

DALESMAN POCKET BOOKS

The Falls and Caves of Ingleton

by

John L. Hamer



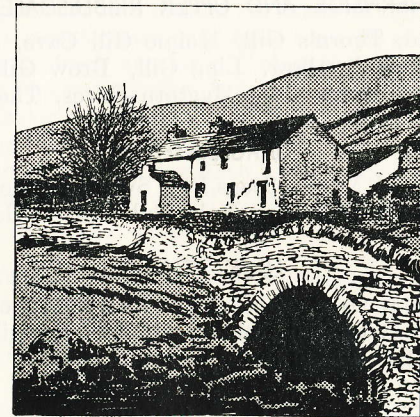
ONE SHILLING

DALESMAN POCKET BOOKS—2

**The Falls
and
Caves of Ingleton**

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Foreword.

INGLEBOROUGH, Whernside, Penyghent and Gragareth Fells are geologically similar in structure with summits composed of impervious rock, mostly Millstone Grit, resting on a mass of Carboniferous Limestone (600 feet thick) which in turn lies unconformably on the Ancient Rocks, the latter being exposed in the Ingleton Glens, especially below Thornton Force. Because of this structure, with the additional complication of extensive faulting, streams from the hills flowing down over the impervious rock and coming against permeable limestone, have dissolved some of the lime, in the course of centuries enlarging existing joints and cracks in the limestone, thus producing those horizontal underground passages and vertical cavities we know as caves and potholes.

The formation of caves and potholes, stalactites and stalagmites is a process to be measured in terms of centuries; it was going on in prehistoric times and it is going on now. Streams still find new passages in the limestone and desert their old waterways. Heavy floods reveal new potholes. Stalactites lengthen and swell, and cracks and joints in the rock widen and become deeper.

Nature never rests, and her work through the centuries has made the neighbourhood of Ingleton one gigantic honeycomb of underground chambers.

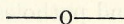
It is the purpose of this little book not so much to provide a ready-made description of them for the visitor to take away, as to whet his appetite for personal exploration of such of them as are safe for amateurs. In recent years they have received much attention: indeed an entirely fresh species of "ologist" has been produced by them. He is the speleologist, from the Greek word for cave. But your true speleologist has come by his knowledge in the "hard way." He knows the risks, the dangers of these caves and how to counter them. The amateur will do well to "watch his step," and if bent on further exploration to join one of the many organised clubs.

* * * *

Since the first edition of this booklet blasting operations in Ingleton Quarry have revealed the presence of a cave high up in the rock face. It is reached by ascending a narrow inclined limestone ledge from the level ground below the quarry cliff. The opening is minute and at once drops vertically to a depth of about 50 feet. Half-way down a ledge juts out on the right from which a passage ascends upstream for a short distance. From the bottom of the shaft the course of the stream can be followed along a twisting and sharply descending cave passage, where there is a confusion of stones and boulders and the floor is very muddy. After some 70 yards the cavern becomes blocked with debris, but the stream obviously reaches the River Doe through the choke.

In its entirety, the pothole at times seems to carry a considerable amount of water as the walls and roof show marked signs of heavy flooding. It has some beautiful stalactites and in places the roof is very lofty. From my observation, the pothole seems to follow a prolonged joint in the limestone: owing to continual blasting there appears to be considerable danger of falling rock.

There have been discoveries since in the Gaping Gill area and above Malham Cove. It is probable that as a result of these hazardous explorations by various skilled pothole enthusiasts more new entry passages may be opened up into the Gaping Gill system and that a way may eventually be found into a possible large cavern behind the great cliff of Malham Cove.



Chapter I The Town

INGLETON, the fire or beacon town as its name implies, sprawls at the foot of Ingleborough, which towers in rugged grandeur to a height of 2373 feet. The average altitude of the town is 500 feet; a varied accumulation of houses and cottages, both old and new, which like Topsy "just grewed," it lies for the most part on the east bank of the River Greta. Two mountain becks surge down the rugged fells from the north: one, the Twiss or Thornton Beck, comes from Kingsdale, and the larger stream, the Doe or Dale Beck, flows from Whernside skirting Chapel-le-dale, a quiet little hamlet, 4 miles from Ingleton. The two streams unite in the town close to the railway viaduct. From the point of "the meeting of the waters," a turbulent meeting in times of flood, the new-born river is called Greta and eventually joins the Lune to reach the sea beyond Lancaster.

The Parish Church of St. Mary stands upon an old site overlooking the Doe, a little way above "the meeting of the waters." A church has stood here since Norman times, but the present nave dates only from 1887, though the tower is 13th century. Possibly the nature of the site has been responsible for the many rebuildings which have taken place, for the bank is glacial drift, and there is evidence that more than one building has sunk slightly and become unsafe. Indeed, traces of this trouble can be seen in the present nave in the south aisle.

The sole remaining link with Norman times now is the very fine font. A curious story attaches to this font. In Commonwealth times the doctrine of baptism was repudiated, and gangs of undisciplined hooligans roamed the country smashing fonts and destroying windows

and statuary. Standing as the church does on a steep bank, it was much less trouble to eject the font through the West Door than to smash it, and this was done. The font lay in the water until the beginning of the 19th century, when it was rescued and restored to use.

