

The Doolin Cave System

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(I.O.S. Map 6 inches to 1 mile, Clare, Sheet 8, and *Plates 6, A and 7, A*)

INTRODUCTION

The seaward end of the Aille river has received scant attention in the past from spelæologists because of its low level. Some of the streams in the neighbourhood sink only a short distance to the north of the Aille river, which remains on the surface. Bartlett (1936) mentions the presence of a large pothole near Fisherstreet in the townland of Doolin. Gowing (1938) records the descent of the pot and a rapid reascent after the leader had landed on a dead cow. It was noted at the time that there was a low bedding plane cave, which was not entered, at the bottom. The pothole is marked by Coleman and Dunnington (1944) as the Fisherstreet Pot but is shown on the Irish Ordnance Survey map as Pollnagollum. Coleman and Dunnington also mark the Doolin Road Sink, St. Catharine's II cave of this paper and St. Catharine's I swallet. This swallet had not been explored. The area is included in *Plate 6, A* (D 1-D 7). The relationship of the sink holes and the pothole to the sea level and to the Aille river seemed, possibly, to preclude much in the way of explorable caves being present, but initial explorations by this Society in 1953 quickly proved the contrary.

SURVEY

All the Main Passage and most of the principal branches were surveyed using a hand bearing compass and a linen tape reinforced with wires. Some of the loops of the Main Passage, parts of the branch passages and part at the head of the Main Passage were surveyed by pacing supplemented by compass bearings. The standard of accuracy of the first case is deemed to be Cave Research Group Classification grade 4-5 (Butcher, 1950), and that of the rest grade 2. A line plot from the data was made at a scale of 1 in. to 100 ft. One loop of nearly 700 ft. misclosed with an error of less than 4 per cent. At the head of the Main Passage there was a remarkably close tie in, after over 8000 ft., with the plotted end of St. Catharine's I passage.

EXPLORATION AND DESCRIPTION

I. THE MAIN PASSAGE

A. Entrance and Downstream Section

The main system was first entered during the 1953 expedition of this Society through the Fisherstreet Pothole. Earlier in the expedition St. Catharine's II cave had been re-examined and St. Catharine's I first explored and surveyed. The Fisherstreet Pothole is easily identified because it is surrounded by a zariba of trees and bushes in a sloping field adjoining and south of the Lisdoonvarna-Doolin Road. The top of the pothole is about 75 ft. above I.O.D. and is roughly circular with a diameter of 30 ft. and a depth of 40 ft. A good belay for a ladder can be obtained from a tree on the east side of the pot. At the bottom is a debris-covered slope, which leads down to the bedding plane streamway under the north wall of the shaft. At this point the bedding plane is about 3 ft. high and about 20 ft. wide. Downstream a tributary enters on the north or Aille river side about 300 ft. from the entrance. After a further 390 ft. the cave ends in a sump with a steeply sloping mud floor. There were signs of flooding to the roof in the whole of the downstream section.

The resurgence of the cave waters is below the high-water mark on the beach of Doolin Strand (D 3). After the initial exploration of the cave, the fresh water issuing there was thought to be either the resurgence of the cave waters, or the seepage through the sand and shingle banks of the terminal pools of the Aille river, about 400 yards away, or a combination of both. In 1955 dry weather so reduced the river that it had ceased to flow on the surface beyond a point about a mile from the mouth as it went underground. The rising on the beach continued to flow and was noticeably colder than either the Aille river or the sea, and could only be the cave waters. The stream is always flowing in the downstream section of the cave in the same direction so only the terminal portion beyond the sump can be affected by the tides.

B. Upstream Section

Upstream from the pot the low bedding plane (section 1) continues for several hundred feet with two tributaries entering on the north side, presumably originating from the Aille river because their temperature* was higher than that of the main stream. The first was impassable but the second was followed for nearly 900 ft. towards the Aille river before the roof came down to the water.

* Cave stream temperature	.	.	.	12.7° C.
Tributary stream temperature	.	.	.	13.4° C.
Aille river temperature	.	.	.	13.4° C.

