

DOOLIN — ST. CATHERINE'S CAVE

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Co. Clare, Eire

Monograph by

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(I.O.S. Map, 6 ins. to 1 mile, Clare Sheet 8.)

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## SUMMARY

The discovery, exploration and survey of this cave has been entirely the work of the U.B.S.S., with minute exceptions. The history from the exploration of St. Catherine's 1 and discovery of Doolin caves in 1953 to the forcing of Aran View Passage in 1963 are given. All the cave passages are described in detail. The beds in which they are formed are easily recognizable in the upper half of the cave, so that it is possible to say that the cave starts and ends in the same bed. Moreover, wherever the streamway descends to a lower level of beds, there is always an abandoned upper level passage.

## HISTORY OF EXPLORATION

Fisherstreet Pot, which is the entrance to Doolin Cave, is in a conspicuous clump of trees and bushes just south of the main road from Lisdoonvarna to Doolin. (Clare Sheet 8, E. 4.1", N.9"). It is marked "Poulmagollum" on the I.O.S. map but has never been called by this name which, by common practice, is reserved for the cave by Slieve Elva. Coleman and Dunnington (1944) marked it as the "Fisherstreet Pot". It is first mentioned by Bartlett (1936) who spent some Easters in Ireland with members of the Yorkshire Ramblers Club. He heard the "sound of a powerful stream flowing towards the sea, about 30-40 feet down," but had no time to explore it. Gowing (1938) on another of those Easter trips let a ladder down into the pot but landed "on the remains of a cow! A pity, for at the bottom was a bedding cave with a little stream running merrily towards the sea." The amazing thing is that with such encouragement it was another 15 years before the cave was explored.

Partly the delay was due to the war. But the U.B.S.S. parties were visiting Co. Clare from 1949 onwards, and most of the Cullaun caves were explored before our members turned their attention to the Fisherstreet Pot. The reason is that this district is low-lying and near the sea, and it was considered unlikely that open cave passages of any extent could be discovered; they would all be filled with water. Did not the Aille River run on the surface just north-west of the pothole? Did not this represent a watertable which might be related to that in any cave system below? It did not.

The swallets near the ruins of St. Catherine's Nunnery were also well known. Bartlett (1936) explored St. Catherine's 2, which he called "St. Catherine's Well Cave", and noted the entrance to St. Catherine's 1 ("St. Catherine's Well") but did not explore it. Gowing (1938) had a look at the Smithy Sink by Doolin Road but got no joy. Coleman and Dunnington (1944) called the latter "Doolin Road Sink", and this Society dutifully followed their lead (Robertson *et al.*, 1956). But to us, before and ever since, it has always been known as the "Smithy Sink", after the smithy just up the road towards Lisdoonvarna. St. Catherine's 3 and the Aran View Swallet were discovered and named by the Society in July 1954. On the I.O.S. map St. Catherine's 1 is called by a name resembling "Poulcronaun", but as it was illegible on all copies it was not adopted.

It was to the St. Catherine's caves that the Society first directed its attention in 1953. On July 29th St. Catherine's 2 was explored by Paul Acke, Geoff Coates, Geoff Fuller and Struan Robertson, and directly afterwards Struan Robertson and Geoff Fuller made the first ever exploration of St. Catherine's 1, which they followed for an estimated distance of 620 yards. At the end the stream disappeared under a rock fall, and for another two years this was the end of the cave. The Smithy Sink was  
/also

also explored, but it finished after 20 yards in a choke of gum-boots, overalls, bottles and cycle rims. The next day Struan Robertson and Dr. Tratman surveyed the main stream passage of St. Catherine's 1 and a rough plot showed that it ended just under the Doolin Road near the Smithy Sink.

On the 3rd August the Fisherstreet Pot was laddered and Geoff Fuller, Struan Robertson and Stan Wood discovered the Doolin Cave. First they explored downstream to the sump, then upstream. They noted that just opposite the entrance there was a tributary stream in which the water was distinctly warm. This is one of the four tributaries entering this part of the cave from the Aille River. (Footnote). The party by-passed the Fallen Slab (Plate 1) by way of the ox-bow under the Aille River, climbed over the Great Boulder Fall and went to the upper end of the Great Canyon. The next day (August 4th) the survey was begun. Struan Robertson, Stan Wood and Dr. E. K. Tratman did 64 stations from the Fisherstreet Pot to the Great Boulder Fall.

The next morning the Hon. Secretary of the Society announced that he was about to give birth. In answer to the expected question he came out with the DOOLIN SONG, the theme of which suggests that theories can be a hindrance rather than a help in cave exploration, which is of course heresy.

#### SONG INSPIRED BY DOOLIN CAVE

(to the tune of "Way down Rio")

Now all you good Spelaeos listen to me  
 Away down Doolin  
 And I'll sing you a song of a cave near the sea  
 Level down at Doolin Strand  
 Way theories away; away from Doolin  
 For the Spelaeodendron  
 It grows with its end on  
 The entrance to Doolin Cave.

Now theories are all very well  
 Away from Doolin  
 But when you get there you must send them to hell  
 When you're down in the Doolin Cave  
 Way theories away; away from Doolin  
 No bedding-plane's flooded  
 Tho' we are all muddied  
 When we're in the Doolin Cave.

/There's

---

#### Footnote.

5.8.53., temperature of water in Aille River 66<sup>o</sup>F; temp in main stream in Doolin Cave 58<sup>o</sup>F, and of warm tributary 66<sup>o</sup>F.

Fluorescein put into Smithy Sink reappeared in Doolin Cave but was not seen in Doolin Strand, where there is a rising among the rocks.

There's every convenience there  
     Away at Doolin  
 There's hot and there's cold so there's no need to fear  
     Of a chill in the Doolin Cave.  
 Way theories away; away from Doolin  
     So climb down that ladder  
     And empty your bladder  
 And enter the Doolin Cave.  
  
 There's a river that's known as the Aille  
     Way near Doolin  
 But we go right under the Aille so Dryly  
     When we're in the Doolin Cave.  
 Way theories away; away from Doolin.  
     Exploded are theories  
     Except where the beer is  
 Kept down in O'Lafferty's bar.  
  
 There was Tratty and Acke and Stan  
     Way down Doolin,  
 And the Hon. Sec. has sung just as much as he can  
     Of the cave at the Doolin Strand  
 Way theories away; away from Doolin  
     With Geoff's two and one  
     Our short story is done  
 And we'll never go down it again.

The last verse, with its allusions to things now forgotten, is usually omitted, when the song is sung. O'Lafferty's bar is no more, but O'Comor's flourishes.

In 1954 the Society continued its exploration and survey of Doolin Cave. On July 9th the whole stream passage was surveyed from the terminal choke to the Great Boulder Fall and it was found that the end of the cave was within a hundred feet both of the end of St. Catherine's 1 and the Smithy Sink. On the 10th St. Catherine's 3 swallet was discovered, but subsequent exploration showed it to be blocked by a large boulder a few feet from the entrance. On the 13th Aran View Swallet was explored, but could only be followed for 200 ft., ending in a maze of shattered limestone shelves. On the 15th the Doolin Dry Tributary Passage was explored and surveyed, and the opinion was first formed that this might have been the original stream passage coming from St. Catherine's 2. There is a good deal of soft mud towards the northern end and on its surface were found some owls' pellets, showing that the passage (now choked) might have been at one time open to the surface.

In 1955 the remaining side passages were explored and surveyed, in the case of Aran View Passage twice over, since the survey bag was  
 /lost

lost the first time. On July 13th a determined and successful effort was made to penetrate the boulder choke at the end of St. Catherine's 1 by Henry Toms, Oliver Lloyd and Chris Ineson. By swinging round a large limestone slab a hole was opened through which we could drop into the active streamway (between Sections E - E' and F - F'). The party making this discovery did not know Doolin Cave. In a few yards we climbed out of the streamway to the left and found ourselves in the Beautiful Grotto (Plate 6). We thought we had discovered a new cave until we saw a footprint. "Bother," we thought, "have the Craven got here first again?" We were still feeling sore about Poll-an-Ionain. In the large stream passage beyond we saw chalk arrows on the walls. We walked downstream for 700 paces, after which it was big enough to take a motor coach. "This", we said, "can only be Doolin," and we turned back.

After publication of "The Doolin Cave System" (Robertson et al., 1956), the cave was only visited for the purposes of recreation, tourism, and photography. The through trip from swallet to pot is 2 miles long and can be done comfortably in 2 hours. It is shorter by underground. That year a finger post was planted in the meadow by the Fisherstreet Pot commemorating this fact (with apologies to the Bord Failte Eireann) but unfortunately there was a horse in the same meadow.

#### The cave rescue

On Sunday 14th July, 1957 one of our parties went to take photographs and explore the upper end of Doolin Cave. They did not ladder the Fisherstreet Pot, as half the tackle was down Faunarooska and the other half was being used at Pollapooka. Instead they entered by St. Catherine's 1 intending to return the same way. Unfortunately the leader was the only one who knew the way back from Doolin to St. Catherine's and he was taken ill, when the party was a good way down Doolin. Owing to this and to an erroneous impression in the mind of another member of the party that the Fisherstreet Pot was climbable, they all pressed on to the lower end of the cave, reached the foot of the pot and spent the next three hours shouting for help.

Now the native Irish avoid caves and potholes (except as a convenient place for throwing dead animals) because they do not like to disturb the Wee Folk. The effect on the natives of weird cries coming from the depths of Fisherstreet Pot after dark can therefore be imagined. The truth is otherwise. A passing cyclist heard the cries and cycled on down the road until he met a friend. They together came to the Pot and decided on action. One got the postmistress at Doolin to call Ballynalacken Castle; the other called out his fellow members of the Lifeboat Crew.

We got the telephone call at 10.30.p.m. and immediately went with tackle to the Pot, but not before another party had already gone to St. Catherine's to find out why the lost ones were overdue. At the Pot we  
/found

found not only the whole Lifeboat Crew and their gear but scores of the local populace for miles around to give help and encouragement (some of it liquid) in what proved a simple operation, since the sick leader of the underground party proved well enough to climb the ladder.

