lies the continuation as Arumvale Cave. The pattern of both Pipe and Cave is distinctly linear with an active stream (the cave shows signs of a rejuvenated stream).

Interesting Features:

The Pipe is the longest single pitch in the south west, being over 80 feet. It is an enlarged solution pipe about 10 feet across and with straight smooth sides. It is easier to abseil down and climb out on the ladder.

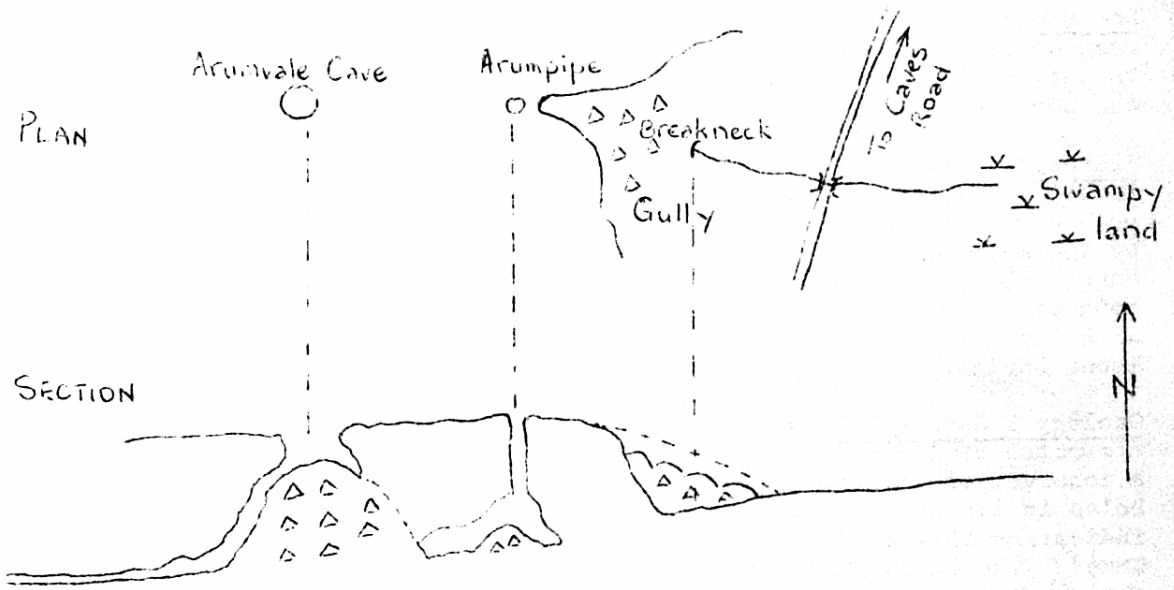
The Cave is entered at the sides of a large depression formed from an extensive roof collapse (it is this collapse that has blocked progress in Arum Pipe). A precipitous, narrow sloping passage winds around the edge of the collapse close to the walls and after 50 vertical feet opens onto the cave proper. A series of crumbly overhangs marks the edge of the collapse where it gives way to the linear stream cave beneath. (Cf Strong's Cave) Once this dangerous vertical section is negotiated, a steep soil slope reaches to the floor which is covered with thick mud of the consistency of firm jelly. The stream meanders in the dome-shaped cavern with extensive mud flats and browny-red fossil soils along the walls above mud level. Decoration is very good with pure white dominating. Further on, mud stains many of the stalactites.

China Room is a large rockfall that does not quite reach the roof. It consists of much crystal lying in shattered slabs and the roof can be seen to have suffered considerable cracking, followed by a period of deposition of calcite along these cracks, before the final collapse took place.

Mud. Beyond China Room the cave gets lower, while the stream anabranches and gradually loses its identity. The walls, roof and formations are all coated with mud, which would indicate at one period there was complete mud fill in this portion of the cave. It also suggests that the stream was dammed presumably by a collapse further on, which leads to a small possibility that this could be reached and passed. The mud contains much vegetable matter, thereby providing sustenance for a small, but thriving, animal population of worms and marron, all normally developed (Bastian, 1958). A pink fungi (?) was also reported (Bain, 1962).

