

A NEW SURVEY OF KENT'S CAVERN, DEVON

by

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North Entrance: N.G.R. SX 93446416, alt. 58.1 m A.O.D.

South Entrance: N.G.R. SX 93446414, alt. 58.5 m A.O.D.

Total length of cave: 934.1 m

Length of show cave paths: 298.5 m

Vertical range of cave: 18.8 m (49.9 m to 68.7 m A.O.D.)

ABSTRACT

Kent's Cavern is one of the largest caves known in the Devonian limestones of south-west England, and the most visited show cave in the area. It is situated in Torquay on the south Devon coast, and has been known since time immemorial: visitors can be traced back to at least 1571. The cave contains a complex sequence of archaeological deposits dating from the Lower Palaeolithic to the present, and has been excavated many times, notably by William Pengelly between 1865 and 1880. A new survey is presented here, together with a description of the cave.

INTRODUCTION

Kent's Cavern is situated in the Devon seaside resort of Torquay, and lies at the south end of one of the largest of the numerous faulted blocks of Devonian limestone on the north side of Torbay (FIG. 1). The cave is the third largest in Devon, with a total passage length of nearly a kilometre, and is a good example of the predominantly phreatic type of solution caves found in the Devonian limestones.

Historically, the cave has always been open, and the passage of numerous early visitors is marked by the inscriptions they left in the cave; the earliest, left by 'Wm Petre' dates from 1571. By the late 18th century guides were being paid to escort the visitors. In 1903 the cave was bought by William Francis Powe, and since then the Powe family have developed it for showing to the public, with the installation of paths and electric lights, so that today it is the biggest and most visited showcave in Devon.

Kent's Cavern's chief claim to fame, however, is its archaeological significance. There have been numerous excavations in the cave (Benyon, *et al.* 1929; Campbell & Sampson, 1971; Dowie, 1928; Kennard, 1945-46; Pengelly, 1869, 1884; Smith, 1940), of which the most important were those carried out by William Pengelly between 1865 and 1880 (Pengelly 1884). He excavated in most of the cave, uncovering a unique series of deposits dating from the lower Palaeolithic to the present. His discovery of the remains of several discrete Palaeolithic cultures was the first major contribution to the study of this period in Britain.

Pengelly's work considerably changed the cave. He excavated the sediments in most of the passages to a depth of 1.2 m below the overlying stalagmite floors; the removal of such vast quantities of sediment considerably increased the open volume of the known passages, and in addition blockages were cleared, creating new connections such as the passage between the Bear's Den and the South-West Chamber. In several places completely choked passages were cleared, revealing previously unknown parts of the cave, notably the Rocky Chamber and in the Sally Ports. Most of the passage names currently used were established before or during Pengelly's period of excavation.

In 1934 Kent's Cavern was surveyed by P. M. B. Lake (Lake 1934), whose plan has served as the standard survey ever since. Unfortunately Lake's plan has no elevation data so that, while it has served its purpose as a route plan well, it is inadequate as a base for further research. The survey presented here (Figs. 2 & 3) has been prepared as part of a continuing study of the geomorphology, sediments and chronology of the cave.