The bedding plane develops into a canyon passage, about 10 ft. high and 8 ft. wide (section 2), very similar in form to the Main Drain of the Coolagh River Cave (Bendall and Pitts, 1953), with gentle meanders and several oxbows of an old abandoned dry route. Shallow vertical niches are present at intervals in the walls of the passage, which is following the minor joint series in the 270° direction, but are not quite opposite each other as they are formed along the 196° jointing. Near section 2 two streams enter at roof level and arch out over the passage. They fill their own passage and their volume varies little under different conditions. They almost certainly come from the Aille river. On one occasion a party went up the cave early in the day and noted that the tributaries were quite normal. On their return, several hours later, the tributaries were warmer than the main stream and there was a distinct vapour cloud arising from them. This could only be caused by the then shallow Aille river having been warmed by the heat of the day. Soon the Aran View tributary passage enters on the north side. The canyon passage of the main streamway degenerates into a wide bedding plane cave with the sides deeply undercut (section 3) by the stream. At this section there is an interesting example of how the stream has followed successive bedding planes only to abandon the upper in favour of the lower. At one point a large slab of rock between the two bedding planes involved has parted along the vertical joints and fallen (*Plate 9, A*) so that both passages are revealed. The slab measures about $30 \times 20 \times 2$ ft.

Just before the roof comes down to form the second bedding plane passage, a dry ox-bow goes off on the north side. This commences as a crawl and soon becomes high enough for walking in comfort. This ox-bow returns to the main stream in the bedding plane but it diverges again before it finally rejoins the streamway at the canyon passage beyond the second bedding plane. If this route is followed the whole of the wet crawl along the second bedding plane can be avoided. Along the second part of this ox-bow the cave is passing under the Aille river and a small trickle falls from the roof to form soft red dripstone. It is thought to come from the Aille river.

The main streamway is rejoined in a true canyon passage which meanders slightly, the height gradually increasing from 10 to 25 ft., while the width remains about 4 ft. The increase in height is due to the gradient of the floor being less than the dip slope of the roof, and the same bed forms the roof along the whole of this stretch. At section 4 the canyon passage is partially blocked by slabs of rock which have peeled off the wall along a calcite vein. Further progress is possible by climbing over the fallen mass. The canyon passage continues for a further 1000 ft. with a height of over 30 ft. and a width of about 3 ft. The walls show deep undercutting at the base by the stream, which sometimes disappears from sight, as it is straightening its course along the joints in the 270° direction.

The passage gradually widens and the height drops to 10 ft. A dry ox-bow passage, as large as the main streamway, enters on the north side at section 5. This rejoins the main streamway after about 390 ft. The passage narrows to about 3 ft. at stream level, broadening to wide bedding plane roof. In turn this develops into a small canyon passage with the height varying from 5 to 10 ft. At section 6 the passage widens and has a shattered roof. Here a large dry ox-bow leaves on the south side. It is about 30 ft. wide and 8 ft. high, and the floor is covered with slabs that have fallen out of the bedding plane roof. The ox-bow rejoins the main passage at section 7, where another large passage enters on the north side; this passage is described later as St. Catharine's II or Dry Tributary. Along this section the roof shows an excellent example of bedding plane anastomoses extending for several hundred feet. The basal bed has fallen and has left exposed the whole intricate network of bedding plane anastomoses, only a few inches high (*Plate 8, A*). Through these a slightly meandering dominant channel had begun to form and had already acquired a nearly flat roof before it was abandoned by the water taking to the lower bedding plane. Shelving of the sides of the passage begins at this point and is shown in the same plate. From this point the passage widens to 15-30 ft. This part of the cave is shattered and the floor is boulder-strewn probably as the result of the collapse of the bed between the two bedding planes (section 8). The stream is soon lost in the boulder floor and the way on lies over their piled-up masses. A drop of 6 ft. leads back to the stream and soon the passage divides, the more northerly passage being the St. Catharine's I tributary.