(TDB/LVB)
16/12/64

ARUMVALE SYSTEM



Plan & Section are not done to scale but are meant to illustrate the suspected relationship between Cave, Pipe and Gully

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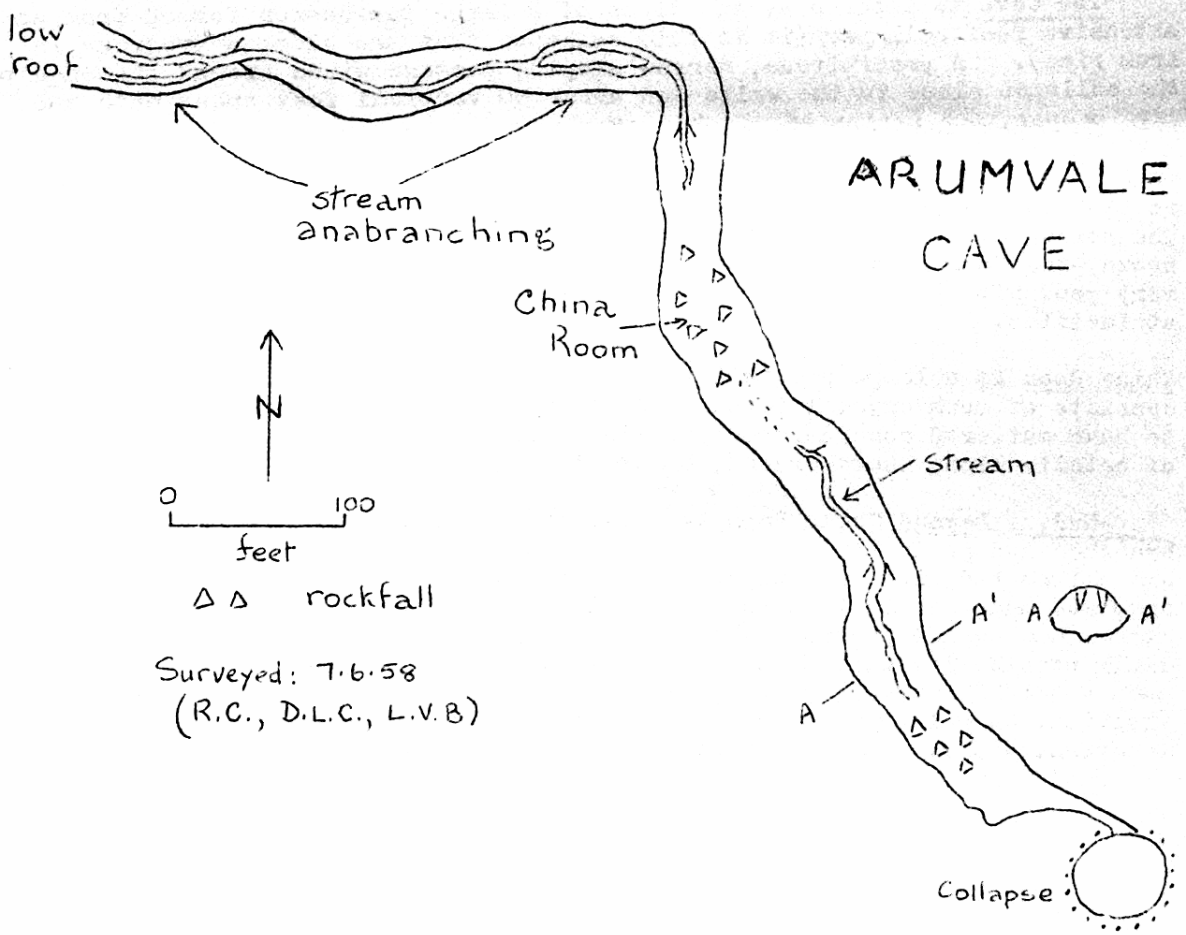


ARUMVALE CAVE

Surveyed: 7.6.58
(R.C., D.L.C., L.V.B)

STRONG'S CAVE, Boyanup — ASF CONFERENCE, 1964-65

Location: A few yards from a track which runs due west from Overtime Lodge for about ¼ mile.