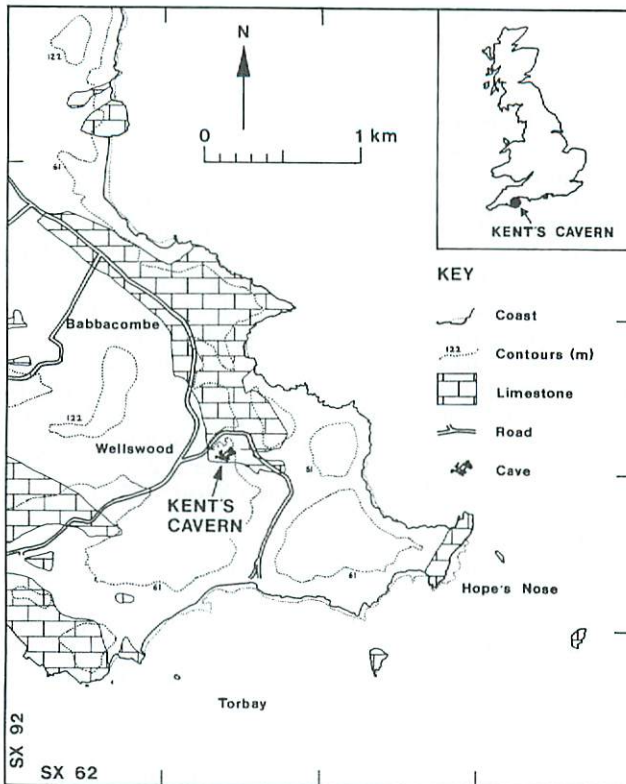


FIG. 1—LOCATION OF KENT'S CAVERN, TORQUAY

DESCRIPTION OF KENT'S CAVERN

Entrances to the Cave

Kent's Cavern lies just to the south of Ilsham Road in Wellswood, 2 km east of Torquay centre. The two entrances are 15 m apart on the west side of the dry Ilsham Valley. The area has been extensively modified by the show cave development, and both entrances are now obscured by buildings.

The North Entrance, opening into the Vestibule, is now a doorway in the back of the waiting room. This is the entrance referred to in early reports as 'the Entrance'. The South Entrance is entered via the shop, and leads into the Great Chamber. A third entrance was discovered during the course of Pengelly's excavations, when work in Smerdon's Passage caused a collapse which opened up a new entrance almost vertically below the South Entrance.

The hole was filled in soon afterwards to prevent unauthorized access, and this entrance is now deeply buried beneath the foundations of the cavern shop. Pengelly found another two blocked entrances nearby, but these were never opened up.

The North Entrance, Vestibule and Sloping Chamber

The North Entrance door opens into a short passage leading into the Vestibule, the upper end of a roomy chamber sloping down to the left. On the right is the short North-East Gallery, partly filled with excavation spoil and ending at a dead end where a glimmer of daylight can be seen. Downslope and to the left is the Sloping Chamber, which was originally separated from the Vestibule by a boulder pile. The removal of the obstruction by Pengelly created a single chamber nearly 30 m long with a steeply dipping bedding plane roof heavily encrusted with tufaceous stalagmite.

The Sloping Chamber has several major passages radiating from it. Halfway down on the left, the Passage of Urns slopes up into the Great Chamber. Beneath the Passage of Urns, Cox's Passage can be followed up to a dead end under the Great Chamber. At the bottom of the Sloping Chamber three passages diverge. Straight on, a 3.5 m high arch is the start of the Long Arcade. To the left is the Charcoal Cave, a short series of passages ending in sediment chokes underneath the Great Chamber and Gallery: there is an impassable connection through to the latter. To the right a wide boulder-strewn opening is the entrance to the Wolf's Cave. The right hand side of the Wolf's Cave is strewn with large collapsed slabs, but keeping to the left an angular passage can be followed for 20 m round a corner to a small chamber, the Cave of Rodentia. To the right the Cave of Rodentia narrows down to a choice of three holes back into the Wolf's Cave.

The Long Arcade

The Long Arcade is one of the major passages of Kent's Cavern, running for 68 m from the Sloping Chamber to the Cave of Inscriptions near the inner end of the cave. Beyond the 3.5 m high archway at the bottom end of the Sloping Chamber, the roof of the Long Arcade rapidly rises to produce a canyon shaped passage 5 to 6 m high, and these dimensions are maintained for most of the rest of its length. A prominent feature of this passage is the phreatic tube in the roof, which may be traced continuously from the High Level Chamber through the Cave of Inscriptions and the Long Arcade to where it is lost in the Sloping Chamber close to the North Entrance.

Thirty-five metres from its start the canyon is divided into an upper and lower passage at the Bridge, which is composed of a span of *in situ* limestone. Before the lower way was cleared, the only way further into the cave was by a 2.5 m climb up into the higher passage. This can still be reached by a straightforward climb up on the near side. From the higher passage, two high-level side passages can be reached. A 1 m step up on the left near the far end enters an elliptical tube at roof level, the Little Oven. This begins as a hands and knees crawl, but after a few metres the passage is almost blocked by a flowstone bank. In Pengelly's day the squeeze over this bank was considered a sporting challenge, and even by today's standards it is quite tight. Beyond, the passage regains more comfortable proportions with a crawl over gour pools, emerging 2.5 m above the floor of the Labyrinth. The other side passage accessible from the Bridge is reached by a bold step from the far end of the upper passage on to a ledge high on the left wall of the Long Arcade. At the back of this ledge is a narrow steeply descending rift, dropping into a tiny round grotto with an impassable slot through to the end of Underhay's Gallery on the right.