The main stream follows the more southerly passage which soon divides into a number of smaller passages, some dry and some with streams. The active streamway can be followed until the water is seen issuing from a small hole at roof level. The warmth of the water indicates that the surface is very near at hand. The plan of the cave shows that this point is within 100 ft. of the Doolin Road sink. There is another branch passage which can be followed for a further 250 ft. beyond the hole in the roof in the general direction of the cave. This takes the cave past the Doolin Road sink and under the road. This passage is probably the inlet for the St. Catharine's III swallet.

2. THE BRANCHES

A. St. Catharine's Series

The St. Catharine's series of swallets lie on the north side of the Doolin-Lisdoonvarna road. Reference to them was made by Bartlett (1936) and Gowing (1938), and the sites of some of them are shown on the Coleman and Dunnington map (1944). They were first investigated by this Society in 1953 and were called St. Catharine's I, II, and III, the numbers indicating

the order of exploration. Only St. Catharine's II had been previously entered.

St. Catharine's I.—The entrance is at the junction of the limestone shales and the mountain limestone at the head of a dry valley. The entrance bedding plane, which obviously floods under wet conditions, takes a fair-sized stream. The first 100 yards of the cave is a miserable crawl, sometimes in the streamway and sometimes in foul-smelling mud. In places the roof is dissected and unstable and the last part is very unsafe with loose shattered shelves of rock, between which it is necessary to crawl. The bedding plane joins a passage about 6 ft. high and 18 in. wide, and has a definite T-section at roof level. This passage commences as an impassable gully cut in the floor of the bedding plane. There is a similar canyon-type passage entering on the east side. It is impassable but carries a stream, which probably comes from the soak-away swallet immediately south of the St. Catharine's ruins.

The T-section passage meanders without appreciable change in form for about 700 ft. Many small passages, some dry, enter on the west side in this stretch, and two tributaries are especially well placed for a showerbath. After 700 ft. the height of the canyon decreases slightly and for another 300 ft. the passage is only 4–5 ft. high. There are obvious signs of flooding to the roof in this part.

At section 9 a large dry tributary passage enters on the west side. The stream now follows an apparent continuation of this passage, which is about 15 ft. high and 3 ft. wide. The large dry tributary passage itself cannot be followed very far as it soon closes up. The next 370 ft. of the cave is a T-section passage with a height of 6–12 ft. The junction of the two passages has produced dual meanders, which are a common feature of the caves of North-west Clare. The upper meanders appear to be those of the dry passage and the lower those of the present active streamway. The two are often out of phase with each other so that in places the roof is not visible from the floor. The lower part of this canyon passage suddenly turns into a low bedding plane cave. The roof meander portion continues and was paced for a distance of 160 ft. where it is blocked by formations, which meet the sand-filled floor. The stream could be heard at the end of this passage, which is an old abandoned streamway.

The main stream continues in the bedding plane which has a very shattered roof. Throughout this section the lower parts of the passage are deeply undercut and wide shelves of rock with razor-sharp edges project over the streamway. The shelves are very loose and great care must be taken to avoid dislodging them. The stream disappears through a boulder floor and the bedding plane closes up.

When the cave was first explored in 1953 the streamway was not rejoined and the bedding plane was the end of the cave. However, the

discovery and survey of the Doolin Cave in 1953, 1954 and 1955 led to the conclusion that the north tributary at the end of the Doolin Cave must be the continuation of St. Catharine's I passage. In 1955 a few small boulders were removed from the bedding plane at the end of St. Catharine's I and it was found possible to drop down through loose boulders into a very small streamway. A 200-ft.-long wet crawl led into the upper end of the Doolin Cave and thus two entrances to the system were established. The Fisherstreet pot entrance is the easiest way to the larger parts of the Doolin Cave, but a through trip from one entrance to the other can be done in two hours. There are many fine formations on the roof in the area of junction of the two caves. Many of them are formed in lines along the joints (*Plate 8, B*).

St. Catharine's II.—This cave is a little further down the dry valley than I and is the old route for the stream now flowing into St. Catharine's I. The upstream part can be followed for about 400 ft. till a calcite flow bars progress. The cave has a number of photogenic formations, and the passage floor at the end consists of long muddy pools formed by calcite barriers across the passage. Downstream from the entrance the passage is blocked, but from the survey it appears to be connected with the dry tributary entering the main Doolin Cave on the north side at section 7.