History: The downstream section has been known for several years. Progress upstream had been stopped at a point where the stream emerged from a narrow cleft. During Easter 1960, members of WASG forced a way through near the top of a fall of rock and explored the cave to the end. A few months later, a small door was placed in the entrance passage to reduce unauthorised parties. All efforts to locate another entrance or an upstream continuation have met with failure.

Geology & Geomorphology: Strong's Cave is an excellent example of a "stream cave" - the cave has a linear form with a stream running along its length. In parts of the cave, the stream has downcut into weathered gneiss (Cf Rudduck's Cave). There has been much enlargement by collapse; in these large chambers, the stream flows gently over a wide bed of sand.

The stream is presumed to be controlled by an old valley that drained towards the coast before the dunes advanced inland. As with Rudduck's Cave, it is suggested that the water table coincided with the gneiss-limestone contact and the ground water was directed into the old stream course. (One significant difference between Strong's Cave and Rudduck's/Arumvale is that the latter have entrances off the gneiss)

As a whole, the size of the cave decreases downstream, the stream eventually passing into a low rock fall which marks the end of the known cave. In the lower reaches of the cave, the gneiss is overlain by a conglomerate (pebbles and cobbles of gneiss) which passes up into 2 or 3 feet of loose quartz sand. Cook(1963) considers this to be a marine conglomerate, but one writer (DCL) is unconvinced and suggests it may be a conglomerate in the bed of the original stream. It is possible that as the dunes advanced inland they first caused ponding of the stream so that the conglomerate became covered with sand. The dunes then covered the valley.

The entrance to the cave occurs where a collapse has broken through to the surface. The water table has obviously never been more than a foot or two higher than at present. The presence of huge caverns shows that the stream was capable of dissolving and carrying away the fallen boulders. A comparison of the plans of Strong's Cave and Arumvale will reveal a large number of similarities. Both upstreams are large (wide and High); both contain a huge rockfall of fairly recent origin; both narrow downstream. Strong's does not have the enormous collapse as Arumvale has but an inspection of the former shows what size a major roof collapse will attain.

Interesting Features:

The cave is attractive to tourists as it contains excellent decoration, is relatively easy to find, enter and traverse.