The little Church of St. Oswald at Thornton-in-Lonsdale, near Ingleton, also dates back to early Norman times. The old church was burnt to the ground in 1933, but, fortunately, the Norman tower and belfry escaped damage and are excellently preserved and co-ordinated in the present building, which was constructed two years after the fire. Adjoining the churchyard are the Old Stocks which were in use as recently as one hundred years ago.

Towards Clapham beside the main road the remains of a colliery working give evidence of the presence of a rich coal seam, which was worked for many years until lack of capital forced the mine to close. The miners' dwellings, built mostly of red brick, are situated opposite in a semi-circular little group known as the New Village.

Chapter II The Falls Walk

THIS glorious walk covers a distance of nearly four miles of most varied river and rock scenery. The two becks, previously mentioned, converge in deep ravines barely one mile apart at the widest point, and it is in these glens that nature has run wild to produce in small compass an amazing variety of scenic wonders. There are good paths and the whole trip will take about three hours. Nowhere else in the British Isles is there to be found such scenery as this in so compact a space.

From Ingleton Church descend the hill, cross the two becks (Doe and Twiss) and the entrance to the Walk is on the right. The path passes through an archway into the first glade with the stream on the right. A gate leads into the "Creeping Steads," where, before the development of the Walk, it started literally with a creep beneath low branches at the edge of the stream. The valley soon contracts and a staircase takes the path over a rocky spur of limestone into Swilla Glen with towering cliffs on each side. At the top of the stairway the rocks dip into the river bed at a steep angle and the bedding and jointing of the Carboniferous Limestone can clearly be seen. Here, clearly displayed, is part of the famous Craven Fault, where the limestone dips below the rocks of the Ingleton plain.

Proceeding along Swilla Glen and crossing the stream by a wooden bridge the waters become more rapid as the Glen of Pecca is reached and a second bridge spans the ravine at a point where an outcrop of slate towers above it. Here, the First Pecca Falls pour down the rocks in a shower of spray. The path now climbs up the escarpment by many steps, winding and twisting by the river margin, and Middle Pecca, Pecca Twin and Holly Bush Spout are viewed in close

sequence. The path ascends to the open moor and a glorious panorama is revealed. On rounding a natural amphitheatre, with the river racing below, the most magnificent waterfall of all is seen—Thornton Force, the water cascading down a sheer cliff, 46 feet in height, into a seething pool below. The rock at the top of the fall is limestone, eroded and fissured by water action and this lies unconformably on Pre-Cambrian Rocks. The cliff is overhanging and it is possible to walk behind the waterfall and stand behind a curtain of glittering spray. A subsidiary outlet from the main waterfall debouches from the rock on the left, and is known as Little Thornton Force.

The path again ascends, climbing to the top of the fall, where the river splashes along serrated limestone ridges and the scene is indescribably lovely. The gorge above Thornton Force is called Raven Ray; it is possible to ascend this glen but progress is difficult and the better route keeps to the left and drops down to the stream again towards Kingsdale. From the bridge which crosses the beck there are glorious views of Gragareth and Hunt's Cross. Ascending the moors from the bridge towards Twistleton Scars a gate gives on to a grass-grown track coming from Kingsdale and skirting the base of the scar. Turning right and proceeding along the track, Scar End Farm is soon reached and close to it Twistleton Farm. From here the summit of the Scar is easily attained by a green path, and the view from the weather-beaten rocks is again extensive.

From the farms there is a choice of two routes—either that road which branches to the right between them leading down the hill separating the glens and proceeding direct to Ingleton, or straight on to the next valley. If the former route is chosen Twistleton "Nunnery" will be seen lying on the right-hand side of the road and looking pathetically like a ruined farmhouse. This place has an interesting history, but unfortunately little now remains of the original nunnery, although some of the old windows can be seen, one being of Saxon design. There have been several searches for legendary treasure hidden in the vicinity of the building and during one raid part of an ancient chimney was destroyed. A stone which once stood above the doorway of the "Nunnery" has been preserved by the owner of the property and this bears the date 1667. This is believed to be of later date than the rest of the structure.

The other route crosses the narrow metalled road which leads north to Chapel-le-dale and south to Ingleton, joining the track just mentioned lower down the hill.

Beazley Farm, the next house, lies amongst trees, and close to it are Beazley Falls a series of cascades formed by the Doe in its headlong dash to the gorges. Near the Farm, stepping stones allow the visitor to cross the river above the falls and proceed over the meadows to White Scar Caves, situated beside the Ingleton-Hawes road.

The ravine fashioned by the Doe is grim and savage, and although not possessing many waterfalls has deep gorges and pools. The path is sometimes uneven and great prostrate slabs of slate strew the valley. Baxenghyll Gorge, first reached, pierces the rock to a prodigious depth and is spanned by a bridge which gives an awe-inspiring view of the swirling cataclysm below. The continuation of the canyon down-stream is called Yew Tree Gorge, where the turbulent river writhes viciously between pointed minatory rocks.