This dry tributary was explored for a distance of about 1500 ft. until the passage was impassably constricted by the dripstone floor meeting the roof. The passage is 5-8 ft. high for most of the way and contains a number of formations. A small tributary stream enters this otherwise dry passage on the north side near the end, probably from the small swallet south-west of St. Catharine's II. The stream flows along the floor for several hundred feet before disappearing on the south side of the passage. It probably enters the main cave a little upstream of section 7.

St. Catharine's III.—About 400 yards up the eastern branch of the St. Catharine's valley there is another swallet, St. Catharine's III, which is situated on the shale away from the shale/limestone junction. At the bottom of a deep hollow the limestone is exposed and the stream goes underground. The swallet is too small to enter but takes a considerable stream. It is not certain that this stream enters the Doolin Cave. The impassable passage that joins the southern branch at the head of the main cave almost certainly leads to this swallet.

B. Aran View Tributary

The Aran View passage is the largest tributary passage of the Doolin system. It was first explored and surveyed in July, 1955. It joins the main streamway about 2500 ft. upstream from the pothole, and runs off in a direction slightly east of north towards a series of sinks near a house called Aran View, from which the passage derives its name.

The passage is described from its point of entry to the main cave. It starts as a typical canyon passage with a flat roof and scalloped walls. It is about 4 ft. in height and width just after leaving the main streamway, but gradually increases in height to 10 ft. In a few places shelves of rock stick out over the passage ; several have broken off and rest, precariously balanced, across the passage over one's head. Progress through most of this cave can be made at a rapid walking pace, but at three or four places there are stalactite barriers, which reach to within a foot of the water, and which necessitate uncomfortable crawls in the stream. There are many formations that improve as one goes upstream : but although many are pretty, none are outstandingly so. There are also several mud stalagmites on ledges on the sides of the passages.

At about 1400 ft. a tributary enters on the west from a passage, which is too small to follow upstream, going off in a direction slightly east of north. At 2000 ft. the main stream of the passage is seen emerging from a narrow fissure in the east wall. The main passage continues and is dry for the next few yards. Then another stream appears from a deep undercut on the inside of the bend, flows across the passage from east to west and disappears down a side passage, which can be followed in a direction slightly west of south for only 150 ft. There is little doubt that this is the tributary entering at 1400 ft. The undercut is so deep that the stream is quite out of sight as one rounds the bend, but is seen again on the upstream side and is followed for the rest of the way.

The passage continues 10 ft. high, flat-roofed and tending to have an S-shaped section. Soon there are signs of a trench developing in the flat roof. The trench rapidly deepens and meanders independently of the stream passage below. The roof meander is always connected to the stream passage by the cross-piece of the " T " of the stream passage (section 3 A). The two vertical passages are sometimes several yards apart, but where the roof meander is directly above the stream passage the total height is about 30 ft.

The formations in this part of the cave are magnificent. Curtains and stalactites abound and are often very beautiful and there are fine pools as well. At one point there is a stalactite barrier coming down close to the water, but a wet crawl can be avoided by squeezing behind some curtains. For some distance on either side of this barrier there is a false floor of chert, which is perforated in many places.

Eventually the roof meander leaves the stream passage altogether and goes off to the right as a high, narrow rift passage with a mud floor (grade 2 survey on plan). The walls are covered with stalagmite flow, and at several places curtains and pillars almost block the narrow passage. It can be followed for about 300 ft. to an impassable stalactite barrier.

The character of the stream passage changes abruptly with the disappearance of the roof meander ; it becomes a low wide canyon passage, shelves of chert project far out across the passage (section 4 A), and sometimes form bridges across the stream. These shelves are treacherous as they break easily. The stream flows more rapidly and the floor is current-marked. There are no formations. Eventually a small chamber is reached which leads to an even smaller one, which is the end of the passable cave. The stream enters as a small waterfall issuing from an impassable passage. A low bedding plane goes off in another direction but can only be followed for 40 ft. before becoming too tight.