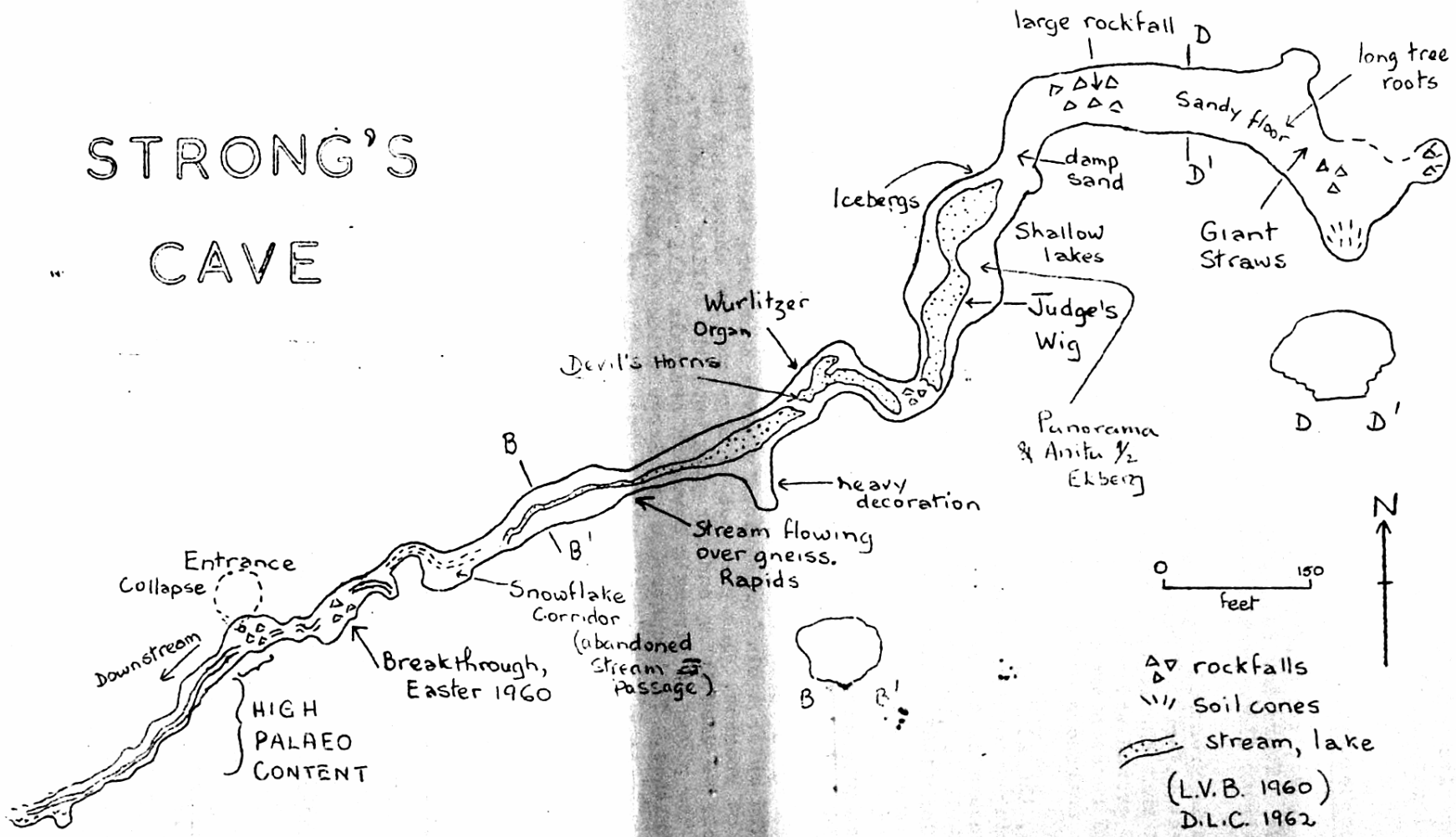
Judge's Wig, Icebergs, & Wurlitzer Organ are 3 extremely attractive and photogenic masses of calcite set in wide roomy chambers in the sections of the cave known facetiously as "The Ballroom" or optimistically as "Lakes" 1 & 2. Others in the same area include Anita (½) Ekberg, Panorama and Devil's Horns.

Straw Stalactites. In the upstream section of the cave there are straws hanging from a high roof. One was measured at more than 20' 6" and is tentatavely claimed as the world's longest (NSS News Vol 8, 129). Nearby are several long tree roots which reach down to the stream.

Fossil material. The collapse is evidently of some antiquity, and contains fossil remains of numerous animals. D.Cook worked on material washed out of the rockfall by the stream and identified several extinct species. (WA NATURALIST, 1963, 8,No 7, 153-172) The WA Museum now has control of the cave, and intends to excavate the rockfall in the hope of recovering bones from a stratified sequence.

(DCL/TDB)
18/12/64

STRONG'S CAVE



CONNOLLY'S CAVE, Witchcliffe

Location: On the eastern end of an east trending ridge; 1000yards NE of the Bob's Hollow Spring.

History: The cave was discovered and explored early this century. Rudduck mentions the cave in his Camp Notes and it is interesting that he describes the cave as developed downstream from the entrance whereas the present-known cave is developed upstream. His description fits the known upstream section so it is more likely that he made a slight error rather than that there is a "lost" downstream section. The cave was re-located by Bastian in 1959.

Geology & Geomorphology: The cave is developed along a stream flowing west to the sea. There has been much enlargement by collapse and the entrance is formed by a "solution pipe" intersecting the roof of a rockfall chamber. It is likely that the stream follows an old valley carved in the gneiss, but there is no direct evidence of this. The part of the cave shown on the map is approximately half of the total length. The unmapped portion is very similar, with short lengths of stream interspersed by large rockfalls.

Features. Mud. In common with other stream caves (Cf Arumvale Cave) the stream bed in several places has deposits of black mud. In 1960, Howlett reported the presence of earthworms (?) in the Anita Ekberg Chamber, while a white gilgie was collected by Cawthorne in 1961.

Decoration. There is little formation in this cave; the only significant deposit being in the Anita Ekberg Chamber.