Eventually, the gorge becomes a glen and savagery gives place to serenity as the path winds through wooded glades, until with a mighty roar the water plunges down Snow Falls. The remainder of the walk follows the stream along a more gently widening valley and soon the path skirts a disused slate quarry. About $\frac{1}{4}$ mile from here a puny stream, the Skirwith Beck, comes in from the left to join the Doe, falling 20 feet to make a splendid waterfall known as Cat Leap which is seen to especial advantage after heavy rain.

Chapter III

Some Small Caves and a Great One

ON the Hawes road and almost opposite Storrs Hall a pyramid-shaped mound rises from the inclined limestone escarpment. In a gully near this mound an old doorway leads into Storrs Common Cave. Once a cave of high merit and of danger, the deeper portion is now walled up. After heavy rain the sound of water can be heard from beyond this artificial barrier as a stream drops into a hidden labyrinth below.

By following the road towards Hawes for about half a mile the visitor will see a farm house lying amongst trees on the left hand side. This is Skirwith Farm. A little way up the scar in the field opposite there is a disused quarry with a few trees clinging to its scarred walls. From the quarry base a minor rill, the Skirwith Beck, emerges from a low cave mouth, courses down the field, flows through the farm grounds and joins the Doe via Cat Leap Falls. It is possible, although uncomfortable, to enter this cave and to explore the lofty chambers which lie beyond the contracted entrance passage. Above the quarry on the surface towards the higher slopes of Ingleborough a sink hole communicates with this cave and from this sink the roar of water in the cavern below can sometimes be heard. The name usually applied to this system is Skirwith Quarry Caves.

Nearly one mile from Skirwith Farm and immediately on the roadside, the celebrated White Scar Caves are found, discovered by a Cambridge undergraduate in 1923, and since opened up and illuminated throughout by electricity. There is a charge for admission, but this is well worth while, for the visitor can penetrate almost half a mile into the heart of Ingleborough mountain in comfort. There is an excellent cafe near the cave entrance.

Chapter IV

Chapel-le-dale

THE Hill Inn, four miles from Ingleton on the Hawes road and two and a half miles from White Scar Caves, is a well-known centre for the many caves and the alpine scenery of this quiet hamlet, couched beneath the northern flank of Ingleborough. From the Inn a path leads up the slopes of Ingleborough along a dry valley to Great Douk Cave, which lies at the bottom of a huge pothole, 60 feet deep and surrounded by a wall. A zig zag path winds down the steep slopes to the bottom. The side nearest to Ingleborough forms a sheer cliff halfway down which a long fissure allows a considerable stream to emerge. The stream after coursing along the bottom for several yards sinks amongst chock stones and is lost to sight. The cave can be entered by two routes; above the waterfall, and reached by a narrow ledge which crosses above the lower mouth, the visitor can enter the cave dryshod through an "eyehole," but this way is dangerous; the alternative route is up the waterfall itself through the main mouth of the cave, where there is nearly always a superabundance of water and the rock is very slippery.

For some yards upstream the cave floor is packed with boulders and flat stones. About 50 yards from the entrance daylight is encountered, coming from a narrow tree-girt shaft which communicates with the main cavern from the limestone terraces 40 feet above. This is Little Douk Hole.

In the immediate neighbourhood of Little Douk Hole are several other caves very near the surface. The first is reached by striking S.W. from Little Douk towards the central massif of Ingleborough. Hardrawkin, or Far Douk Cave as it is called, lies close to the furthest wall at the bottom of a small shakehole. Both upstream and downstream this cave can be followed some distance with risk of a wetting. Similar openings in the moor are found close by in the same allotment. These are known as the High Douk Holes.

From the end of the field a gate gives on to the open moorland and a slight descent should now be made towards an outcrop of limestone lying towards the central ridge which joins Ingleborough to Park Fell. The rocks are grotesquely fluted and fissured like the terraces above Douk, although not on so vast a scale. A sheep pen edges the limestone pavement and a stream enters a bedding cave too low to permit investigation. The second stream drops into a funnel-shaped rift and after a short journey through a twisting cave passage disappears beyond a basin-like rib of rock to sink immediately in its own bed. This passage is easily followed from the mouth to the point of the disappearance of the stream and breaks through to the surface in several places. Some of these communicating orifices

are deep and dangerous, and care should be taken in walking over the sometimes slippery surface rocks.

Braithwaite Wife Shakehole, a deep grass-grown depression with a stony bottom, lies in the next allotment near the wall running parallel to the ridge and S.S.W. of Douk Cave. The stones in the bottom of the hole close a passage into Sunset Hole Caves, the true entrance to which is found above Braithwaite Wife Shakehole higher up the fellside and in the next allotment. Sunset Hole is a cave of engulfment and usually swallows a considerable stream. The passage, entered through a manhole, is easily followed for a good distance and there are lateral passages. Exploration should not be undertaken alone or without proper tackle, as the interior is dangerous and there are deep ladder pitches.