The survey shows that the end of the passage is 300-400 yards from the Aran View Swallets. From the western one of these a small cave can be followed for about 100 yards towards the head of the Aran View Passage. Therefore there is little doubt that it is the Aran View water which appears in this tributary.

DEVELOPMENT OF THE CAVE

The development of the cave in its essentials does not differ from that of other caves in the area. Its relationship to the surface features and the shale boundary are described by Ollier and Tratman (p. 153). There are, however, certain points that call for further comment.

Surface features clearly indicate that St. Catharine's II has become a dry cave because its headwaters have been captured by the now active swallets of St. Catharine's I. It also seems very likely that the Doolin Road Sink was a little further west and south than at present. St. Catharine's III is obviously a later development and the waters now swallowed there once continued on down the valley to join St. Catharine's II.

In the Doolin cave itself there is a long, large passage running towards II. It carries only a small stream presumably derived from the small swallet west and south of II. Downstream from the point of entry of this almost dry passage to the main cave, lengths of dry passage cross and recross the active route. In places between, the dry route seems to have coincided with the wet route. The floors of the dry route are but little above the floor of the wet route.

The Doolin Road sink was active at the same time as St. Catharine's II. The two passages joined. Subsequent alterations of route, mainly straightening but not entirely so, have left parts of these passages as ox-bows and loops. Subsequently there was capture of the headwaters of St. Catharine's II and practically all the water took to a way entering the main cave further upstream.

The Fisherstreet pot requires some further explanation. There are observable in it on the general line of the cave parts of a choked canyon

passage. Downstream its line, for the few feet it is visible, veers away from the line of the main cave towards the south and its probable continuation is under a long, shallow, narrow depression in the field. The roof of the passage is very close to the surface. The shale cover over the limestone is only a few feet thick. There are copious seepages, sufficient to produce a constant trickling film of water down the sides of the pothole even under the exceptionally dry conditions of 1955. It is suggested that this passage as a whole owes its presence to solution by these seepages down vertical joints. At the pot the seepages were greater than elsewhere and the rate of solution greater, leading to a gradual widening of the joint till the shale cover collapsed over the area where the joint communicated with the cave below. This opening has been steadily enlarged by the continuous trickling films of water down the sides. There are many examples in the area of considerable enlargement of vertical joints by such seepages through a thin shale cover.

The base of the pothole is at present unaffected by the tides as it lies too far above high-water level. The water can escape direct into the sea or into the Aille River downstream from the pot at places that can either be risings or sinkings depending on the level of the tide, the volume of the cave waters and the Aille river. If land elevation affected the area, as it may have done since the cave was first formed, it would have produced no effect at the pot, though some degradation of the passage downstream would presumably have occurred. Perhaps the steep mud floor descent marks the nick point of this degradation. If land depression affected the area, and there is evidence, not yet fully studied, for a raised beach at about 30 ft. above I.O.D., tidal effects would have been produced in the pot and damming back of the waters to fill completely the first bedding plane at least would have occurred with every high tide. The pot would fill at least partially from the bottom. There is no surface evidence that it ever habitually filled completely and served as a rising.

The Aille river, once it reaches the limestone, begins to go underground and its waters enter the Doolin Cave at various places, but the passages are as yet only sufficiently enlarged to take all the water under dry conditions.

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PASSAGE LENGTHS

	FEET
Fisherstreet Pothole downstream to sump .	700
Fisherstreet Pothole upstream to junction with St. Catharine's I=Main Passage .	8200
Loops in Main Passage	2100
Main Passage to Doolin Road Sink and branches	450
St. Catharine's II Passage	1500
Aran View Passage	3860
Aille River Passage	860
St. Catharine's I	2170
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	19,840=3.75 miles