#### Further exploration

In 1959 attention was directed towards the tributaries of St. Catherine's. There was one in particular (320 ft. beyond Section C - C') entering the New St. Catherine's streamway on the right, which proved on survey to cross over the top of the main streamway and pursue an easterly course towards its source. This seemed impossible. In 1960 the survey was repeated, but the tributary still went the wrong way. Also in 1960 a detailed survey was made of the passages around the Beautiful Grotto, and it began to appear unlikely that the St. Catherine's 3 water joined the Smithy Sink water in that neighbourhood, as had been postulated, and as had been shown on the regional map in Proc. 7: 3, Plate 6. Certainly there was both cold and hot (from Smithy Sink) water entering here, but the passages were too small to have come all the way from St. Catherine's 3.

Great thought was given to these matters in 1963, when a detailed study of the whole St. Catherine's System was made, and Theory was at last vindicated. It was postulated and found that there are old upper level passages (in Bed no. 4) corresponding to every active streamway, and that some of these pursued an independent course. The St. Catherine's 1 Tributary was in fact the St. Catherine's 3 Stream Passage, the water leaving it just after it had crossed over the New St. Catherine's 1 stream passage, to enter by an obvious waterfall on the right (wrong) side (Section C - C'). But in the upper or old stream passages, now abandoned, the relationship between St. Catherine's 1 and 3 was normal, the latter entering the former on its left hand side (Section Y - Y'). Exploration of the old upper stream passage from Smithy Sink (the Smithy Oxbow) resulted in the discovery of a grotto (Smithy Grotto) of surpassing beauty, while analogous exploration of the roof of the Great Oxbow gave us another grotto (The Great Oxbow Grotto) more beautiful if only because there is more room to admire it. Both grottos are in Bed No. 4.

Exploring the Aran View Tributary on the 13th July 1963 David Savage's party removed some shingle from the uppermost end of the known stream passage (just below Section Pp - Pp'), entering an oxbow, whence the passage was explored upstream for a further 1,000 ft. However, exploration of the Aran View Swallet itself produced much the same result as in 1954. It was not until this maze of fallen slabs was attacked from inside that a way through was found, by removing but one limestone slab. This breakthrough was achieved on July 17th by David Savage, David Patmore and Mike Statham. Aran View Swallet is now the third entrance to the Doolin - St. Catherine's Cave. The new part of Aran View Passage was surveyed in 1964.

/NAMES



## NAMES

The main cave is the streamway from St. Catherine's 1 entrance to the sump below Fisherstreet Pot. Claims have been made to regard St. Catherine's as a tributary to a main streamway starting in the Smithy Sink Complex. Now that the oxbows there have been fully explored, it is clear that St. Catherine's was always the main streamway, so the pre-eminence of Smithy Sink can no longer be entertained. Moreover in 1956 it was thought that St. Catherine's 3 entered the Smithy Sink Complex, but we now know that it joins St. Catherine's 1.

The first name to be given to any part of the main cave was St. Catherine's 1. This cave was discovered before the descent of the Fisherstreet Pot. When the lower part of the main cave was discovered by this route it was named Doolin Cave. When the account of the whole cave was published in Proceedings (Robertson et al., 1956) it was called by the rather cumbersome name of "The Doolin Cave System." At that time St. Catherine's was regarded as a tributary. Since this view can no longer be held, and since the name "St. Catherine's" has priority over that of Doolin and should not be lost, both have been retained, and the cave is now called "Doolin - St. Catherine's Cave."

As described on page 3 the name "Doolin Road Sink" has priority over that of "Smithy Sink", but the latter is the name which the members of the U.B.S.S. have always used. When in 1963 it became necessary to find names for new discoveries in the cave related to this sink, the name "Smithy" was preferred, both for reasons of euphony and common usage.

## THE ROCK BEDS

The entire cave lies within a limited number of limestone and shale beds, some of which are so well defined, that they can be identified throughout the upper cave. They are:

- |                    |                     |
|--------------------|---------------------|
| 1. Shales          | up to 15 ft. thick. |
| 2. Limestone       | up to 30 ft. thick. |
| 3. "Two Foot Cap", | about 2 ft. thick.  |
| 4. Shelving Bed,   | about 8 ft. thick.  |
| 5. Limestone,      | up to 20 ft. thick. |
| Total              | about 75 ft. thick. |

1. Hodson's Carboniferous Shales are seen above St. Catherine's 1 entrance and in the upper 15 ft. of Fisherstreet Pot.

2. This limestone has no characterizing features. It is seen in the upper half of Aran View Passage, in the first 4 ft. of limestone below the shales of St. Catherine's 1 entrance, in Smithy Aven, in all of St. Catherine's 2 and in the Fisherstreet Pot.

/3. The

3. The "Two Foot Cap" is a distinct bed in most parts of the cave. It has well defined bedding plane solution with anastomotic half tubes both above and below it (Plates 3 and 4). The Fallen Block (Plate 1) comes from this bed. Often a change of roof height of about two feet is due to falls from this layer. It is encountered just inside the entrance to St. Catherine's 1, in the roof of Smithy Oxbow, and from these two it forms the roof of all the older parts of the cave down to the Sump.

4. The Shelving Bed is limestone which in the upper half of the cave, down to the Great Boulder Fall, has a strong tendency to form limestone shelves. This shelving tendency is not so strongly marked in Aran View Passage (Section Rr - Rr' shows it) but is present in the downstream half. In the lower main cave the shelving tendency is absent, but we know we are in the same bed, having traced it throughout the whole cave. The tendency to form limestone shelves is not confined to this bed. In the upper Aran View Passage (to Section Jj - Jj') Bed no. 2 forms shelves, while just before the Great Oxbow in the main passage shelves are formed in Bed no. 5.

5. This limestone, like Bed no. 2, has no distinguishing features. There is a very distinct solutional bedding plane of up to 1 ft. in height between Beds 4 and 5 in St. Catherine's (shown in Sections C - C' and V - V'). The junction of Beds 4 & 5 is shown in Plate 5. Most of the stream passage and all of the canyon passages in Doolin are in this layer. In the Great Canyon, one sees as much as 20 ft. of it.

#### DESCRIPTION OF MAIN CAVE

##### St. Catherine's 1.

The entrance to St. Catherine's 1 lies two feet below the shale-limestone junction (Beds 1 and 2). In the cave there is an almost immediate drop of two feet in the roof, giving a total thickness of 4 ft. for Bed no. 2 at this point. After this a roof bedding plane is encountered which is recognizable at intervals all the way down to Fisherstreet Pot. Below this roof is Bed no. 3. It does not form shelves. The cave is developed in this bed all the way to Section A - A'. These 205 ft. are a rather uncomfortable, rather smelly crawl in a passage 2 ft. high by 4 ft. wide, where one frequently encounters dead sheep. The draught generally goes downstream so that on the way out one encounters the dead animal long before one reaches it. The stream is in the floor for the first 54 ft., after which it sinks in the gravel to a lower level and reappears at Section A - A'. Thirty feet before reaching this there is a rather awkward squeeze resulting from a fallen block. A plan of the streamway and oxbows from here to Section B - B' is given in the St. Catherine's Plan. The uppermost of these passages (in Bed no. 3) goes off right at Section A - A' and was followed  
/for

for 160 ft. to a pool. It is believed to re-enter the Old St. Catherine's 1 Passage 60 ft. beyond Section T - T' at roof level. At Section A - A' one drops down to the streamway and the cave is developed from here to Section B - B' in Bed no. 4. These limestone shelves are shattered and loose. All three levels can be followed but the highest is the easiest.

At Section B - B' occurs an interesting piece of vertical development. The Old St. Catherine's 1 Passage continues in the Shelving Bed for a distance of 962 ft., when it rejoins the main stream passage at Section D - D' (Plate 5). At 500 ft. it is joined on the left by a similar passage coming from St. Catherine's 3. But at Section B - B' the streamway, which has already dropped down into Bed no. 5, is rejoined by the caver who, dodging a heavy drip from the roof, slides gingerly over some large, loose, rocking limestone shelves, to find himself in a clean, smooth stream passage 6 ft. high by 1.3 ft. wide. At this point a tributary enters on the left, which is believed to come from the sink (St. Catherine's 1a) immediately to the south of the ruins of St. Catherine's Nunnery.

From Section B - B' to D - D' the stream passage ("New St. Catherine's 1 Passage") has a rectangular cross section of from 6 to 8 ft. high by 1.5 to 2 ft. in width, with well marked meanders, the waves having a length of about 20 ft. The roof is formed by the floor of Bed no. 4 (the bedding is here horizontal with no dip), beneath which is a well marked, wide solutional bedding cave of from 0.5 to 1 ft. in height. It is grooved in many places by dry tributary channels. At Section C - C' two water skutes enter on the right from grooves in this bedding cave, and the passing caver gets wet. This water has left the Old Upper St. Catherine's 3 Passage 25 ft. above Section X - X' and originates from St. Catherine's 3 Swallet (proved by colour test). Three hundred and twenty feet beyond C - C' a large dry tributary passage (end of St. Catherine's 3 Passage) comes in on the right. It is almost as large as the St. Catherine's 1 active streamway, for the rather good reason that at one time it took the combined waters of Old St. Catherine's 1 and 3. For the same reason it is in a straight line with the main streamway below it, the streamway above it appearing to enter as a tributary. This turning can be missed on the way home.

After this the beds begin to dip once more to the south and by Section D - D' the roof is only 4.5 ft. high. At this point we are rejoined by the combined Old St. Catherine's 1 and 3 Passages in the Shelving Bed, which enter on the right (Plate 5). Further downstream Bed no. 5 is soon lost and is not seen again until Doolin Cave is reached. There are upper oxbows to the stream passage which are not always in phase with one another and are sometimes separate or widely offset. There are two distinct places where one has to leave the streamway and climb into the old upper passage, which is wide and floored with shattered limestone slabs covered with fine grey mud.

/The

The 1953 Prime Survey Point is a slab on the right of the passage (Section E - E') under which the stream flows. Ahead is a passage which chokes in 20 ft. The stream is soon lost in a bedding cave 1.5 ft. high and the passage to the right goes for 30 ft. to the end of St. Catherine's 1. There are now two ways into Doolin Cave from here. There is the hole we made in 1955, through which one can lower oneself 3ft. into the streamway, which has now entered the top of Bed no. 5. But in 1963, in the comfort of a wet suit, one of us pushed his way along the active streamway to the same point, removing one boulder on the way.