A few metres beyond the Bridge is the wide entrance to the Labyrinth and Underhay's Gallery on the left. The floor of the Long Arcade rises steeply here and steps have been laid in the tourist path. A few metres beyond the entrance to the Labyrinth is a huge conical stalagmite formation, the Inscribed Boss, hiding the entrance to Clinnick's Gallery, which is reached by paths round either side of the boss. It should be noted that Lake (1934) confused the Inscribed Boss with Hedges Boss in the Cave of Inscriptions. Straight on, the Long Arcade opens into the Cave of Inscriptions.

Clinnick's Gallery and Rocky Chamber

The concrete paths leading round either side of the Inscribed Boss gives access to Clinnick's Gallery. Before Pengelly cleared it, this passage was almost blocked with sediments; the chambers beyond were only discovered during his excavations. Today Clinnick's Gallery is a 2.5 m high passage which meanders round several corners to enter the 24 m long Rocky Chamber. The Rocky Chamber area contains the best decorated stalagmite grottoes in Kent's Cavern, and some of the finest in Devon. On the left at the entry to Rocky Chamber is the Organ Chamber, blocked at the far end by a solid boulder choke. Continuing down into Rocky Chamber, both sides are adorned with flowstone banks and stalagmites, notably an impressive group of columns on the right. The chamber slopes down to the far end, where a bank of sediment prevents further progress.

The Cave of Inscriptions, High Level Chamber and Great Oven

The end of the Long Arcade opens into the Cave of Inscriptions, a roomy chamber some 5.5 m high, with the Long Arcade roof tube meandering prominently across its ceiling and disappearing up into the High Level Chamber to the right. A large stalagmite boss in the middle of the Cave of Inscriptions is famous for the graffiti it bears, which read 'ROBERT HEDGES / OF IRELAND / FEB 20 1688'. Behind Hedges Boss is the Alcove, a small recess excavated by Pengelly.

The main continuation from the Cave of Inscriptions is a lofty passage to the right, known as the High Level Chamber. The show cave path ends at the start of this passage; beyond, the floor rises steeply so that after 12 m the roof height has decreased to about 3.5 m. On the left at the top of the slope is a wall of unexcavated sediments capped by stalagmite, above which a low slot at roof level connects with the Swallow Hole Gallery. Continuing on, the High Level Chamber ends after a few metres at an unexcavated sediment blockage. The way on is to the left at the end, into the 17 m long Swallow Hole Gallery. The Swallow Hole Gallery ends at another wall of stalagmite capped sediment with the slot from the High Level Chamber above it; clearly the two passages are only separated by an area of unexcavated sediments. Several small side passages can be explored on the right hand side of the Swallow Hole Gallery.

Returning to the Cave of Inscriptions, a walking height passage on the left (approaching from the Long Arcade) is the Great Oven. The passage starts as a fine steeply ascending canyon, at the top of which is an awkward 2 m climb into a 1 m wide rock-floored elliptical tube. After a few metres of crawling, past a similar sized oxbow, the floor steps back down into a phreatic rift. This can be followed straight ahead, under a 6 m high blind phreatic aven (the highest part of the cave) to emerge in the Bear's Den. A small hole on the right near the start of the rift may be followed via two tight squeezes into a small well decorated chamber with a large stalagmite column on the left. At the end of this chamber an impassable hole connects through to the passages above the Tortuous Gallery.

The Labyrinth and Underhay's Gallery

The entrance to the Labyrinth from the Long Arcade is mainly the product of Pengelly's excavations; originally only two low crawls through existed here. On the left at the start of the Labyrinth is Underhay's Gallery, a short dead-end passage with impassable connections through to the Labyrinth and a side passage of the Long Arcade to right and left respectively.