The next allotment holds fresh surprise. Just beyond the dividing wall which runs down from Ingleborough is the great chasm of Mere Gill, which drops over 400 feet into the limestone in a series of gigantic subterranean steps. It is a narrow surface cavity with mountain ash clinging to its edges and it engulfs a stream called Mere Gill. It contains a dark forbidding lake of great depth, which gives this frightful rift its name.

* * *

On the other side of the Hawes road on the slopes of Whernside a well marked track leads from below the Hill Inn to a wooded valley, the one-time bed of the Doe, which now takes a subterranean course from below Gatekirk Cave to reappear after brief appearances at Weathercote Cave and Hurtle Pot, at God's Bridge below Chapel-le-dale Church. In the centre of this valley just before Gatekirk Cave is a natural phenomenon known as Hawes Gill Wheel, where several small streams pour from the rock at the top of a depression and cascade to the bottom immediately to be swallowed up again. Higher up the valley the Doe pours out of the imposing mouth of Gatekirk Cave. The cave is entered on the right bank of the river and the roof is low for several yards; then the cave widens and the roof towers above with stalactites of varying sizes hanging from it.

Behind Bruntscar Farm, half-a-mile west of Gatekirk Gill, is Bruntscar Cave, a fine "cave of debouchure" tunnelling into Whernside for almost half-a-mile before contracting to a mere rift. Two waterfalls must be climbed in the exploration of this cave. Proceeding along the foot of the scars from Bruntscar towards the little hamlet of Winterscales the visitor will soon reach Ivescar Farm. Immediately behind the farm a stream issues from a tunnel-like cave, which soon becomes narrow and choked with debris. These are the Boggart Holes.

On the top of the scar between Ivescar and Bruntscar there is

a farmhouse called Scar Top. Near this at the bottom of a shake-hole is Homeshaw Cave, which can be explored both up-stream and down-stream for a distance of 20 to 30 yards in dry weather. Browside Cave, nearby, is a fine cave of exit similar to Homeshaw but much richer in calcareous formations and very contracted in parts. It has a most unpromising entrance.

The tiny Church of St. Leonard, seating fewer than 100 persons, lies amongst trees beside the Doe, one mile from Gatekirk, and at the foot of the rise to the Hill Inn. Originally with Ingleton Church a chapel-of-ease to the mother parish of Bentham, the church was known as Wisedale Chapel or Ingleton Fells Chapel.

A little way behind the church lies Hurtle Pot, a black ugly pot-hole 70 feet in depth. At the bottom the subterranean River Doe swirls and eddies with a dull gutting sound which was ascribed in more superstitious days to the Hurtle Pot "Boggart." Further up the valley, about 40 yards from Hurtle Pot and at the foot of a cliff, a narrow oval rift again communicates with the river. Here is Jingle or Gingle Hole, 40 feet deep. It is so named, like its neighbour in Kingsdale, on account of the low reverberating noise produced in its depth when a stone is cast down.

Weathercote House, in a beautiful setting, lies above Jingle Hole and near the awe-inspiring Weathercote Cave, which is surrounded by a wall and clothed with trees and vegetation. Permission to view the cave is obtained on application at Weathercote House. The stream pours down the funnel-shaped hole in a magnificent waterfall, only to go underground again at once. Weathercote is misnamed for it is not so much a cave as a pothole. Certainly there is a small cave at the bottom, but this is contracted and does not allow exploration.

Chapter V Ingleborough

THE ascent of Ingleborough is best made from Storrs Hall above Ingleton. From the common opposite the Hall there is a track which leads to Crina Bottom House. From Crina Bottom, a little house clinging to the hillside under rugged scars, there is a good path to the summit along the valley of Jenkin Beck and finally up natural gigantic steps of the Yoredale sandstone and limestone and millstone grit rocks to the flat top of Ingleborough. The distance from Ingleton to the summit cairn is almost 4 miles. The mountain can also be ascended from Clapham through the Ingleborough Estate, past Clapham Cave and along the ridge from Gaping Gill Hole. The third route is from Chapel-le-dale by way of Douk Caves and up the connecting spur between Ingleborough proper and Park Fell.

Ingleborough summit is perfectly flat, composed of coarse millstone

grit and is nearly one mile in circumference. The name signifies that it served as an important beacon and there is no doubt that Ingleborough was once used as a military post of consequence.

Close to Crina Bottom is a source of Jenkin Beck which starts its career at the bottom of a small pothole called Rantry Hole. In an erratic course now above, now below ground the little beck tumbles down towards Ingleton and soon drops in a fine waterfall (Easegill Force), passes underneath the old Ingleton—Clapham road near Yarlsber Farm and joins the Greta beyond the New Village. The Force lies amongst trees, is spanned by a natural stone bridge and is reached most conveniently from Yarlsber Farm.

About 700 yards above Crina Bottom slightly to the left of the path up Ingleborough and about $\frac{3}{4}$ mile from the summit close to some shooting butts are found a group of shakeholes formed by the action of bog rivulets. The deepest of these has grass-grown sides and is of conical shape.