### Doolin Cave

During the next 120 ft. the stream cuts its way down through 8 ft. of Bed no. 5. Overhead are rock falls, through which access may be had to well decorated grottoes in Bed no. 4 (Section F - F'). The finest of these is the "Beautiful Grotto" (Plate 6). This is a triangular chamber (50 x 30 ft. and 4 to 9 ft. high) formed by rock falls in Bed no. 4 just above the junction of the St. Catherine's and Smithy Streamways. The Smithy Stream is almost unseen as it slinks into the St. Catherine's Stream under a low arch. Overhead the roof is now formed by the floor of Bed no. 4, but offset up to the right is the Old St. Catherine's Passage ("Doolin - St. Catherine's Oxbow") forming a noble oxbow 12 ft. high and up to 20 ft. wide. At Section G - G' it is time to leave the streamway and travel by this oxbow.

Before doing so, however, let us see what is happening to the active streamway. For the next 382 ft. it goes along a bedding cave called "The Waddle" (originally "Witts' Waddle"). This is from 10 to 16 ft. wide and from 3 to 4 ft. high. At Section H - H' the stream is braided. There is clean solid limestone on all sides, nicely scalloped. The last 100 feet are in an even lower, wider bedding cave with about nine inches of air space and apparently no way on. This is an optical illusion due to the rock falls ahead. As soon as these are reached the roof opens up and one can climb into the oxbow above.

We must return to the upper end of The Waddle (Section G - G') and climb to the upper level. The Doolin - St. Catherine's Oxbow here is 34 ft. wide and 6ft. high (Section I - I') and sweeps from side to side in gentle curves (Plate 7). The roof is our old friend the Two Foot Cap (Bed no. 3) and on its undersurface are some beautiful examples of anastomotic half-tubes forming a sort of jig-saw pattern. This pattern is not irregular. There is a distinct tendency for accentuation of channels following roughly the major jointing (Plate 4). After 317 ft. this passage is joined on the left by a similar passage of about half the size. This is the Smithy Oxbow, the old stream passage, long abandoned, from Smithy Sink. The two have joined by the time we reach the end of The Waddle. For about another 70 ft. we continue to clamber over rocks, but after that the streamway becomes passable again and  
/progress

progress at a brisk walk can be resumed.

The next thousand feet of cave is in a roomy streamway 8 ft. high by 20 ft. wide. It is all in Bed nos. 3 and 4. One hundred and twenty feet before Section J - J' the height has increased to 12 ft. and the lower 4 ft. are in Bed no. 5. At this point two rivulets enter from the plane between Beds 4 and 5 on the right, quite close together, at the top of a gentle slope. This water is from the stream which occupies part of the Dry Tributary Passage. This passage is encountered just above Section J - J' coming in on the right five feet above floor level. It has the same roof as the main stream passage. It is continued on the left side of the streamway by an oxbow at the same height. Section J - J' is drawn here and shows the oxbow on the left and the stream passage on the right. Clearly the oxbow was the original stream passage both for the main stream and the tributary.

Between section J - J' and K - K' the stream passage continues at this lower level (in Bed no. 5) with a T-shaped cross section, until rejoined just before K - K' by the Dry Tributary Oxbow. This oxbow has its floor still 5 ft. above the main stream passage and its roof in Bed no. 3. Section K - K' shows the shattering encountered where the oxbow again crosses the streamway and breaks up into two; one continuing above, the other going left for 80 ft., and then rejoining. From here onwards the upper level passages are relatively inaccessible, and often have partial floors of loose limestone slabs.

The stream passage continues from Section K - K' in Bed no. 5, the floor every now and then stepping down, so that at Section L - L' the passage is 9 ft. high. Soon after this shelving occurs and a lower meander appears, first to the right (one of Collingridge's "pseudo-oxbows"; 1963) then to the left, where the passage then divides. The lower meander (only 4 ft. high) becomes the main stream passage, the upper becomes the Great Oxbow.

The left hand passage carrying the stream is generally less than 6 ft. in height and often less than four (Section M - M'). Its width varies little, remaining at about 3 ft., except at roof level, where a pronounced T-section is often present up to five feet wide. After 494 ft. the stream bed is strewn with boulders, kettles and boots. There has been a considerable roof collapse (now 8 ft. above) creating an awkward and unstable obstruction. Shortly after this has been passed the Great Oxbow returns on the right. At this point the roof height is only 10 ft. but after 60 ft. it suddenly rises to between 30 and 40 ft., due to the return of a high level oxbow in Bed no. 4. This is described later on page 20. This is the beginning of the Great Canyon, a tall handsome passage, though only 3 ft. wide, which continues for over 1000 ft. to the Great Boulder Fall and beyond. At first its upper part contains many shattered limestone slabs, but it cannot be followed at that level. It soon goes off to the right and after a choke returns

/at

at the Great Boulder Fall. The passage at floor level after a short distance quite suddenly changes from the typical U-shape to a relatively narrow V-shape. The floor level drops six feet in a series of short steps, along a horizontal distance of about 20 ft. This has caused the formation of a number of water shutes. After this the gradient becomes gentle and the U-shaped section returns.

About 30 ft. before Section O- O' a heavy drip comes from the roof, and about 16ft. beyond the last drip is the Great Boulder Fall. At this point for several yards large slabs of rock have separated along a major joint and peeled off. The passage just here is sinuous, so the section (O - O') does not show the straight joint on the right hand wall, which is present a few yards further on. Neither does it show an extra layer of boulders on the top, which are just round the corner. David Savage climbed this pile of boulders in July 1964 and obtained access to the roof meander in Bed no. 4. Upstream it forms a pretty grotto (The 1964 Grotto), about 40 ft. long, and is then choked. Downstream it has no floor and becomes part of the Great Canyon. The main stream passage of Doolin now keeps the same roof to its end. The Great Boulder Fall has resulted in considerable obstruction to the passage. The cross section is reduced by at least 60%. It has been suggested that this obstruction would cause flood waters to back up, and there are indeed flood levels in the Great Canyon 9 ft. above the streamway. Flood debris in the Great Oxbow Grotto is undoubtedly ancient, since some of it is stalagmited.

During the next 616 ft. past the Great Boulder Fall the height of the canyon passage steadily diminishes from 25 to 10 ft. while the width increases to 5 ft. The stream has begun to form shingle bars across the path. At Section P - P' an oxbow goes off to the right at a level slightly higher than the stream passage. It is convenient to follow this oxbow, since the height of the stream passage abruptly drops to 5 ft. and then to 3.5 ft. before the oxbow is rejoined. This part of the stream passage is known as the "Second Bedding Cave". The roof of the oxbow is between Beds no. 2 and 3, while that of the streamway is between Beds no. 3 and 4, except at one point (Plate 1) where an enormous slab has fallen from the roof. This slab is 2 ft. thick and comes from Bed no. 3. It has bedding plane solution both above it and below. There is a communication between the oxbow and streamway about 100 ft. below Section P - P'.

Just before the end of the Second Bedding Cave, where it is rejoined by its oxbow, a tributary passage enters on the left which contains bright orange mud. Below the junction the roof height rises to that of the oxbow, to 5 ft., and soon after the Aran View Passage comes in on the right. After 300 ft. the roof level gradually falls

/again

again and a wide bedding cave opens up at waist level (Section Q - Q'), the stream flowing in a small channel incised in the southern part of the abandoned bedding cave (3 ft. high by 30 ft. wide). This channel provides a comfortable walking height of 6 to 8 ft. in places, but undercutting of its northern wall soon causes it to become broad and shallow, necessitating stooping or worse. In this section there is a dangerously sharp limestone shelf at waist level, where undercutting has taken place.

At Section R - R' the bedding cave extension has disappeared and the cross section has become a rectangle (10 ft. each way). It is almost perfect in its symmetry and constant in the amplitude and wavelength of its meanders. Near the roof are many old channels from the original roof meanders, which have cut down to a depth of 2 or 3 ft. Where these channels communicate with the main passage they sometimes leave rock cornices carved in the shape of a boat with pointed ends.

260 ft. below R - R' a tributary stream enters on the right near roof level and provides a jet of water which almost reaches the far side of the passage (Plate 8). The volume of water is remarkably constant in different types of weather, and is so much greater than that entering any of the neighbouring swallets, that it must come from the River Aille. Confirmation is provided by its temperature; it gets steaming warm on a hot afternoon. It is known as the Aille Cascade. Judging from its position in relation to the surface it probably comes from the Aille just above Roadford Bridge, where the river starts sinking.

Further downstream the passage is rather narrower and higher (6ft. wide by 15 ft. high) and some oxbows (see survey) enter and leave on both sides. These are old channels formed in a roof-level bed, where many smaller such channels may be seen. At the upper end of the last oxbow, 750 ft. below the Aille Cascade, the roof suddenly drops 16 ins. (Bed no. 3) to a height of 8 ft. From here onwards there are banks of soft mud on both walls, indicating the normal flood level of this part of the cave. 200 ft. further down the oxbow returns accompanied by a small tributary from the right, and the water of the streamway suddenly deepens uncomfortably. The hard limestone floor has given way to deep silt. The reason for this is that further downstream there has been a deposit of shingle. This dams back the water to form the deep pool, the waters of which are still enough to allow the deposit of fine suspended material.

Almost at once the First Bedding Cave is entered, and by the time one reaches the First Aille Tributary Passage daylight can be seen 170 ft. away. The Second Aille Tributary comes in 40 ft. from the pothole and the third is just opposite to the pot. All enter the streamway on the right and have warm water. Before reaching the Fisherstreet Pothole  
/the

the passage height is 3 ft., but most of this is occupied by water, so that one gets very wet. The width of the First Bedding Cave is 30 ft.

Continuing downstream from the Fisherstreet Pot the passage immediately swings round to the south and follows the dip, which is here quite pronounced. Indeed one would soon run out of rock altogether, were it not for a series of rapids, which enable the stream bed to drop even faster. The bedding cave is from 4 to 6 ft. high and about 20 ft. wide. At 350 ft. below the Pot the Fourth Aille Tributary Passage enters and at about 670 ft. the passage sumps. The roof here is covered with foam bubbles formed with slimy mud. The actual position of the sump depends on the weather. There is no evidence that it is affected by the tides.