The Labyrinth itself is a wide passage with phreatic half-tubes in the roof, which provide walking height routes to either side of a massive roof pendant that partially blocks the entrance. The Labyrinth was originally named for the confusing mass of fallen blocks and stalagmite bosses which had to be negotiated here, but these have long since been removed and it is now a roomy chamber with several passages diverging from it. To the left is an awkward 2.5 m climb into the Little Oven. On the other side of the passage a somewhat easier climb reaches another roof level tube, which can be followed over holes in the floor for 11 m to where it becomes too low. The holes drop into a small mud floored chamber decorated with a few small stalagmite draperies. From this chamber a lower passage can be followed back to the Labyrinth, emerging half way up the wall beneath the roof level tube.

At the end of the Labyrinth, two passages lead on. The show cave path turns left into a low level route, Matthew's Passage. To the right and above a climb onto a ledge, the half-tube in the roof carries straight on into another passage. Both routes emerge after a few metres in the Bear's Den.

The Bear's Den and associated passages

The Great Oven and the passages south from the Labyrinth unite in the Bear's Den, a roomy chamber 16 m across with large flowstone bosses against one wall. A number of passages radiate from here. Approaching the Bear's Den from the Labyrinth via Matthew's Passage, the high level passage from the Labyrinth is immediately to the right, and beyond it is the Great Oven. At the far right hand corner of the chamber, beyond the stalagmite bosses, a tall passage is the entrance to the Tortuous Gallery, whilst to the left are two passages, the Lake at roof level, and beneath it the Water Gallery.

The Tortuous Gallery starts as a high rift with an arched roof and a mud floor. After a few metres the top of a steep slope is reached, part way down which the passage divides. Both ways are narrow and twisting: to the right leads to the Undervault, and to the left, to the Terminal Chamber, which is blocked by a collapse at the far end. A climb up where the passage divides gives access to two high level holes leading into a maze of small phreatic tubes. A passage to the right leads past a hole down to the Undervault to an impassable connection with the grotto off the Great Oven: the other tubes bifurcate and close down.

Returning to the Bear's Den, the Lake passage can be reached by a fairly straightforward climb, though it is more usually entered using a ladder. The wide passage is heavily encrusted with flowstone and after a few metres a large stalagmite basin is met—the Lake. Before Pengelly's excavations the Lake was full of water and only the venturesome crossed to the far side, but when the Water Gallery beneath was dug out the seepage of water from the Lake caused considerable problems, so it was drained. Beyond, the floor rises and a short crawl over flowstone runs to a stalagmite choke. Just before the end a small passage on the left may be followed to a hole down into the Water Gallery: this route was the first connection made between the South-West Chamber and the Bear's Den. The Water Gallery, beneath the Lake, was entirely cleared during Pengelly's excavations; before then no direct

route existed between the Bear's Den and the South-West Chamber. Today the Water Gallery is the main route back to the entrances.

The Water Gallery and South-West Chamber

From the Bear's Den a short slope leads down into the Water Gallery. This is not a true passage but is merely the result of Pengelly's reluctance to remove the massive stalagmite floor overlying the sediments in this part of the cave. Instead he burrowed beneath, leaving the stalagmite floor in place to form the roof of the tunnel so produced. The Water Gallery starts off at barely standing height but, once inside, the passage gets wider and the roof gradually rises. A bear's skull and numerous other fragments of bone remain embedded in the flowstone roof here. A few metres further on the roof rises sharply and becomes solid limestone, and the South-West Chamber is entered. The South-West Chamber runs straight ahead as a high wide passage. The floor dips where the wide South Sally Port branches off on the right before sloping up into an enlargement of the passage (the Lecture Hall) beyond which the Great Chamber is entered.