Another group of deeper potholes gaping in the moor, lies some 80 yards to the east and less than $\frac{1}{4}$ mile to the N.N.E. of Crina Bottom and quite near to the Ingleborough path. An imaginary line from the centre of the Ingleborough plateau extended to reach Crina Bottom House will almost pass over the deepest of these holes. The first one is almost perfectly symmetrical with rocky, rounded walls, clothed luxuriantly with ferns and vegetation—the pothole dips vertically for nearly 40 feet. The next obvious shakehole, again towards the east, looks unpromising and forms a double hole bridged by a narrow weathered rib of limestone. The visitor should take care when walking on the stones by the natural bridge, however, for in a position almost hidden from sight by large stones a hideous little rift drops vertically to a depth of over 40 feet.

Following the road from Yarlsber Farm towards Clapham the hamlet of Newby Cote will be reached after a walk of $3\frac{1}{2}$ miles. From here the moor rises sharply towards Ingleborough and Newby Moss is gained by following an ancient stream bed dotted with curious circular depressions. This is Know Gap Sike, which is artificially controlled and only carries water after heavy rain or snow. Striking left from the Sike hollow at a point about one mile from Newby Cote a scramble through bog and marsh brings the visitor to a boulder cairn on Newby Moss summit from which the first big spur of Ingleborough can be seen rising from the wild moorland. About 200 yards from this cairn is the Newby Moss pothole region.

A tree clings precariously to the side of a narrow zig-zag fissure some three feet wide, twenty feet long and spanned by natural bridges of weathered limestone. This is the deepest of the Pillar Pots piercing the moor to a depth of 160 feet. The deepest hole of all in this group, however, lies some 130 yards west from here and descends to the astonishing depth of almost 350 feet. This is Long Kin Hole

West and it is a dry hole formed by the enlarging by water of a fault in the limestone.

Nearby and N.N.W. of the Pillar Pots are situated Moss Shaken Hole and Boggart's Roaring Hole, neither as deep as the former but presenting interesting geological features. Boggart's Roaring Hole is over 100 feet deep and there is a smooth slab of rock on one side of the rift down which a stream roars in wet weather to sink through stones at the bottom. A peculiar vibrating sound rising in crescendo emanates from time to time from this hole, and is probably caused by water seeping through the rocks in the lower limestone strata. This is locally called the "Boggart" or the "Fairy Churn" and in folk-legend is attributed to "little people" working grimly in their mountain workshops. Sound-phenomena are common in Yorkshire potholes and have given rise in former times to many legends of this kind.

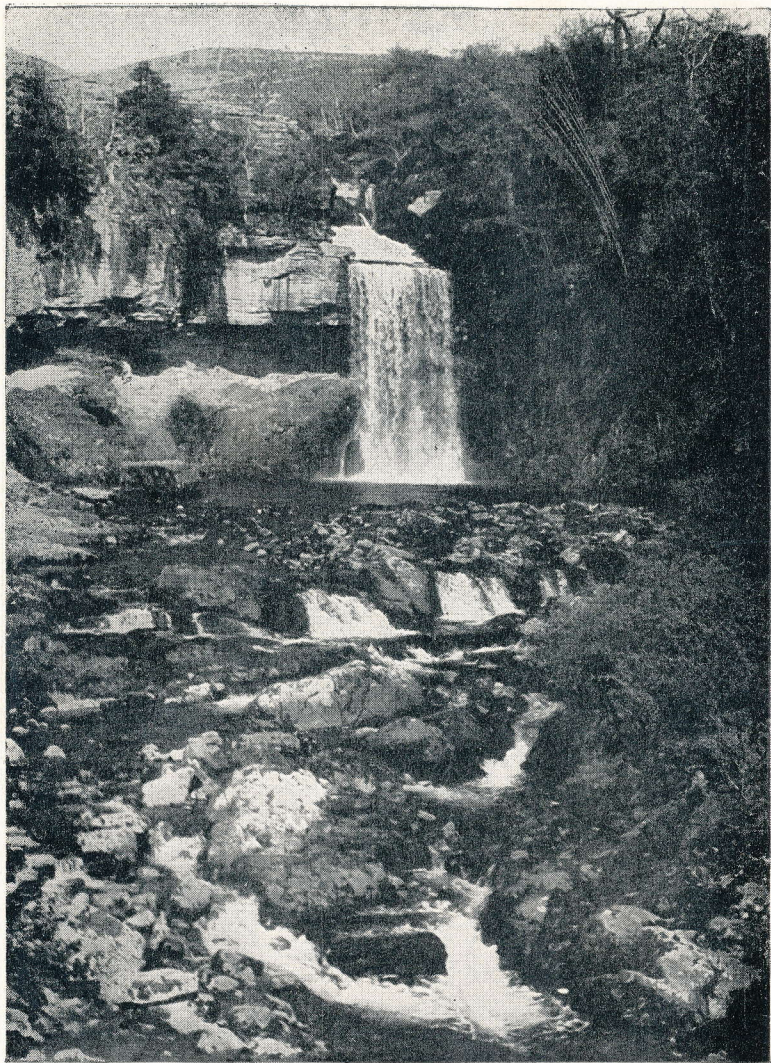
Retracing steps to the Sike and heading in an easterly direction it is a 30 minutes walk to the celebrated Gaping Gill Hole. On the way many "swallow holes" are passed hinting at the presence of cave systems below, and from time to time a minor stream appears on the surface to be swallowed up again after a few yards. Gaping Gill Hole lurks at the lowest portion of a natural basin sunk into the moor, down which cascades Fell Beck draining the slopes of Ingleborough. This is the grandest and most spacious pothole in the British Isles, although the narrow surface cleft gives no hint of the colossal cathedral-like caverns which exist below. The primary shaft drops 365 feet into the main chamber, which glitters with formations of calcite. Long and dangerous descending cave passages extend from the main cavern in at least three directions, E., S.E., and S.W., and not all of these are yet completely explored. The greatest depth so far reached in this system is about 450 feet. The waters from Gaping Gill reappear near the magnificent mouth of Clapham Cave, one mile lower down the moor in the Ingleborough Estate. Just above Clapham Cave and between it and Gaping Gill there is a dry valley hemmed in by beetling cliffs. This is Trow Gill, and it is possible that it was once a huge cavern, the roof of which collapsed leaving an open canyon, through which the visitor may climb a rocky staircase to Gaping Gill. Clapham Cave is a splendid stalactite cave which can be followed for a long way in comparative comfort by the light of candles. It is advisable, however, to inquire at Clapham village before proceeding to the cave to confirm the presence of a guide.

