

Coole Cave: County Galway, Ireland

By

P. W. WILLIAMS and J. C. COLEMAN

INTRODUCTION

The sinks and risings of the rivers in the Gort area of south County Galway have often been described (Kinahan *et al.*, 1863; Martel, 1895; Baker, 1932). Whilst the hydrology of the area is interesting, the absence of explorable openings at the sinks and risings has deterred spelæological exploration.*

The cave to be described in this paper is the only one, so far, explorable in the area. It is an abandoned subterranean section of the underground waters of the Gort river.

The cave had been entered previous to our survey (February 9th, 1964) but no account was published.

Kinahan *et al.* (1863) mentioned that excavations were made, by Mr. Gregory of Coole Park, in parts of the cave for faunal remains and that in places a stalagmite floor was broken through. Beneath it a thickness of 3-4 ft. of fine red-brown clay was examined with no finds of an old fauna. Scott also referred to this excavation and noted that supposed bear bones from the cave were, in fact, those of pig.

LOCATION

The cave is situated 2 miles north of Gort town (turn west down laneway at Kiltartan new school), a short distance to the south-west of the rising called Polldeelin (*Fig. 69*).

Ordnance Survey, 6 inch (Galway) 122, N. 4.7 in., E. 1.9 in.; Ordnance Datum, 60 ft.

DESCRIPTION OF THE CAVE

The entrance to the system is a hole in a hummocky field and is a collapse in a passage roof (*Fig. 70*). A short, climbable descent of about 10 ft. brings one to the start of Bat Passage, which leads off to the north. To the south an obvious mud-and-boulder slope descends to the Entrance Hall. This is the only real chamber of the cave. From the surface of the 2-3 ft. deep pool of water in its centre, the height of the Hall is about 20 ft. From its ceiling to field level, the solid rock roof is only about 6-8 ft. thick. The Entrance Hall is the hub of the cave; from it radiate six passageways.

* The rising of the Cannahowna river $1\frac{1}{2}$ miles south of Gort has a large entrance. J. C. Coleman in September, 1963, took a boat into the stream passage for 200 ft. to an impenetrable fissure.

The Main Gallery extends 570 ft. from the Hall to the final sump. It displays very well the nature of the ancient streamway of the Gort river, whose direction appears to have been strongly influenced by the local dominant jointing. It is not possible to view exactly the former cross-section of all of this passage, since mud, stalactites and flowstone infills partly cover walls and floor (a few helictites were also seen). But, nevertheless, its general section, as is best displayed in the Canal, is roughly circular. Ceiling height

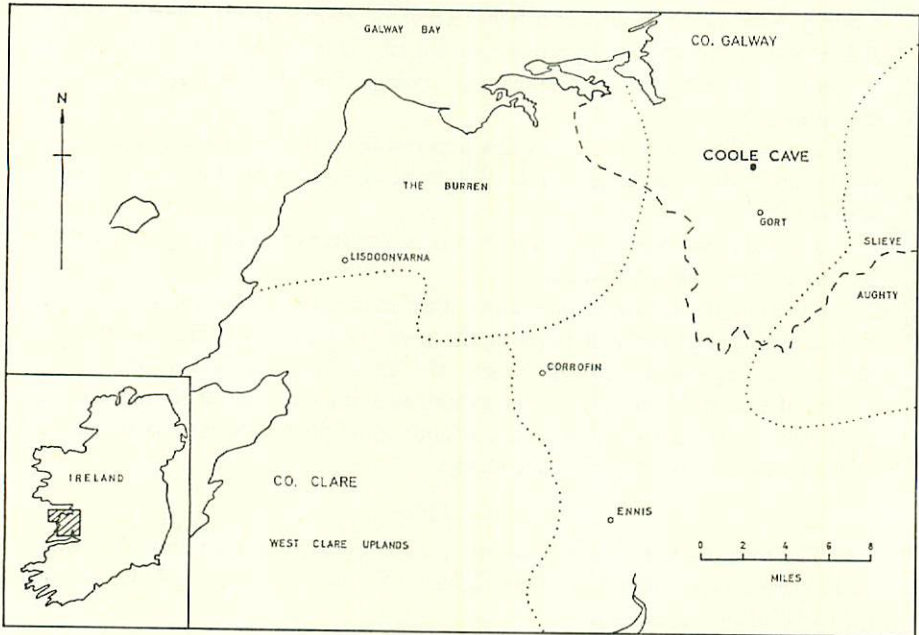


Fig. 69

remains fairly constant except near the final sump, where the roof and the muddy floor slope downwards into a deep pool. The Main Gallery affords easy walking (or wading) and wooden boards and cord show signs of an earlier, unrecorded exploration.

This major gallery is continued on the opposite (NW.) side of the Entrance Hall, in a lower arch-roofed passage which is about 12 ft. wide (Main Gallery Extension). Fairly deep water is soon reached. This discouraged penetration, particularly since thick clinging mud, which has unpleasant restrictive effects when wading, covers the floor. Air space above the water is about 4 ft. for as far as can be seen, which is roughly 100 ft. The water is clear but stagnant; the passage walls are smooth with quite large, shallow scallops. Dinghying seems the best means of further exploration.