The Great Chamber and South Entrance

Despite its name, the Great Chamber is not much larger than other chambers in the cave, though it does have a wider roof span. It is formed by the junction of three major passages, the South-West Chamber, the Passage of Urns and the South Entrance, and the wide roof is formed by a series of gently dipping bedding planes. Approaching from the South-West Chamber, two side passages are passed as the Great Chamber is entered. To the left is the Gallery, a large complex alcove, divided into an upper and a lower part by a massive false floor. To the right a steeply downward sloping passage is the North Sally Port. Continuing into the Great Chamber, to the left at the end is the massive Passage of Urns, sloping down to the Sloping Chamber and providing a quick route to the North Entrance. To the right and past a hole in the floor is the stooping height arch of the South Entrance, leading out into the cavern shop.

The Sally Ports

Two major side passages branch off from the Great Chamber and the South-West Chamber, the North and South Sally Ports. They lie at a lower level than most of Kent's Cavern, a characteristic they share with the Wolf's Cave and the Charcoal Cave at the bottom of the Sloping Chamber. Part of the South Sally Port and most of the passages of the North Sally Port system were discovered during Pengelly's excavations, when their sediment fill was removed.

The entrance to the South Sally Port is at the end of the South-West Chamber, where it enters the Lecture Hall. The passage drops abruptly down a steep slope before levelling off and ending after 24 m. There is a 6 m high rift on the right at the end, and a small passage beneath it can be followed round several corners to a sediment choke and a pool which marks the deepest point in the cave.

The entrance to the North Sally Port is in the Great Chamber, on the right as it is entered from the Lecture Hall. This passage is smaller than the South Sally Port, and descends steeply to where several passages branch off on the left into a maze of narrow phreatic passages. This is best negotiated by following the walking height routes provided by a series of half-tubes in the roof, which lead to a T-junction with a larger passage. To the right rapidly closes down: to the left, the passage may be followed past the blocked

third entrance on the right and into Smerdon's Passage. This runs past several small passages on the left, to a slope and climb up through a hole into the Passage of Urns. The passages on the left form another small maze, at the end of which an aven leads up into the Great Chamber close to the South Entrance.

NOTES ON THE SURVEY

Instruments and Datum

The survey was carried out using a Suunto hand sighting compass and clinometer and a fibron tape. The compass was calibrated by taking surface bearings outside the cave entrances. The compass and clinometer were read to the nearest half degree, and fore and back sights were taken for all sights except in a few small side passages. The tape was read to the nearest centimetre. A traverse from the nearest benchmark was surveyed using a quickset level to find the altitudes of the cave entrances. Some fixed stations were also levelled using the same equipment inside the cave.

The local datum used for the cave survey was the floor level in the middle of the Great Chamber (precise location, 0.4 m on a bearing of 002 degrees (mag) from fixed station 7b). The levelled altitude of this datum is 58.74 m A.O.D.

Accuracy

A number of closed traverses were surveyed in the cave. The total closure errors were generally around 0.5% and none exceeded 1%. The maximum vertical error disclosed by levelling in the cave was 0.17 m. The survey was designed to avoid the need for ordinary least squares data reduction, and the errors were distributed between traverses using the loop replacement theorem of Kelly and Warren 1988. Detail was measured using offsets to record all significant changes in passage size and other important features. In the largest chambers additional survey stations were used to fix the position of the walls. BCRA grade 5d accuracy is claimed for the survey.

Fixed Survey Stations

Eleven points at major passage junctions and passage ends have been marked with 8 mm bolts. In addition a fixed station was recorded but not marked outside the cave entrances. Their locations and altitudes are listed in TABLE I. The station locations are marked on the plan. L denotes a station altitude found by levelling. The other station altitudes were calculated from the main survey data.

TABLE I—Fixed survey stations

Station	Location	Altitude metres A.O.D.
1	North-west angle of northernmost pillar base outside shop	58.15 L
5b	South face of rocks in Vestibule	57.12 L
7b	Rock outcrop, middle of Great Chamber	58.88 L
13b	North wall of Long Arcade opposite Labyrinth	56.55 L
16b	West side of Matthew's Passage at entry to Bear's Den	57.82 L
21b	West wall of Cave of Inscriptions	57.14 L
34b	End of Rocky Chamber	52.7
48b	End wall of High Level Gallery	60.6
40b	End wall of South Sally Port main passage	51.5
56b	Corner at bottom of North Sally Port entrance passage	51.2
63b	Block on right at end of Smerdon's Passage	52.4
85b	Vertical face in south part of Terminal Chamber	54.0