About one mile from Gaping Gill to the north east and in the next allotment are several deep holes of merit. Marble Pot lies near the dividing wall nearest the Gaping Gill allotment, Near Marble Pot towards the centre of the allotment are the twin abysses of Long Kin Holes East, penetrating the moor vertically to a great depth. The deeper hole is circular in shape and bounded by a crumbling wall, while its partner is long and narrow. Due north of Long Kin Holes



Ingleton

C. Harrington



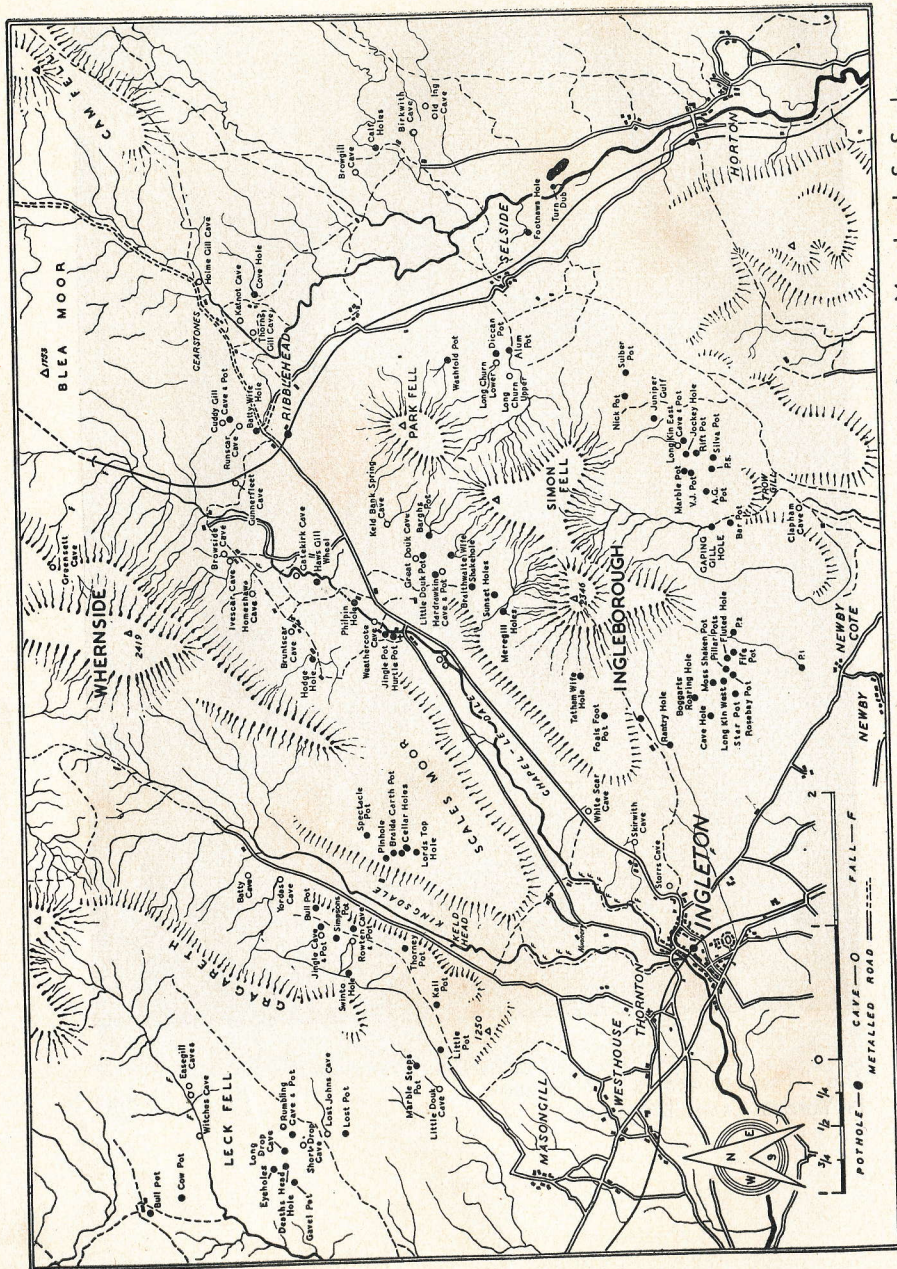
Thornton Force

C. Harrington



The "Map of Wales" formation
in Yordas Cave, Kingsdale

H. W. Rhodes



Sketch Map by J. S. Swale

in a hollow is Long Kin Cave which engulfs a fair-sized stream. Between this cave and Marble Pot and on the ridge intervening are two narrow rifts produced by faulting which pierce the moor for great depths. These are called Jockey Hole and Rift Pot.

Close to the opposite wall from Gaping Gill allotment and in the same field as Long Kin Holes East, lying to the N.N.E. of the latter, an awful rift gapes in the moor, descending to a depth of over 300 feet. This is Juniper Gulf which is very, very wet and extremely dangerous. The wall passing near the gulf strikes along the limestone escarpment from north to south and a gate gives passage into the next allotment. In this allotment nearly one mile from the gate near a Shooting Box and due E.N.E. from Juniper Gulf the sike called Fell Close loses itself amongst the stones. Near this spot is a slit in the earth which can be entered but it is dangerous as the cave passage has a steep downward trend and is rather wet. Nick Pot, as this cave is called, has a total depth of over 260 feet.

Lower down the slope and almost in line with Nick Pot a wall surrounds a small oval pothole 50 feet deep, the sides of which are richly clothed with ferns and other vegetation. This is Sulber Pot, from which there is an extensive view of Penyghent across the Ribble Valley, Cam Fell to the N.E., and the Settle hills to the S.E.

From this vantage point looking almost due north a clump of trees will be observed standing alone on the moor some one and a half miles distant beyond a limestone plateau. Among these trees lies one of the finest Yorkshire potholes—Alum Pot, a large oval-shaped abyss of great depth, a larger edition, in fact, of Sulber Pot. The Alum Pot Beck cascades down the pot in one magnificent plunge, and a further stream is seen to enter the chasm some 60 feet below the gaping mouth. Alum Pot is more than 300 feet deep and can only be descended with the aid of proper equipment. It can be descended either through the main shaft, which is a hazardous venture, or through Long Churn Caves, which lie to the north-west and communicate directly with the main gulf. Long Churn Caves pierce the naked limestone like lattice-work and can be explored for a short distance by the ordinary rambler. Care is necessary, however, as they are caves of engulfment and unwariness might cause mishap.