Rockfalls. There are numerous rockfalls and the stream percolates through them while cavers usually climb over them. However, there is one place (Section A-A^1) where the caver has to "percolate" through the rockfall, and extreme care is needed. As in other caves developed in the aeolianite, the limestone is very friable.

CALGARDUP CAVE, Witchcliffe

Location: Some 30 yards NE of the intersection of Caves Road and Bob's Hollow track.

Features: Calgardup is an old tourists' cave with two sections, one trending north from the entrance and the other trending east. The two sections are occupied by small streams which flow towards the entrance. There has been much enlargement by collapse and solution of the fallen blocks has left spacious caverns.

In 1960, fluorescein placed in the westward-flowing stream stained the lowest portion of the stream in Connolly's Cave. It is thought that the water finally emerges in Bob's Hollow Spring. The rate of flow and salinity of Bob's Hollow Spring are greater than that of Connolly's Cave which in turn are greater than that of the streams entering Rudduck's Cave, Calgardup Cave or Mammoth Cave.

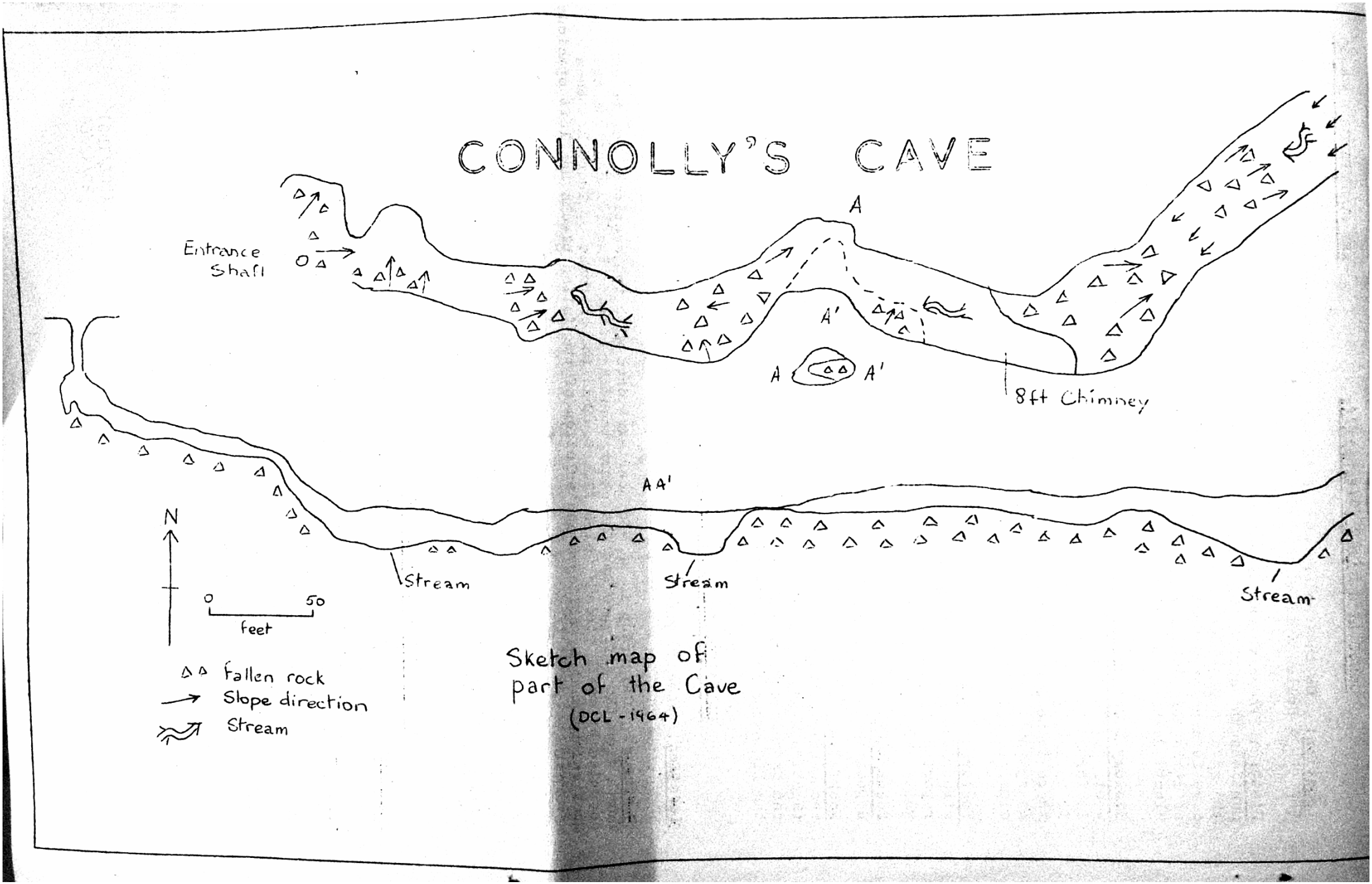
MAMMOTH CAVE, Witchcliffe

Location: Some $\frac{1}{2}$ mile south of Calgardup Cave in a natural depression on the east side of the road.

Features: Mammoth Cave is a tourist cave made famous by the discoveries of the remains of extinct marsupials. A small stream flows into a large entrance in a cliff about 30 feet high. Collapse and solution of fallen blocks have created large caverns with an abundance of decoration. A second entrance to the cave occurs a few yards to the west of Caves Road where a collapse has broken through to the surface.

The water from Mammoth Cave is thought to join the stream in Connolly's Cave, but this theory remains to be tested. An abortive fluorescein test made in 1960 was a dismal failure when the dye failed to dissolve. Early records describe a cave which lies several hundred yards to the west of Mammoth Cave and carries a stream, but the cave has not been seen since.

(DCL/TDB)
20/12/64



Sketch map of part of the Cave (DCL - 1964)

RUDDUCK'S CAVE, Witchcliffe ASF CONFERENCE 1964-65