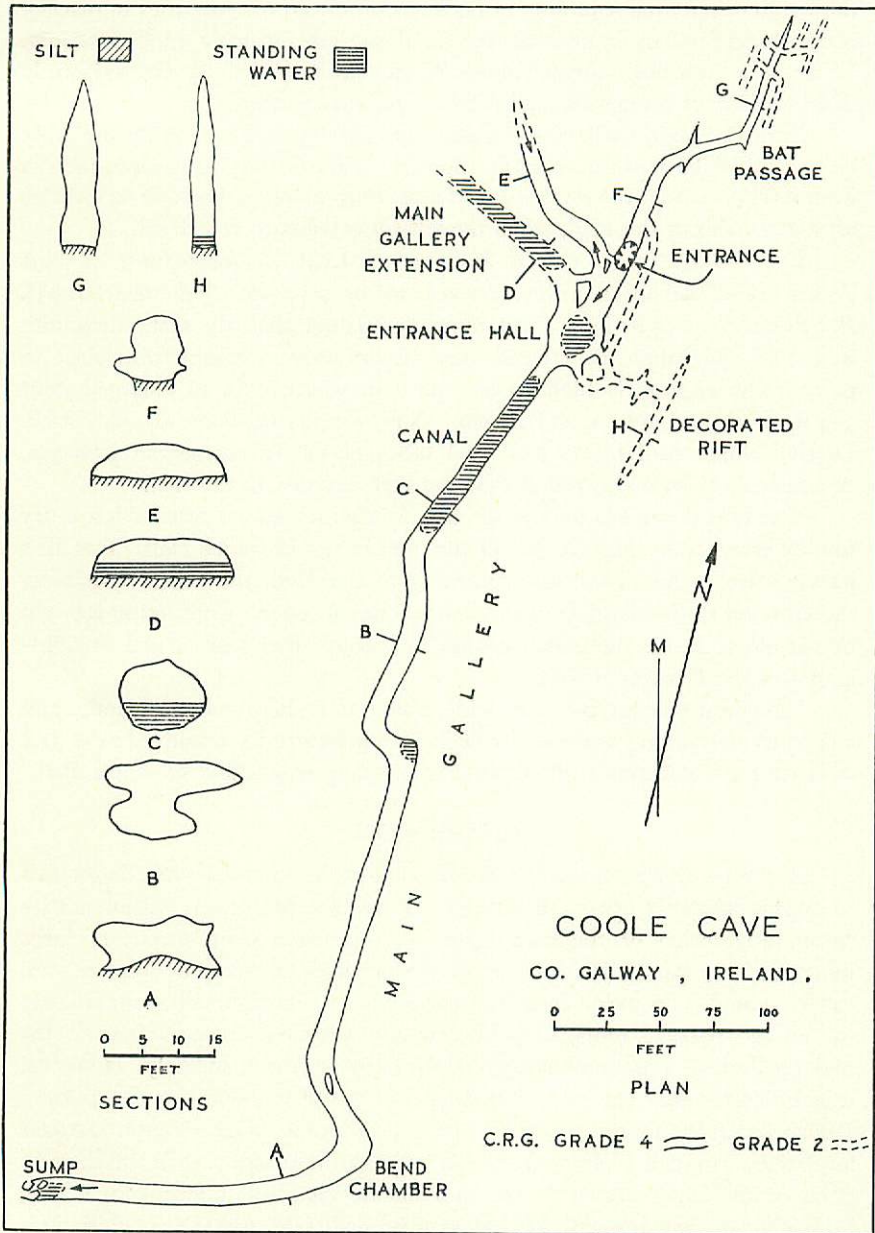


Fig. 70

The main Gallery and the Extension possess features suggestive of phreatic conditions: generally circular or ovoid passage cross-sections (although differential solubility of beds has produced irregularities in places), large though partly mud-obscured scallops, and stumpy roof pendants. Everything indicates a former phase, when solutional activity was uniformly distributed over roof, walls and floor of the passageways.

Between Main Gallery Extension and Bat Passage is a route probably originally similar in dimensions and form to Main Gallery Extension, though a silt infill gives to it the impression of a bedding-plane passage. It terminates after 120 ft. from the Hall, when the silt fill extends to roof level.

Bat Passage is so named because of J.C.C.'s observation of bats (lesser horseshoe) there on his first visit to the cave site (September, 1963). Bat Passage is 143 ft. long. It is more undulatory than the rest, since both solid roof and rubble floor levels vary discordantly in height from place to place. The passage is highest near its end, where it is an enlarged joint 3-4 ft. wide and up to 20 ft. high. Nowhere is the floor of solid rock. Detrital slopes lead off to low level tubes or partly submerged passages. A higher level joint-controlled tube network extends to the east.

The best decorated part of the cave is a joint passage reached via a dry muddy crawl from the east side of the pool in the Entrance Hall. Two link passages leave this crawl, one returning to the Hall, the other by-passing the entrance and emerging in the floor of Bat Passage. Continuing straight on for about 40 ft., the crawl finishes 6 ft. above the floor of and at right-angles to the Decorated Rift.