About half-a-mile north of Long Churn Caves in the direction of Ribblehead and at the foot of Park Fell a stream (Washfold Spring) runs below ground close to a sheepfold. Some distance below the point where the stream enters the limestone a small crevice penetrates to the water channel about 15 feet below the surface. This is the unpromising and uninviting entrance to a deep chasm called Washfold Pothole. It is extremely dangerous and difficult and was first explored in its entirety in 1934 after a long and hazardous siege, when a depth of over 400 feet was reached. The cave is very contracted in most portions and is excessively wet throughout. The

visitor must be content to view this cave from the safety of the surface, for it presents great problems even to the experienced pot-holer and is definitely not in the province of amateurs.

Dicken Pot Cave lies nearly 200 yards W.N.W. of Long Churn Caves in a hollow at the other side of a jagged spur of limestone, and a wall running along the top of the limestone has to be climbed. A stream courses near the surface in the hollow, bridged for nearly 80 yards by narrow ribs of rock. Finally, this stream leaps into a cave of engulfment and falls in a series of cascades to lower regions.

There appears to be some difference of opinion as to which pothole in the Alum Pot area is Dicken Cave and which is Upper Long Churn Cave. I believe it is now well established that Dicken Cave is the one next to Long Churn proper and lying just north of Alum Pot, whilst the one I have labelled as Dicken Cave is in reality called Upper Long Churn. Early books on the district definitely name this latter as Dicken Pot Cave, however.

It is a point worthy of note that the waters from Alum Pot are seen again in Footnaws Hole between the Ribble and Selside before flowing *underneath* the Ribble finally to join it on the other side by way of a murky pool called Turn Dub. This phenomenon is explained by the fact that here the Ribble runs over glacial drift; originally the waters from Alum Pot emptied themselves directly into the river when the valley was much deeper, but, when this was filled during the Ice Age with a drift of boulder clay, they had to burst a way through under the great pressure of water in Alum Pot.