Location: Northwest of Calgardup Cave, about 200 yards from the first bifurcation on the Bob's Hollow track, on a bearing of 330°.

History: The camp notes of the late Mr S.A. Rudduck describe the cave as lying in the swamps west of Calgardup. He had investigated it and forced a way through the watery bottleneck to a spot where a narrow flattener was filled with mud. In 1961, using his notes and Lands & Survey maps, WASG made two attempts to re-locate the cave. We apparently looked too far west, for in March 1962, Howlett and Bain using Marmaduke Terry's 1900 survey lines, led a party that finally found the cave which was named Rudduck's Cave in honour of the farmer and cave explorer.

Geology & Geomorphology: A small seasonal stream rises in a swampy area underlain by Precambrian gneiss and flows into the cave at the base of a 15 ft high bluff of limestone. There are a series of shallow pools in the cave with a small flow of water between them for most of the year. The cave follows the contact of the limestone and the underlying gneiss and in several places the stream has cut as much as 2 feet into the gneiss. The cave ends where the roof gradually descends to meet a slurry of mud and silt. The stream possibly emerges on the coast at the Bob's Hollow spring, but an attempt to prove this with fluorescein and rhodamine B failed because the rate of flow at the time of test was too small.

The cave is thought to be controlled by an old valley carved in the gneiss (i.e., the original topography before deposition of sands). Dunes advanced from the coast and partly covered the valley with a thin layer of calcareous sand which soon lithified. Because of the relative permeability of the thin limestone and the impermeability of the gneiss, the water table approximated to the limestone-gneiss contact, and the movement of the ground water was concentrated in the floor of the original valley. The cave was then dissolved out in the approximate position of the old stream course by water coming partly from the sides of the valley and partly from the swamp on the axis of the valley. A later drop in the water table then caused the stream to cut down into the floor of the cave (see cross section A-A').