#### DESCRIPTION OF TRIBUTARIES AND OXBOWS

##### 1. Old St. Catherine's 1.

This oxbow (Sections B - B' to D - D') is formed entirely in Beds no. 3 and 4 and has the same roof throughout, except near the end where for a short distance the undersurface of Bed no. 3 forms the roof. The characteristic feature of the passage is its limestone shelves. These are well formed, sometimes decorated with stalagmite (Section T - T') and often fractured along the 196° joint (Section U - U'). When this happens the fallen slabs obstruct much of the lower part of the passage, reducing the height from 10 ft. to 5. Generally the width is not less than one or two feet, but in some places it is best to climb into the roof T - section, where there is always plenty of room.

At the start (Section B - B') the passage is offset 20 ft. from the main streamway and thereafter it pursues an independent course first to the west and then more to the south, where the north-south jointing becomes conspicuous, and has clearly been a determining influence in the formation of the passage. After continuing thus for 500 ft. the passage is joined on the left by the dry part of Old St. Catherine's 3 Passage, together with a tributary passage of unidentified source (Inset in St. Catherine's Plan). Just above floor level is a band of chert which is also a prominent feature of the Old St. Catherine's 3 Passage. It is at this point that the latter passage drops to the lower level (Bed no. 5) originally known as the "St. Catherine's 1 Tributary".

For the next 100 ft. the combined Old St. Catherine's 1 and 3 passage is offset only 10 to 20 ft. from the "St. Catherine's 1 Tributary", so that at Section V - V' the passages communicate for several feet. The combined old passages join the New St. Catherine's stream passage at Section D - D'. A hundred feet before this a small tributary stream enters right 2 ft. above floor level and leaves left for the main streamway after 70 ft. at floor level.

/2. St. Catherine's



2. St. Catherine's 3. (Clare 8, E.13.5 in., N. 14.6 in.)

The swallet is a large irregular hollow, about 20 ft. deep, in shale with a main stream and two minor tributaries, together making a stream slightly smaller than that of St. Catherine's 1. At the bottom of the hollow, limestone is exposed and the stream passes underground in a passage not unlike the entrance of St. Catherine's 1 and in the same bed. After a few feet the way on is blocked by a large boulder.

From inside the cave the stream passage has been explored upstream to a point 1300 ft. from the swallet. Here it is a bedding cave 6 ft. wide by 2.5 ft. high with a shingle floor, ten inches of water and "still going strong". Downstream it continues thus for nearly 400 ft. (to Section W - W') by which time well developed limestone shelves are seen in the walls. Soon after this (70 ft.) the stream disappears underneath the chert floor for a distance of 180 ft. In one place it can be seen through a hole in the chert one foot below. After cutting through this floor the passage height improves to 5 ft. The whole of this section runs from east to west along the minor jointing, and at a number of places the passage is crossed by conspicuous calcite-filled north-south joints.

After another 200 ft. the passage crosses over the top of New St. Catherine's 1 and 40 ft. later the stream disappears down left into the bedding cave, which formed in the upper part of Bed no. 5. It soon reappears in New St. Catherine's 1, as already described. There are conspicuous chert ledges four feet above floor level (also seen in Old St. Catherine's 1). A few feet later the passage, which has hitherto followed the minor joints, turns south and follows the major. It is still in Bed no. 4, except for the part below the chert ledge, but the limestone shelving is less conspicuous. The passage height rises to 12 ft. (Section X - X').

A hundred and twenty feet further on the floor suddenly drops in a series of three bold steps totalling nine feet, down into Bed no. 5, and five feet further on the tributary of unknown origin enters on the right from a 3 ft. step. The Section Y - Y' drawn at this point shows a gap in its upper half on the right. This is where Old St. Catherine's 3 enters Old St. Catherine's 1. The lower half of the gap represents the tributary of unknown origin. This was followed in 1959 upstream for 120 ft. (not shown in the survey) when it became too tight. At its lower end the old upper level of this tributary is separate and offset, but further upstream the two run together, making a canyon passage 20 ft. high.

Below Section Y - Y' the passage is smooth walled, 20 ft. wide and 12 ft. high, entirely in Bed no. 5, and has small oxbows running in and out of the upper bedding plane. For 90 ft. it has rock floor and for the rest of the way, until it joins New St. Catherine's 1, it is floored  
/with

with mud up to 2 ft. deep. This is flood mud from the main streamway, which fails to get washed away, because the only water flowing down this passage is the trickle from the tributary of unknown origin. The roof drops slowly to 6 ft. in height, because the bedding is no longer horizontal.

### 3. Smithy Sink and its Streamway.

Smithy Sink (I.O.S., 6 in. to 1 mile, Clare Sheet 8, E. 11.1 in., N. 12.6 in.), formerly known as Doolin Road Sink, is just south of the road from Doolin to Lisdoonvarna near the smithy. It has a capacious entrance with a fair sized stream, but it closes down to a choke after about 20 ft. A small hole to the right just before this choke leads to a little chamber with a mud floor, upon which is scattered much domestic debris. After a short distance this ends in a mud choke. The stream has several points of engulfment higher up.

Inside the cave the Smithy waters are encountered 150 ft. from the Sink, where they enter a stream passage by two tributaries. The origin of this stream passage is obscure. It contains cold water, whereas the two Smithy Tributaries are warm, and was believed to have come from St. Catherine's 3. This has been proved to be incorrect. It comes from a fairly narrow bedding cave in the roof of Bed no. 4, so that its origin cannot be very far away. It may come from the points of engulfment above Smithy Sink. It is clearly the main stream passage, as the first and larger of the Smithy Sink tributaries enters by dropping over a 2 ft. step. The second enters at floor level and soon after a dry tributary is encountered, also on the left, which has been followed up for over 100 ft. (not shown on survey), where it emerges from an uncomfortable bedding cave.

By now the Smithy streamway is running in a canyon channel, the lower half of which is in Bed no. 5. Up above, Bed no. 4 meanders independently and is often lost. At Section Aa - Aa' it may be entered high on the left through loose limestone slabs, and at once one enters the Smithy Grotto. This lovely cavity (Plate 2) is from 3.5 to 2 ft. high, with its roof in Bed no. 3. Its boundaries are difficult to define, as the bedding cave narrows gradually, but it is about 16 ft. wide and 20 ft. deep. It contains many white stalagmite columns, rows of stalactites along the joints and a floor of limestone slabs cemented by stalagmite flow. It can, but need not be traversed to reach Smithy Aven.

Downstream of Section Aa - Aa' the lower part of the streamway begins to meander independently of the upper. The latter is entirely in Bed no. 5; Bed no. 4 was lost at Smithy Grotto and continues as Smithy Oxbow. This meandering results in a scissors movement, whereby the upper part forms a short oxbow entering the St. Catherine's stream passage 10 ft. upstream of the Smithy Stream. The latter, running in  
/the

the lower meander, enters by a low arch (6 ft. wide by 3 ft. high).

#### 4. Smithy Oxbow (Old Smithy Stream Passage)

This old, long-abandoned stream passage in Beds no. 3 and 4 bears the same relationship to the Smithy Stream as the Doolin - St. Catherine's Oxbow does to the Waddle. Upstream it has been penetrated north of the Smithy Aven as far as the passage marked with dotted lines on the plan. At this point, about 100 ft. from the Smithy Sink the passage is in Bed no. 2 and the caver finds himself stuck in a bedding cave nine inches high and 12 ft. wide, with a strong draught coming from the north. The passage becomes easier as it is followed south towards its termination in the roof of an aven of circular plan (12 ft. diam.) with jagged, water-worn walls. This is Smithy Aven. In its floor (Section Bb - Bb') Bed no. 3 is encountered, giving access to a low wide bedding cave with floor of mud and shingle on shattered limestone slabs. To the right access may be had to Smithy Grotto (only please don't, or it will get muddy), while straight on a stalactite barrier is encountered. The centre of this has been forced and may be passed by a slim caver, after which the passage turns south and steadily gets bigger. After 50 ft. it is joined by a similar passage from the left (Section Cc - Cc'), which can be followed for 50 ft. to an impassable gravel choke. This gravel still bears debris and the remains of the dry foam from old floods. The stagnant pool just beyond is probably a relic of the last flood.

After another 300 ft. the passage joins the Doolin - St. Catherine's Oxbow. On the way the floor is nearly always covered by large limestone slabs from Bed no. 4 except in one place (Section Dd - Dd') where the scalloped rock floor is exposed. The passage here is 9 ft. high and is all above Bed no. 5, which is only entered just before the junction with the Doolin St. Catherine's Oxbow (Section Ee - Ee').

#### 5. St. Catherine's 2. (I.O.S. 6 in. to 1 mile, Clare Sheet 8, E. 11.1 in., N. 13.9 in.)

The entrance to this cave is situated 675 ft. from that of St. Catherine's 1 along a bearing of  $240^{\circ}$ . It is a little way further down the dry valley in a shake hole 16 ft. deep. This leads at floor level into the lower end of the cave, which is 370 ft. long. The upper end of the cave is only 340 ft. from the entrance to St. Catherine's 1. It is blocked by a choke of mud, shingle and stalagmite ascending to the roof. At first the passage is 5 ft. high and richly decorated with red stalagmite flows. Seventy feet further down a heavy drip enters and falls onto these red flows. This is the only water that enters the cave. For another 150 ft. it forms gour pools in the floor with muddy bottoms and then it disappears. By now the passage is 8 ft. high (Section Z - Z'), tall and narrow with a T-shaped roof. There is little or no tendency to form limestone shelves. It is almost certainly formed in Bed no. 2. Twenty feet from the entrance the roof bed drops 2.5 ft. and 5 ft. further on an ill-defined dry tributary enters on the right.

/There

There is a mud choke downstream of the entrance and some evidence that this fills a vertical feature, and that in fact the cave passage descends to Bed no. 3.