This joint passage is 2-3 ft. wide, about 20 ft. high and 60 ft. long, and has pools of standing water on its floor. No helictites were noticed here, but stalactites and curtains with serrated edges hang from the roof and walls.

DISCUSSION

The total system of Coole Cave thus far explored and surveyed amounts to approximately 1,150 ft. of passage. From the preferred, almost north-south, orientation of the main galleries, and from observations of large joints running parallel with many of the passages, an obvious joint control can be noted. To judge from the nature of erosional details—particularly the arched passage roofs, and circular and elliptical cross-sections of the major galleries—a predominantly phreatic origin seems most likely. However, it is difficult to date the cave. The height of the system above the Gort river indicates that the formation of the cave was at a time when the ground-water level was not much higher (plus 10-20 ft.) than it is today. Silt infillings in parts of the cave, similar to the deposits in Vigo and Glencurran Caves, probably date from immediately before or immediately after the last glaciation. There are no possibilities of flooding with silt-laden water since then. It is

probable that Coole Cave was partly occupied by the Gort river for a short period in post-glacial time, as the Main Gallery and its extension are partly washed clear of infill. Yet it is impossible to account for the cave's development entirely since the last glaciation, as this does not allow adequate time for the cave's formation, infilling, partial clearing and later abandonment. The cave therefore dates from at least the last interglacial. It is almost certainly part of the subterranean course of the interglacial Gort river.

It is enlightening to observe the present, active carbonate deposition within the cave; particularly since the passages are no more than 25 ft. below the surface. Deposition is a consequence of carbon-dioxide loss, when percolating water adjusts to normal atmospheric composition after emerging into the cave passage (Holland *et al.*, 1964). It can therefore be deduced from the evidence of flowstone deposits that even at the shallow depth of less than 25 ft. below the surface, percolating water can be supersaturated with respect to normal atmospheric carbon-dioxide partial pressure. In other words, the water (say at 10° C.) must have dissolved at least 75 p.p.m. CaCO₃ within 25 ft. of vertical penetration (and an unknown amount of lateral movement). Actual measurements of percolation water dripping into the cave (*Table 1*) showed total hardness to be about 260 p.p.m., which is quite high. Two samples from the Canal, a large stagnant pool, had a mean total hardness of 247 p.p.m. Since the Canal is fed entirely from percolation water, its relatively low hardness is almost certainly a result of carbonate deposition.

Table 1.—COOLE CAVE WATER HARDNESS

| SAMPLE POINT | DATE | TIME | °C. | pH | CaCO ₃ (p.p.m.) | CaCO ₃ +MgCO ₃ (p.p.m.) |
|-------------------------------------|---------|-------|------|-----|-------------------------------|--|
| Roof drip immediately N. of Canal | 6.11.64 | 15.50 | 11 | — | 280 | 290 |
| | 6.11.64 | 15.50 | 11 | — | 314 | 328 |
| | 28.2.65 | 11.30 | 10 | 8.0 | — | 237 |
| Roof drip about 100 ft. S. of Canal | 28.2.65 | 11.30 | 10.5 | 7.7 | 198 | 236 |
| | 28.2.65 | 11.30 | 10.5 | 7.6 | — | 216 |
| | 28.2.65 | 11.30 | 10.5 | 7.7 | 242 | 257 |
| Canal | 6.11.64 | 14.30 | 11.5 | — | 256 | 264 |
| | 28.2.65 | 11.30 | 10.0 | 7.8 | — | 230 |

Less than a quarter of a mile north of the cave, water in the Gort river was found to have an average total hardness (from 11 measurements at Poldeelin resurgence) of only 87 p.p.m. Yet two samples from Coole Lodge pump— $\frac{1}{2}$ mile south of the cave—showed a total hardness of 440 p.p.m. Thirty other samples of ground-water in the district had a mean total hardness

of 339 p.p.m. (Williams, 1964). Additional samples of percolation water from the uppermost 100 ft. of limestone have been taken in N.W. Clare by Smith and Nicholson (1964). Most of their hardness figures were in the range of 100–300 p.p.m. CaCO_3 .

Although analyses of percolation water in the Clare–Galway area are few, the samples from Coole Cave show that about 260 p.p.m. total hardness can sometimes be acquired in the first 25 ft. of vertical infiltration. Since ground-water in the area has been found to average 339 p.p.m. total hardness, it can be seen that more than 75 per cent of the total corrosion by percolation water may sometimes be accomplished in the top 25 ft. of limestone. Here it is of interest to note that, in Slovenia, Gams (1962) considers the bulk of corrosion in the limestones to occur in the uppermost 10 m. of the percolation zone.

SURVEY

The cave was explored and surveyed, February 9th, 1964, by J. C. Coleman, N. Mathys, C. Reynolds and P. Williams of the Speleological Society of Ireland. The survey was made with a prismatic compass and marked measuring line which was checked against a linen surveying tape. C.R.G. grade 3–4 is claimed for the survey, except Main Gallery Extension and Decorated Rift sections, where grade 2 surveys were carried out.

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