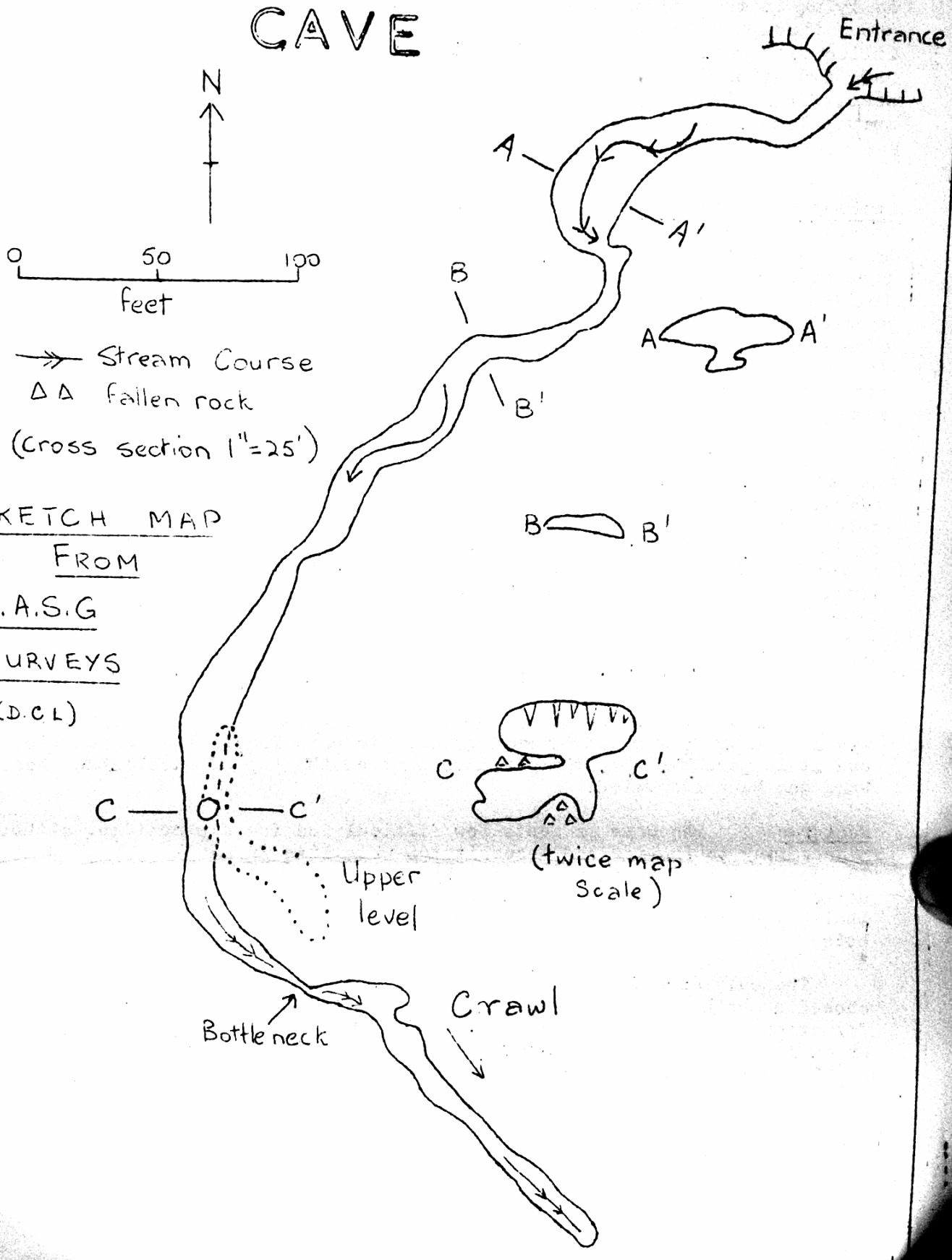
Towards the far end of the cave is an interesting "upper level". The two levels are separated by what appears to be a layer of cemented blocks, and it is possible that this is a remnant of the top of a collapse whose base has been excavated.

Features: The cave presents few difficulties for exploration, although penetrating to the far end necessitates wriggling in shallow mud and water. The prospect of extending the cave by digging is not very bright, as the water appears to bank up back to the entrance in times of flood, suggesting that beyond the present limit the cave is either constricted or choked or both.

The only significant formation present is in the upper level which is choked at both ends by flowstone, stalagmites and stalactites. The formation is yellowish and of reasonable colour. Weathered gneiss is exposed in the walls in several places (a feature of considerable interest) and has caused an abundance of mica in the alluvium.

(TDB/DCL)
15/12/64

RUDDUCK'S CAVE



SKETCH MAP FROM W.A.S.G SURVEYS (D.C.L)