#### 6. Doolin Dry Tributary Passage and Oxbow.

This passage, 1497 ft. long, is believed to be the continuation of St. Catherine's 2 and enters the main stream passage of Doolin at Section J - J'. At its northerly end it is 1300 ft. south of the entrance to St. Catherine's 2. Here it is blocked by a stalagmite flow accompanied by beautiful formations. The passage is in three parts. The first and third are in Bed no. 3 and the upper part of Bed no. 4, the second occupies the entire thickness of Beds no. 3 and 4 and contains a stream. Twenty-five feet from the choked northern end is an aven 10 ft. high and 18 ins. diam. in the roof, with spongework in the sides, the limestone (Bed no. 2) being composed almost entirely of fossils. After 100 ft. there is a stagnant pool in the muddy floor and after another 100 the passage is nasty, low and shattered.

Presently a stream is encountered entering the passage at a lower level. The passage then becomes large and sweeping (Section Ff - Ff'). The roof from here onwards shows beautifully developed pendants. The stream may be followed upstream below the level of the passage for a distance of 50 ft., where it is seen to be formed by the junction of two streams. The more westerly originates in the swallet 420 ft. S.W. of the entrance to St. Catherine's 2 on a bearing of  $234^{\circ}$ . The other's origin is unknown. There are two soakaways in the St. Catherine's 2 valley which may feed it, together with the trickle in that cave itself. The stream passage just described is in a constricted bedding cave which can be followed up altogether for 100 ft.. The stream is lost 380 ft. before the end of the Dry Tributary Passage and emerges in the Doolin main streamway, as already described. The third part of this passage is much roomier than the first (20 ft. wide and 5 ft. high). There is a floor drop of 5 ft. where it enters the main streamway.

Immediately opposite, also 5 ft. above stream level is the Oxbow (Section J - J') which runs for 200 ft. before rejoining the main streamway, still 5 ft. above. Its structure is identical with that of the Dry Tributary Passage, of which it appears to be the continuation. After rejoining the main streamway the Oxbow swings to the right, returns at Section K - K' and then breaks into two. The upper continues straight on, the lower swings to the left and rejoins the upper after 80 ft.

#### 7. The Great Oxbow and Grotto.

This tall canyon passage (650 ft. long) by-passes a low stretch of streamway already described. It is generally about 3 ft. wide by 15 ft. high, but of the first few hundred feet the roof is composed of  
/jammed

jarred blocks forming the false floor to a higher passage. After 320 ft. this passage coincides with the lower for 200 ft., at the end of which it is accessible by a short climb (Section N - N'). This is of course the downstream continuation of the Dry Tributary Oxbow, which has just been described. Some 260 ft. before The Great Oxbow rejoins the main streamway, this upper passage goes off to the left and may be followed for 200 ft. At this point it comes out into the roof of the main streamway canyon passage, at roof level, 85 ft. downstream of the junction. In this part of the upper level passage is the Great Oxbow Grotto. This is 40 ft. long by up to 20 ft. across and has a roof height of about 3 ft. It is richly decorated with stalactites and columns, almost pure white, flowing over onto the shattered limestone shelves on the floor and forming a fine crystal pool. Trapped in the flowstone are small pieces of wood and straw and piles of loose broken straw-stalactites. This is evidence of ancient flooding 30 ft. above the present stream level. One limestone shelf with stalagmite columns has become tilted by floods and then re-stalagmited. There is no evidence of recent flooding.

The junction between the Great Oxbow and the stream passage is very complex, as there are three or four abandoned oxbows at different levels connecting one another, the Great Oxbow and the main stream passage.

#### 8. Second Bedding Cave Oxbow.

This oxbow, 340 ft. long, conveniently by-passes the second Bedding Cave. It starts at Section P - P' with a height of 3 ft. (Beds no. 3 and 4) perched 3 ft. above the level of the streamway. Its roof is above Bed no. 3 and its floor is composed mainly of solid rock covered with mud, since Bed no. 4 does not form typical shelves in this part of the cave. After a dozen feet there is a heavy drip from the roof which has formed orange stalagmite and still brings with it orange mud. About 90 ft. along the oxbow a large hole on the left communicates with the stream passage. The Aille River passes overhead at this point. Beyond this the oxbow broadens to a bedding cave 20 ft. wide and has pools of flood water in its floor. Where it rejoins the main streamway the two have the same roof.

#### 9. Aran View Passage.

This is the largest and most important feeder of the main cave, running as it does for a little over 5,000 ft. The entrance (I.O.S. 6 in. to 1 mile, Clare Sheet 8, E. 7.8, N. 14.2 in.) is in a small depression at the lower end of a shallow valley running off the shale edge in a south-westerly direction, south east of Aran View House. A narrow artificial channel 200 ft. long diverts most of the stream, that normally sinks just short of the entrance, around the top of the swallet depression and away from the cave mouth. The cave commences in Bed no. 2 as a 6 ft. high canyon passage containing no stream,  
/except

except under wet conditions (Gg - Gg'). The floor is hidden beneath domestic rubbish mixed with decaying animal and vegetable material, and at two places within 150 ft. of the entrance the roof bed has partially collapsed, so that one has to crawl in this foetid mass. Section Hh - Hh' shows the roof at a lower level and formed of boulders due to this collapse. After 70 ft., however, the original roof is restored, and can be seen at intervals down to Section Jj - Jj', when it gets lost.

After 130 ft. the lowest part of the passage broadens and enters a zone of collapsed, thinly bedded limestone shelves (Section Ii - Ii') whilst the upper part diverges and continues as an independently meandering canyon passage. This shelving limestone layer is not Bed no. 4, it is well above it. 212 ft. from the entrance there is a carbide arrow on the right hand wall. This was present before 1963 and represents just about the limit of previous explorations. The way on was not easy to find. We looked for it in the collapsed shelving section, but looked too low. We tried the narrow upper canyon passage which returns and continues here, but this proved impossible. It was too narrow and we received a deluge of water from the roof at the tightest part. The water comes from the artificial channel in the field overhead. The collapsed section was therefore tried at its downstream end, by going into Doolin Cave and up the Aran View Passage. From that side it was necessary only to move a single small slab of fallen shelving, and a way through the collapsed section to the surface was made.

The point of breakthrough is just 37 ft. beyond the carbide arrow. The floor then drops 8 ft. and heavy drips make the cave wet. The first running water seen in the cave enters from two channels in the floor, one on each side of the passage, which join and drop still further, just before Section Jj - Jj'. The left hand trench represents the main stream passage. The right hand carries more water (from the field overhead) but is a tributary. The upper level passage corresponding with the latter is met with 10 ft. upstream of the waters meeting. Limestone shelves are here very well marked.

For another 20 ft. past Section Jj - Jj' the way lies in a high canyon passage 34 ft. high. The upper 20 ft. is in a layer of shelving limestone. Some of it corresponds in its meanders with the lower level but much is offset. It can be followed for some way downstream. The lower 14 ft. is smooth walled canyon passage and this is the one we follow. The upper 5 ft. of this also forms an independently wandering passage which, if followed upstream, is found to be offset from the main passage.

Forty four feet after Section Jj - Jj' the stream goes off left along a low bedding cave (2 ft. high). This can be followed all the way

way to its reunion with the surveyed passage just before Section Ll - Ll'. The surveyed passage is a smooth walled, rather sinuous oxbow, 2 to 3 ft. wide. A fairly typical section is at Kk - Kk'.

Just before Section Ll - Ll' a passage to the left, of the same height as the oxbow, is found to contain the main streamway, descending a series of waterfalls. But instead of joining the oxbow, the stream disappears down a bedding cave to the left, as shown in the section. It coyly re-enters the canyon passage 60 ft. further on by the same low bedding cave on the left. Just after this a band of chert appears in the floor. This forms a clear horizon, which can be identified at intervals down to beyond Section Pp - Pp'.

Forty feet before Section Mm - Mm' the passage once more divides. The canyon passage goes off to the left, but we follow a low crawl (1.5 ft. high) down right. After 40 ft. the floor drops over the chert ledge and the passage height increases to 3 ft. (Section Mm - Mm'). 16 ft. further the main stream returns by a little low passage on the left, having dropped over a ledge of the same chert. The canyon oxbow, which we are not following, can be observed through impassable holes in the roof of the left of this stream passage, and a little further on is blocked by stalagmite flows. This obstruction is not indicated in the survey.

For the next 300 ft. the stream passage has a characteristic T-shaped section (Section Nn - Nn') and is from 3 to 5 ft. high. At Section Oo - Oo' it is again crossed by the canyon oxbow from left to right. The stream continues with the canyon passage for only a few feet, before entering an impassable bedding cave on the left and taking the chert bed with it. We now follow the canyon oxbow for 67 ft., when the cave repeats itself. The water re-appears left, the canyon oxbow ahead closes down after about 120 ft., and the way on is to follow the stream down a low crawl (Section Pp - Pp'). After 50 ft. of this, dead straight, the 1954 part of Aran View Passage is reached, by a 3 ft. drop over the chert ledge.

From this a small passage (4.5 ft. high, with remnants of chert ledge at 3.5 ft.) leads off to the left. Occasionally the chert bed remains intact to form a narrow bridge across the passage. This marks the original floor level of the continuation of the bedding crawl, which is being cut back at the last waterfall. On the left hand side after 400 ft. of this low passage the canyon oxbow rejoins the stream passage. It may be followed upstream for 200 ft., but is then obliterated by stalagmite flows. Downstream the canyon passage remains with the streamway forming a very distinct upper level, bringing the total height of the passage up to 15 ft.

For the next 900 ft. the upper level shows a slow but easily  
/discernable

discernable decrease in size coupled with an alteration in the frequency and amplitude of its meanders, until it gets lost altogether. The upper level is always connected to the stream passage by the cross piece of the T-section of the latter (e.g. Section Qq - Qq'). When the upper level becomes very small it divides into even smaller channels and becomes the lower surface of an 18 in. high anastomosing bedding plane roof passage extending for a considerable distance on the left side of the stream passage. For the rest the upper level is unknown, but it is present shortly before the connection with Doolin. Just before the last of the roof meanders a considerable amount of shelving occurs, making the roof and walls dangerous for climbing.