PLATE 8

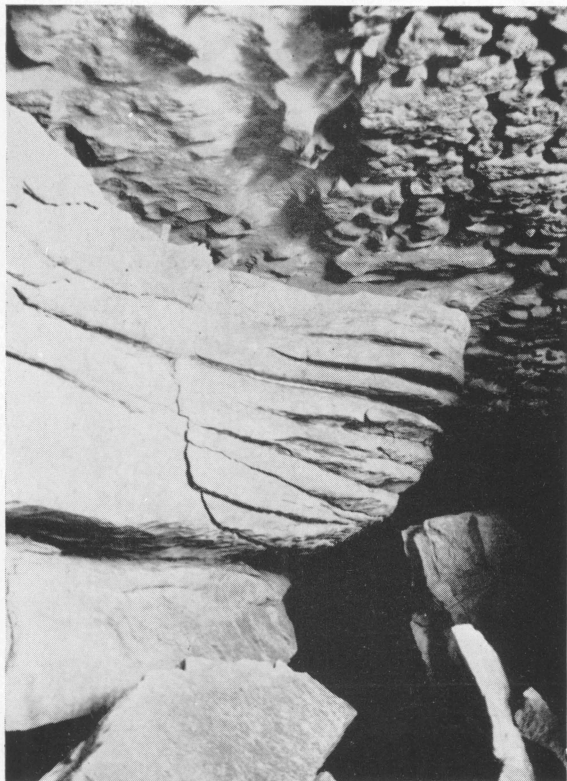


Photo: Dr. O. C. Lloyd

A.—Doolin Cave; half-tubes in roof.



Photo: Dr. O. C. Lloyd

B.—Doolin Cave; the Grotto.

PLATE 9

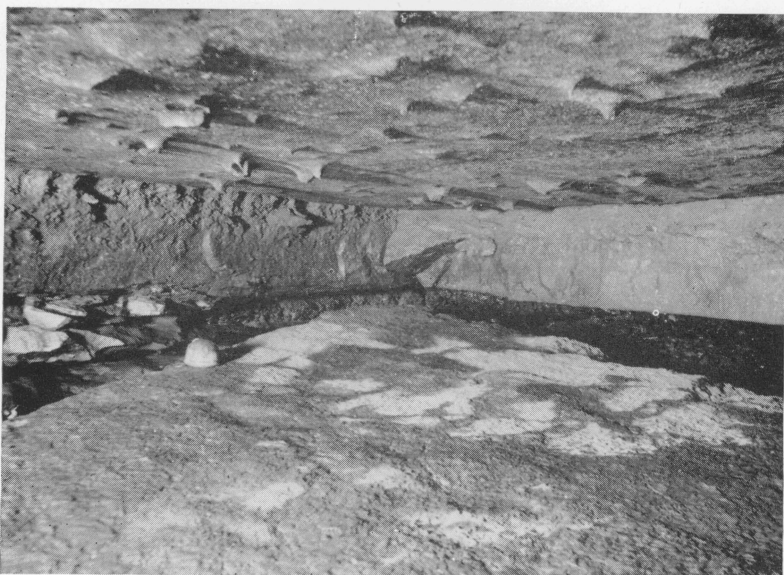
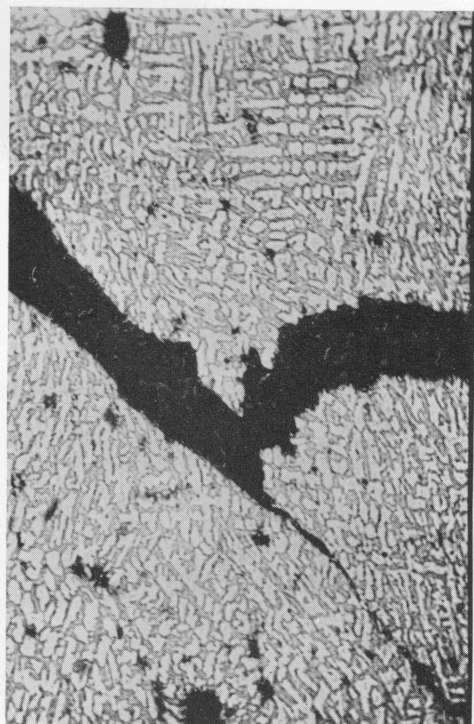