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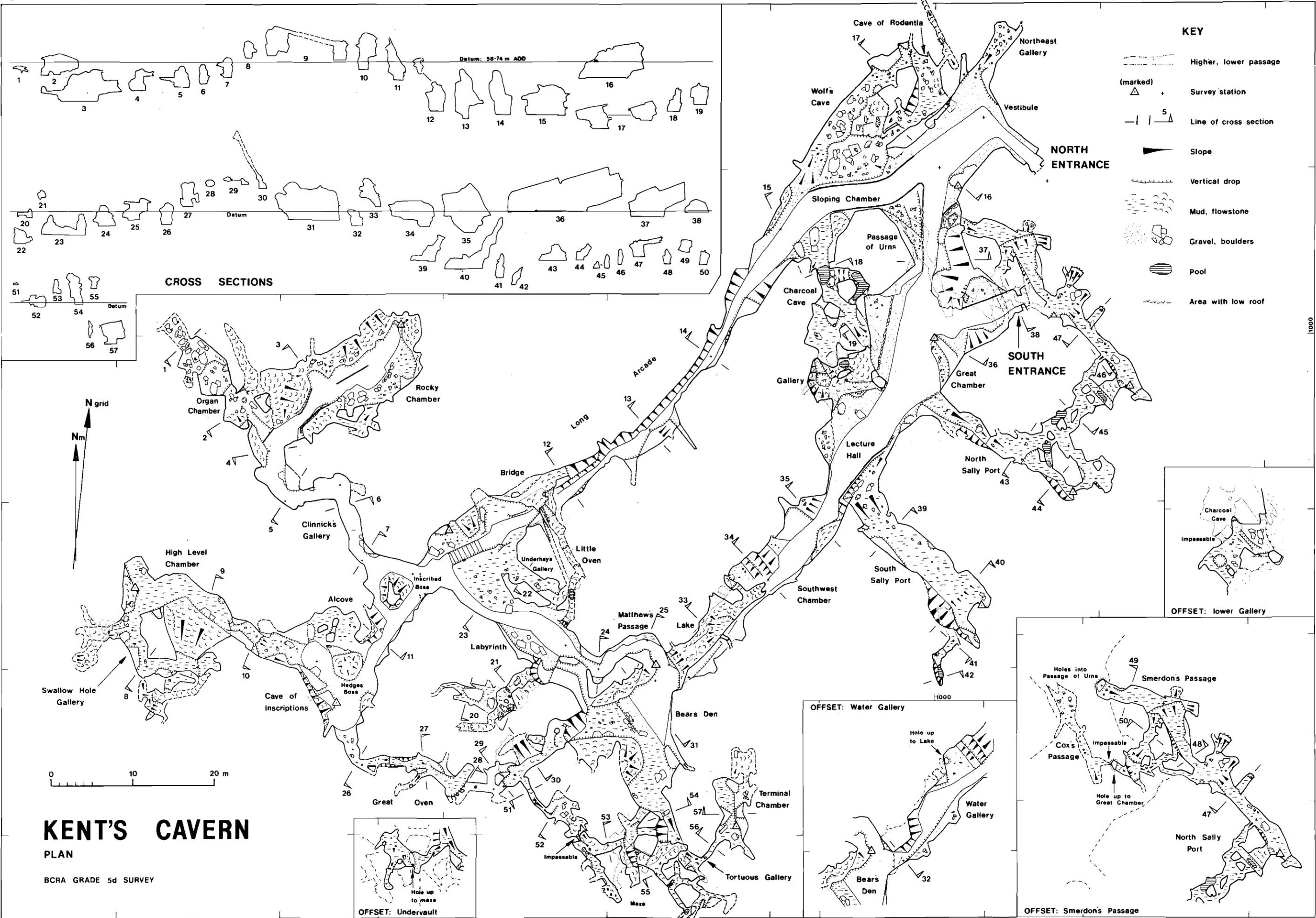
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FIG. 2—KENT'S CAVERN



KENT'S CAVERN

EXTENDED ELEVATIONS

BCRA GRADE 5d SURVEY

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