Unexpectedly the stream suddenly leaves the passage it has been following and enters a very small passage going south-west. The main passage (in Bed no. 4 from here to Doolin, though where it enters this bed will require further study) remains dry for the next few yards, until a small stream enters from an impassable tributary on the left. This stream probably has its origin in a swallet on the shale edge 1,100 ft. south-east of Aran View Swallet. The junction is just short of Section Rr - Rr'. The small passage with the stream rejoins the main passage after 400 ft. No part of it is more than 2.5 ft. high or wide, and along all of its length oxbows of the same size as the passage occur. The floor is covered with deep scalloping, which makes the going tedious. In this passage may be seen another example of braiding (the first was in The Waddle).

After the main passage has been rejoined by its stream it shows little change of character for the remaining 2000 ft. It is, however, far from monotonous. All types of stalagmite decoration proliferate and in places almost block the passage, leaving only small openings at stream level. Places where the caver can walk rapidly and easily alternate with low, wet crawls beneath multi-colored dripstone.

#### 10. Aille Tributaries.

There are five warm streams entering the lower part of Doolin Cave: the Aille Cascade and the four tributary passages. The first has been described, and the positions of the latter defined, where they enter the main stream passage.

The first Aille tributary has been followed up for 560 ft., but only the lower 260 ft. were surveyed. It is a bedding cave in Beds no 3 and 4 of remarkably uniform cross section: a triangle with roof 3 ft. wide and height of 3 ft. A warm tributary enters it from the right 165 ft. before its termination.

The second Aille tributary is passible for 30 ft. and runs along the major jointing. It is a low bedding cave with the same roof as the rest of the cave, 12 ft. wide by 1.5 ft. high. It originates in a  
/wet



wet bedding plane coming from the west.

The third and fourth Aille tributaries are too small to be explored with any comfort. Each is a low wide bedding cove.

#### 11. Fisherstreet Pot.

This is in a clump of trees and bushes in a sloping field just south of the Roadford - Doolin Road. The top of the pothole is 75 ft. above I.O.D. and is roughly circular with a diameter of 30 ft. and a depth of 40. It is not climbable free; a 35 ft. ladder on a long tether is required. Belay to a tree. The best placed one (Sambucus nigra) is unfortunately dying, but there is plenty of Spelæodendron (Silix caprea). Inside the pot is oval (25 ft. by 15) and it ends on a scarce slope covered with debris. The cave is entered by an undercut (8 ft. wide by 2 ft. high) in the NE side. The walls of the shaft are of limestone (Bed no. 2) to within 15 ft. of the surface, above which they are of shale (Bed no. 1). A section has been drawn (Section Phi - Phi'). In times of severe flood (e.g. 1961) water will rise to within 15 ft. of the surface. Just within the cave is an obvious line of weakness with an open major joint extending for several feet into Bed no. 2. The pot is evidently a vertical collapse feature and not a true pot-hole. No stream has ever entered it. It has formed by the collapse of the overlying shale into part of the open joints mentioned. Constant widening is now taking place due to water percolating down the walls of the shaft.

#### ORIGIN AND DEVELOPMENT OF THE CAVE

There are three striking things about this cave. One is that from beginning to end the roof is in the same bed. It may drop one or two beds in its progress but it always returns. It may be offset but it is always there. This is Bed no. 3. The second is that two of the beds (nos. 3 and 4) have such striking characteristics, that they can be recognized in all parts of the cave above the Great Canyon. The third is that, whenever the stream runs below Bed no. 4, there is always an upper dry passage corresponding with the stream passage. It may be just above it and have no floor, or it may be considerably offset, but it is always there. These generalizations do not apply to Aran View Passage, where insufficiently detailed study has been made of Beds no. 3 and 4.

The mode of cave formation is the usual one for NW Co. Clare: phreatic bedding plane solution followed by vadose channel formation (loosely called "canyon"), often with meandering, and then partial collapse of the unsupported roof. In this cave there are three main bedding planes which underwent phreatic solution. These are between Beds no. 2 and 3, 3 and 4, and 4 and 5. Others exist but are less well defined. In each of these, where the undersurface is exposed, very  
/fine

fine anastomotic half-tubes, "spongework" or roof pendants may have been formed. These are best seen in the roof of the Doolin - St. Catherine's Oxbow and in the Dry Tributary Passage. Downcutting begins in the upper beds. In Bed no. 2 it accounts for very little cave development except in Aran View Passage, since this bed is not well represented in other parts of the cave. In Bed no. 3 it gives rise to the entrance passages from St. Catherine's 1 and 3. In Bed no. 4 it gives rise to all the passages with limestone shelves (except for Aran View Passage and just above the Great Oxbow) and more conspicuously to the old dry upper passages of St. Catherine's 1 and 3 and Smithy Sink. Near the junction of two passages, where they are broadest, collapse of limestone slabs is most conspicuous. Unstable shelves are characteristic of Bed no. 4 all the way down to the Great Boulder Fall, but south of this they are not. It follows that south of this point the beds are less easy to define, but Bed no. 3 remains conspicuous by its behaviour, as at the Fallen Slab in the Second Bedding Cave.

The reason why shelves should be formed in a limestone bed is not clear. It is likely to be due to a peculiarity of the rock, rather than of the forces causing solution. The most likely explanation is that there are thin bedding planes which are unusually soluble for some reason. This defect must be present over wide areas, and so the explanation is imperfect, for shelving may be seen on one side of a passage and not on the other. Sometimes on turning a corner shelves may be encountered on the outer side of the bed, sometimes on the inner. This makes it hard to bring in currents or eddies as part of the causal mechanism. Section T - T' has been accurately drawn and shows that both the upper and undersurface of a shelf may be curved. This means **that a weak bedding plane is not the full explanation. Curving of the undersurface suggests phreatic solution, more one cannot say.**

Bed no. 5 is only entered in some parts of the cave, and these are the ones where the bedding is most nearly horizontal. As soon as the dip once more becomes greater than the rate of streamway descent, the stream comes back into Bed no. 4. This happens notably in St. Catherine's 1 and in the main Doolin Passage between the Great Canyon and the Second Bedding Cave.

The cave roof at St. Catherine's 1 entrance is believed to be between I.O.D. 190 and 195 ft. The height of the cave roof at Fisherstreet Pot has been measured across the surface from the road and by a plumb line down the pot. It is 32 ft. I.O.D. The descent of the roof bed is therefore 160 ft. in 2 miles, which is well in accord with our observations, which show no dip in parts of the cave and very little in others. The Geological Survey shows virtually no dip.

There are few vertical features. Those observed in the description  
/(Section

(Section B - B' and Bb - Bb') are all associated with changing from an upper to a lower series of beds: but in one particular place the bed of the stream drops rapidly and that is in the Great Canyon. The reason for the V-shaped notch at floor level here described is that with a quickly dropping stream corrasion is exceeding corrosion. In other words, where the stream flows rapidly, mechanical action is having a more significant effect than solution. This state of affairs is seen in the V-shaped valley of a youthful surface stream. Where the floor level drops the roof level can be seen to drop at the same rate, and so it is apparent that the passage at this place is following a local increase in dip of beds. The average dip over the whole distance is 1 in 64, or 54'. Through much of the cave the roof appears to be horizontal, because the passage follows the strike. But besides this (e.g. New St. Catherine's 1) there are places where the dip is nil.

The passages developing in the upper beds are likely to be the oldest, but it does not follow that passages developing in Bed no. 2 are necessarily older than those developing in Bed no. 3. The reason is that Bed no. 2 is irregularly represented over the area covered by the cave, being very thin over the entrance to St. Catherine's 1 and very thick in Aran View passage.

#### New for old

The usual method of cave development is for the lower bedding caves to capture water from the upper. This they cannot do under phreatic conditions as they are already full. At first it is in the upper levels that meandering vadose channels can be cut, but these become deserted as the land rises, the water table sinks and the water comes to run in the lower channels, which, as may be expected, form meanders independent of those in the upper levels.

The relationship between upper and lower channels is fairly obvious when the two are running together, one above the other, as they usually do. The reason why this is usual is quite simply because they tend to form not merely in weak bedding planes but along vertical lines of weakness, joints, which tend to go through many beds for a great depth. Where aberrations occur we get an oxbow, which usually deviates only slightly from the joint controlling cave development. But in the Doolin - St. Catherine's Cave we have examples of considerable aberrations, since the Old St. Catherine's 1 and Smithy Oxbows are grossly displaced from the lines of their present streamways. One must assume in these cases that the weak joints penetrated for no great depth. This is the easier to understand since in these parts of the cave the bedding is almost horizontal and may not have cracked so much vertically.

That the upper and lower streamways do develop independently and  
/consecutively

consecutively is obvious. That their development periods may overlap is true but less obvious. It can be seen, for example, in the Great Oxbow, whose floor is below the level of the roof of the stream passage corresponding to it.

The presence of small oxbows near the roof of a stream passage is commonplace. What is rare is the presence of equal streams joining, separating and joining again. This "braiding" is seen in the streamway of the Waddle and in Aran View Passage. In both cases the passage is a low one, 3 ft. high. The explanation is uncertain. Where two channels have unequal streams, the larger captures the water from the smaller, because it gets cut down more quickly. By the law of averages it should turn out that rarely the streams are of equal size and cut down at the same rate. This is the simplest explanation of braiding.

#### Stream capture

Examination of the junction of Old St. Catherine's 1 and 3 (Section Y - Y') shows that these swallets must have started to function at the same time. Similarly it is found that the old upper stream passages of St. Catherine's and Smithy Sink have an equivalent development, so that these too must have started contemporarily. With St. Catherine's 2 it is more difficult. There can be little doubt that the continuation of this cave is the Dry Tributary passage of Doolin. For one thing the survey pattern suggests this. For another the latter is much more choked with mud than any corresponding passage in the cave, suggesting post-glacial capture of the headwaters. Thirdly, the streamlets in part of the Dry Tributary Passage come from the St. Catherine's 2 valley.