Photo: Dr. O. C. Lloyd

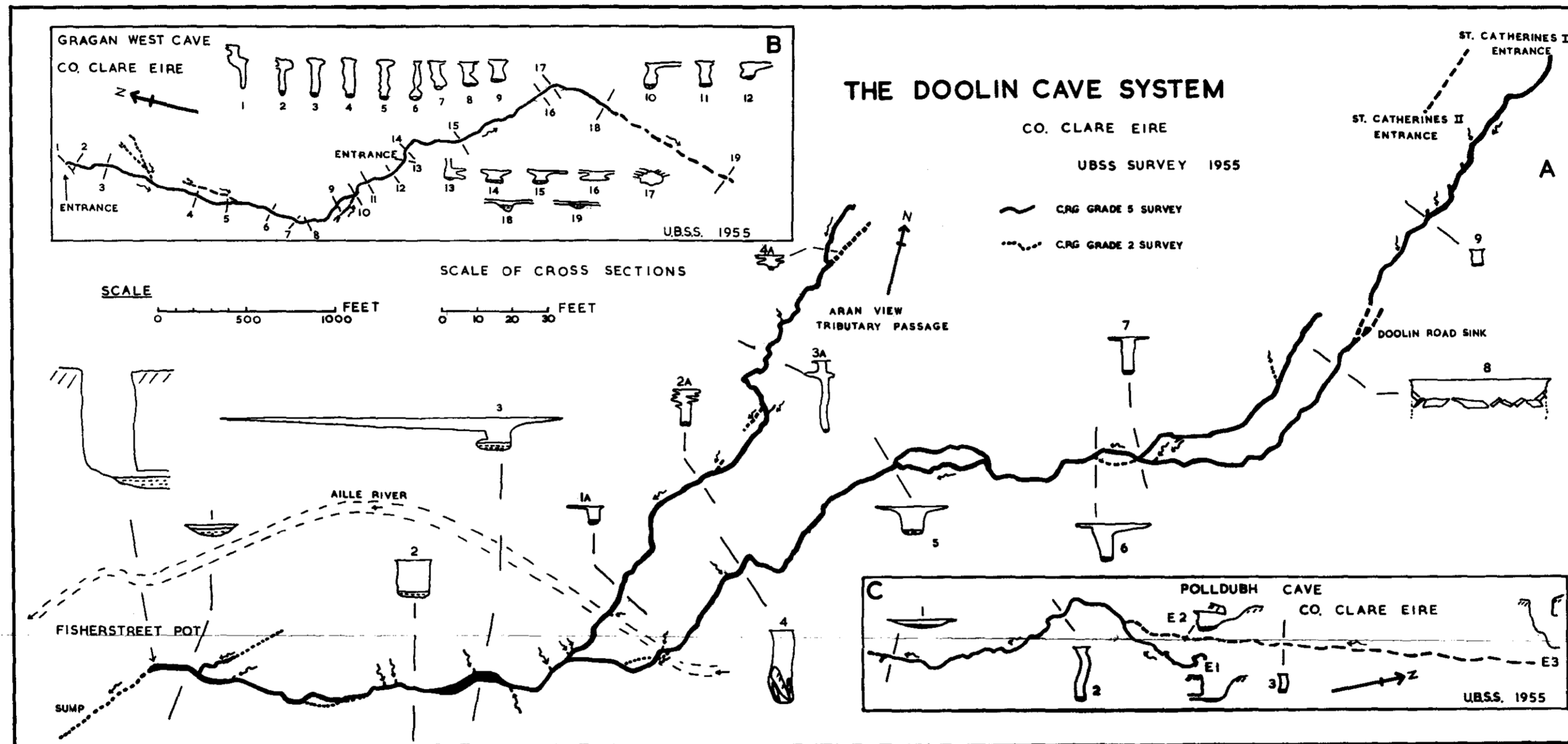
A.—Doolin ; fallen block from roof.



B.—Etched section of anvil. $\times 80$.



C.—Etched section of cracked
20% tin bronze. $\times 115$.



The great difference between the lengths of the caves and their widths, except in the bedding plane passages, has necessitated an exaggeration of the width in order to show the passages clearly. The actual size of a passage at any point is given by the cross section, which is drawn at 20 times the scale of the plan.