St. Catherine's 2 from its position and size must at one time have taken most, if not all, of the water now entering St. Catherine's 1. Whether the change was gradual or abrupt it is hard to say. During the last glacial retreat varved mud was laid down in many old upper level cave passages in Co. Clare and the Dry Tributary Passage may well be one of them. If so, then the capture of the headwaters by St. Catherine's 1 must have been at about this time, since if it had been later the mud would have been washed out of the Dry Tributary Passage. At all events, whether gradual or not, the original entrance to St. Catherine's 2 became choked with mud and gravel and is now lost, while the water sank as it now sinks higher up the valley in St. Catherine's 1. This brought the water down the present main streamway, joined with that from St. Catherine's 3 and Smithy Sink. It must at first have gone along the Dry Tributary Oxbow (which is not very muddy), but soon abandoned it (no downcutting), as it was captured by an open bedding cave between Beds no. 4 and 5 at Section J - J'.

St. Catherine's 1 shows several examples of stream capture,  
/together

together accounting for the fact that the St. Catherine's 3 water enters its streamway on the wrong side (Section C - C'). First it was captured at its junction with Old St. Catherine's 3 (Section Y - Y'), because here was a weak junction with another tributary coming in and an open bedding plane beneath. This is when the "St. Catherine's 1 Tributary" became active and took the whole of both streams. Next St. Catherine's 1 was captured at Section B - B', where a similar weakness existed, due to the tributary on the left (from St. Catherine's 1a) and the drip in the roof. So it sank into Bed no. 5 and cut itself a meander channel there. Meanwhile St. Catherine's 3 was cutting its way back upstream by a series of steps (now dry), but as soon as it began to cut down over the bedding cave in which New St. Catherine's 1 was running it was captured by that stream, which it now enters on the right. This is the point at which cutting back must first reach this open bedding cave.

Stream capture dried up the Old St. Catherine's Stream Passage in Doolin, when the water table fell to allow water to drop to between Beds 4 and 5, between the Beautiful Grotto and the Waddle. Though offset there is here an open joint between the two cave passage levels. Since then the stream passage has been cutting back to the former end of St. Catherine's Cave, so that the floor of this part of the passage drops fairly rapidly.

In the Smithy Stream water capture first became effective at Smithy Grotto, rendering dry all that part of the Smithy Oxbow beyond, to its junction with the Doolin - St. Catherine's Oxbow. Next the headwaters were captured by the present complex of wet passages, which dried up Smithy Aven. At first the water ran in the bedding cave above Bed no. 5, and deepened a channel into this bed, but later independent meandering of a lower bedding cave brought the water through its present low arch to mix with that from St. Catherine's.

The Aran View Passage shows repeated examples of water capture, nearly all of them occurring along a weak bed associated with a conspicuous chert band. One such place is at Section Ll - Ll', and another is at Section Pp - Pp'. The capture just after Section Jj - Jj' is of a similar nature but takes place in a higher bed. A sad lesson to be learnt in Aran View Passage is that, although one can postulate the existence of upper level passages, and although one may find their beginnings, if not their ends, they have a strong tendency to become obstructed by stalagmite flows over their walls, so that they become impassable. One of the unsolved problems of this passage is what becomes of the upper meander level below Section Qq - Qq'. There is no known point of re-entry anywhere in the main cave, so that if the upper meander proves impassable, we may never know.

## PASSAGE LENGTHS

<u>Passage</u>	<u>Feet</u>
St. Catherine's 1	1974 ft.
Doolin. a. from St. Catherine's 1 to Fisherstreet Pot	<u>8314 ft.</u>
Through trip b. from Fisherstreet Pot to sump	(1.95 miles) 10288
Old St. Catherine's 1	676
St. Catherine's 2	962
St. Catherine's 3	370
Smithy Stream	1323
The Waddle	210
Smithy Oxbow and Grotto	384
Doolin Dry Tributary	697
Great Oxbow and Grotto	1497
Second Bedding Cave Oxbow	989
Aran View Passage	350
Aille 1 Passage	5121
	<u>561</u>
Total	(4.75 miles) <u>23428</u>

## ACKNOWLEDGEMENTS

Most of the work upon which this monograph is based was done by members of the U.B.S.S. too numerous to mention. I must however single out David Savage, David Hobbs and above all Dr. E.K. Tratman, who has made a lot of informative suggestions, many of which I have adopted. My work on this cave began as an attempt to revise the account of 1956 for the book on caves in NW Co. Clare, but rapidly outgrowing its original intentions the work, as it progressed, became quite unsuitable for that book, and so is being given independent existence. The work is the Society's, the opinions are my own.

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Plate 1



The Fallen Slab in the Second Bedding Cave, 1955.

Plate 2



Smithy Grotto, 1963.

*(All photographs are by Dr. O. C. Lloyd.)*

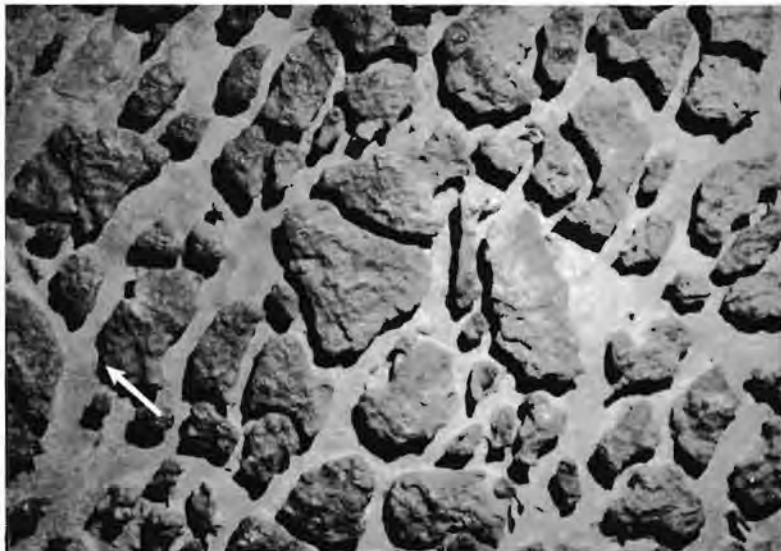


Plate 3



Anastomotic half-tubes in roof, 1955.

Plate 4



Roof of Doolin—St. Catherine's Oxbow. The arrow indicates direction of stream flow. 1961.

Plate 5



Section D-D' looking upstream.  
Old St. Catherine's on the left, New St.  
Catherine's being entered by the caver. 1962.

Plate 6



Beautiful Grotto, 1955.

Plate 7



Doolin—St. Catherine's Oxbow, looking upstream, 1962.

Plate 8



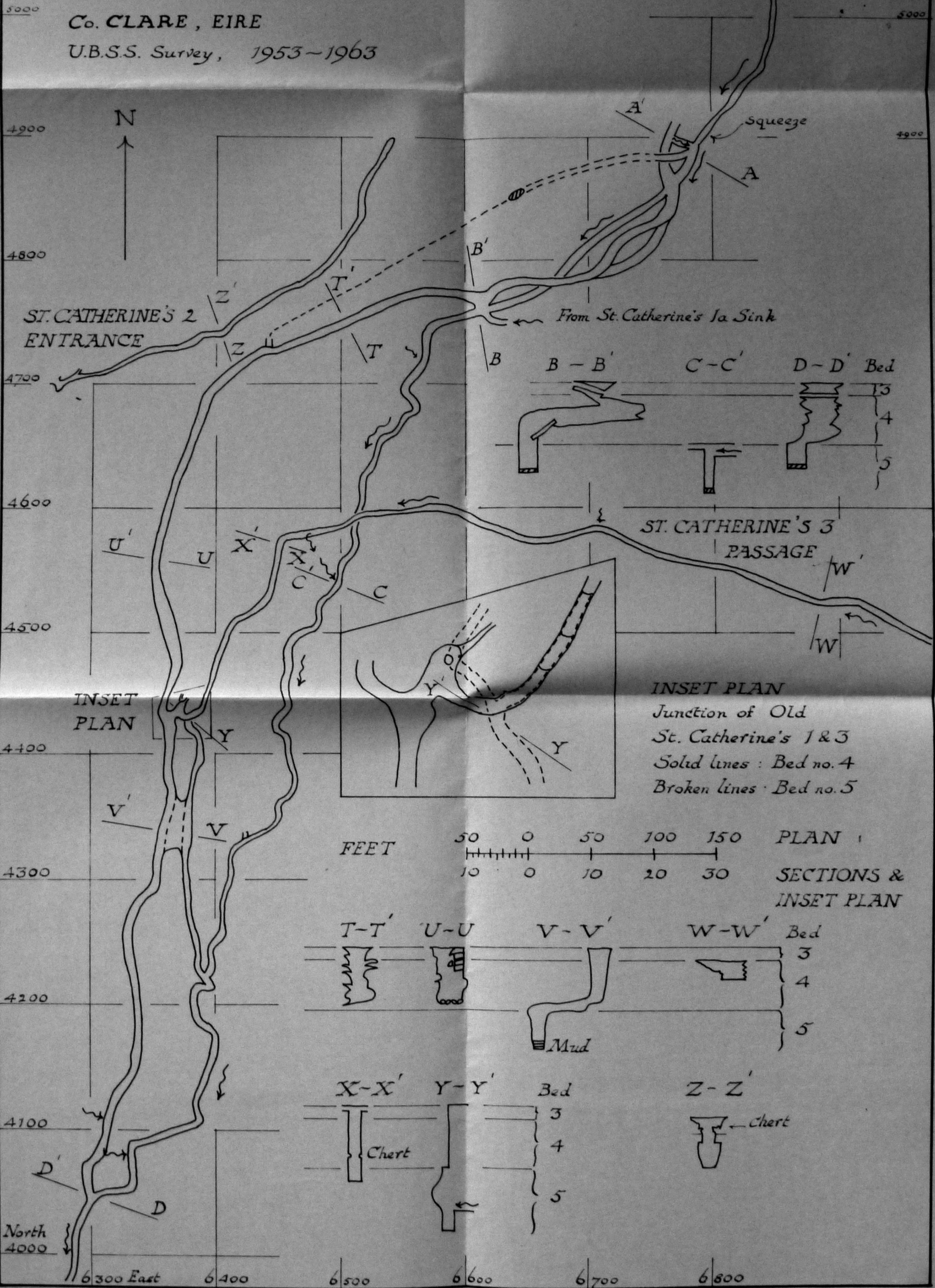
Aille Cascade. The fog is genuine and is due to the warmth  
of the Aille water. 1963.

# SAINT CATHERINE'S

Co. CLARE, EIRE

U.B.S.S. Survey, 1953-1963

ST. CATHERINE'S 1  
ENTRANCE



ST. CATHERINE'S 2  
ENTRANCE

From St. Catherine's 1a Sink

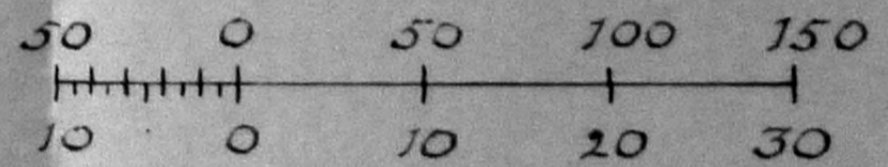
ST. CATHERINE'S 3  
PASSAGE

INSET  
PLAN

INSET PLAN

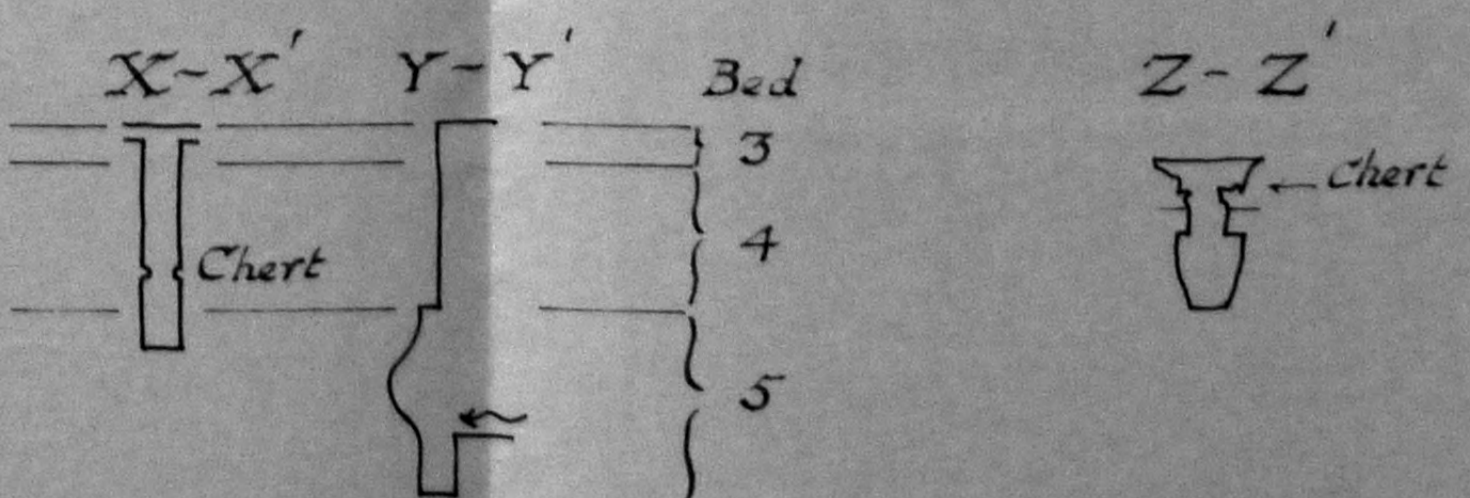
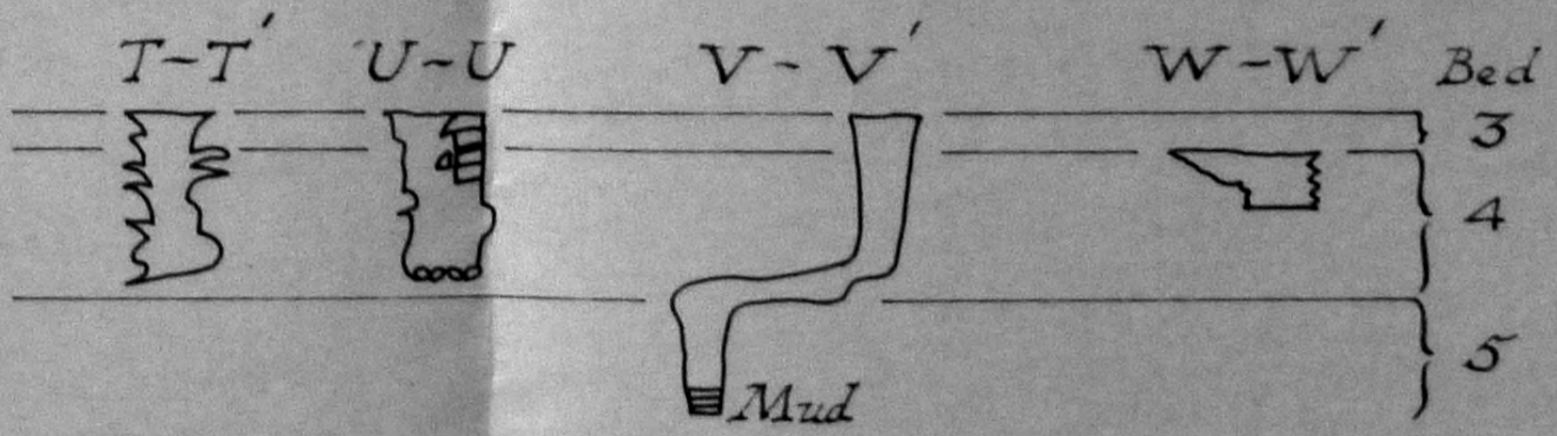
Junction of Old  
St. Catherine's 1 & 3  
Solid lines : Bed no. 4  
Broken lines : Bed no. 5

FEET



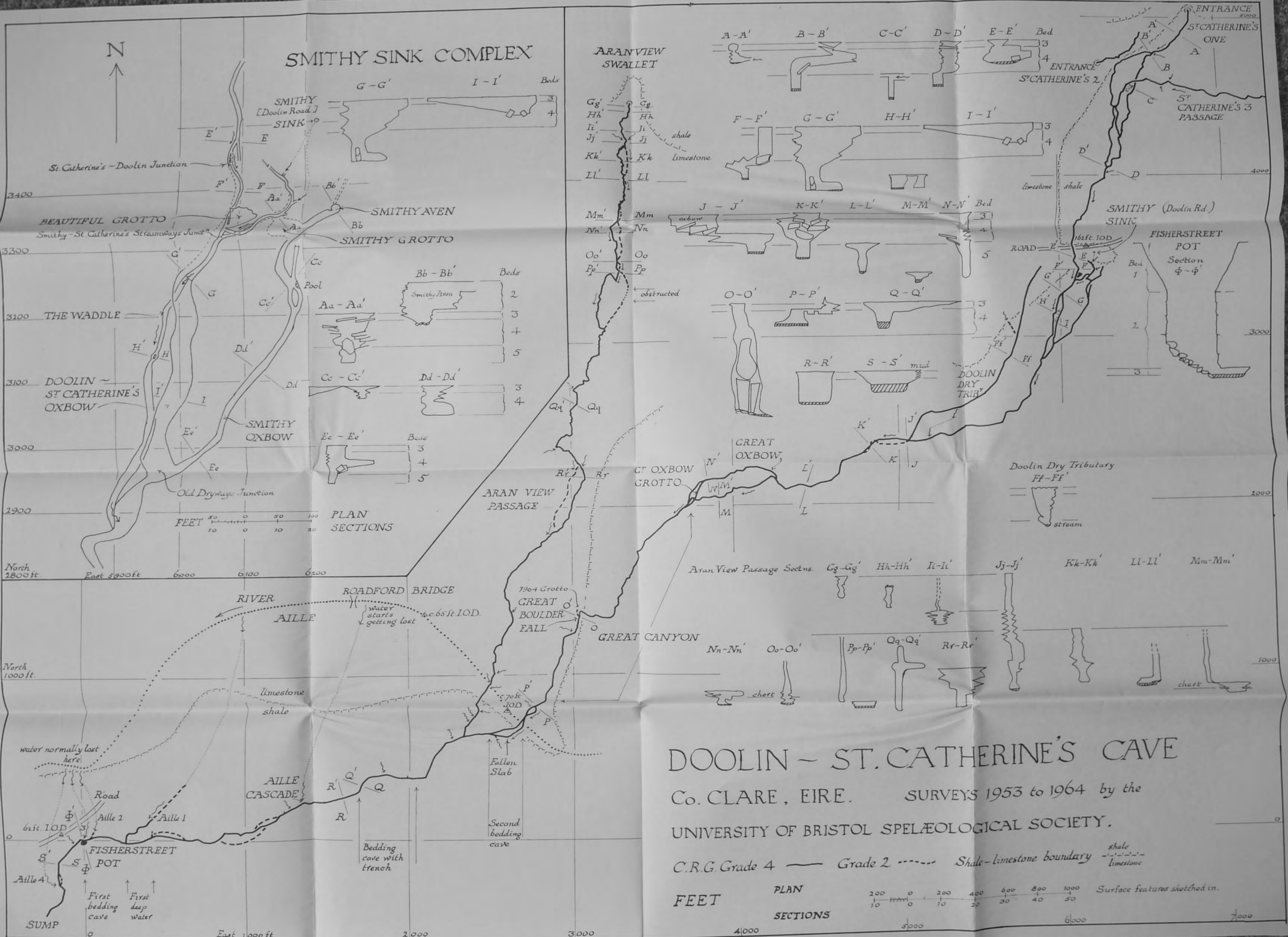
PLAN

SECTIONS &  
INSET PLAN



North  
4000

6300 East 6400 6500 6600 6700 6800



# SMITHY SINK COMPLEX

# ARANVIEW SWALLET

# DOOLIN - ST. CATHERINE'S CAVE

Co. CLARE, EIRE. SURVEYS 1953 to 1964 by the

UNIVERSITY OF BRISTOL SPELEOLOGICAL SOCIETY.

C.R.G. Grade 4 — Grade 2 - - - - - Shale-limestone boundary - - - - - shale  
 - - - - - limestone

FEET PLAN 200 0 200 400 600 800 1000 Surface features sketched in.  
 10 10 20 30 40 50  
 SECTIONS 3000 6000 7000