Chapter VI

Whernside and Upper Ribblesdale

WHERNSIDE (2414 feet), the highest mountain in these parts, is usually ascended from Ribblehead, $5\frac{1}{2}$ miles from Ingleton and $1\frac{3}{4}$ miles from the Hill Inn. The summit can also be reached by taking the road from Ingleton to Scar End Farm, scaling Twistleton Scars and crossing desolate Scales Moor. This way is long and tedious, however, and the first route is recommended. It is possible to get a bus from Ingleton to Ribblehead (Station Inn) on certain days of the week, and one of these days should be chosen for the ascent. Whernside has a long cat-like contour lacking the bold ruggedness of Ingleborough, but it is a beautiful mountain, and from it the surrounding views are magnificent. The Whernside Tarns lie on peat beds near to the 2050 feet contour line on the northern slopes nearly $1\frac{1}{2}$ miles from the summit cairn.

The railway viaduct which carries the main line from London to Carlisle across the deep valley between Ingleborough and Whernside is 1328 feet long and is composed of 24 arches. The piers are sunk

deeply into the moor, resting on concrete which is laid upon solid rock. For very many years there was a large camp of labourers who struggled to find a firm foundation for the massive arches, and to drive a tunnel through the rising moor to bring the line to Dentdale. At one time, during an epidemic of smallpox, burials in the little churchyard at Chapel-le-dale reached twelve a day. When finally the task was done the Railway Company erected a memorial in the church to those whose lives had been lost, while the lychgate, also erected by the Company, recalls the grim price paid for the conquest of nature embodied in these massive works.

About half a mile from the Station Inn and N.N.E. of it, near a raised limestone plateau on the open moorland on the left-hand side of the road, a busy stream has hollowed out a series of fine caves. On the Ordnance Map the upper cave lies at a point directly above "Runscar Scar" where the water sinks into an excellent cave which can be explored for a good distance, though at the risk of a considerable wetting. Near this cave, Rainscar or Runscar Cave as it is called, and marked by a stunted rowan tree, there is a small shakehole, almost 35 feet in depth. This is usually a dry hole and there is nothing to promise further cave passages at the bottom. This is known as Cuddy Gill Pot. From the base of the limestone plateau almost in a line from this pot the stream emerges from a lofty cave only to disappear almost immediately into a cave of engulfment. Both upstream and downstream these passages can be explored for several yards—the lower cave finally becoming blocked. Further down the moor the stream once more shows itself in another double cave, and both upper and lower caves are accessible for about 20 yards. There are few stalactites or stalagmites in these caves, but everywhere there is tufa, and the water of the stream is heavily charged with iron. Finally this active little stream sinks in the muddy bottom of Batty Wife Shakehole which, although at present partially filled in, appears to be opening out again. Batty Wife Hole is a peculiar name and there are other holes in this district similarly named, such as Braithwaite Wife Shakehole previously described. Legend has it that these holes were used for the riddance of troublesome wives.

At the north end of the railway viaduct and close to the west side of the embankment a conspicuous sink hole contains a double cave rich in stalactites but somewhat damp. This is Gunnerfleet Cave, and is near the farm of the same name.

From the Station Inn in the direction of Hawes there is a cluster of trees and the hamlet of Gearstones, one mile from the Inn. About 200 yards before the hamlet is reached a track leads from the right-hand side of the road to Thorn's Gill, a veritable hidden paradise. Gayle Beck, an upper source of the Ribble, thunders down a rocky canyon, densely clothed with vegetation, to form several picturesque waterfalls. Before crossing the footbridge at the head of the ravine a short walk towards Gearstones along the left bank of the stream

leads to Holme Gill Cave. Once a show cave of great merit (there are the remains of an old gate at the entrance) this is a high, wide passage for over 150 yards with more than enough water.

Returning to the footbridge and crossing the beck it is possible to travel downstream on the opposite bank. Katnot, or Cupnick, Cave is situated halfway down the ravine above the stream just below an old lime kiln and near what appears to be a spring, though in fact it is the water coming from the cave at a lower level. The cave is entered over a heap of loose stones and the unpromising entrance leads the explorer into a vast cavern, twisting and turning into the scar limestone. The passage can be followed easily for 100 yards before water makes progress more difficult. With the proper equipment this roomy cavern can be penetrated for a much greater distance and it is one of the finest caves in the district.

A few hundred yards above Gearstones towards Hawes a lane leads off to the right and crosses Gayle Beck by a narrow footbridge. This lane proceeds over Cam Fell and may be followed uphill for nearly one mile, when a weatherbeaten signpost 1432 feet above the sea points to Kettlewell (15 miles) and Ingleton (10 miles). Turn right here following the old packhorse road from Hawes to Settle, and after a downhill journey of nearly one mile Ling Gill Bridge is reached spanning Cam Beck, another source of the Ribble. Ling Gill is similar to Thorn's Gill, but more savage, and there are numerous displaced water-worn rocks strewn about in chaotic confusion. Down the gill on the right-hand bank and after a walk of some $1\frac{1}{2}$ miles Nether Lodge Farm is reached. From here a short cart track leads over the moor to Brow Gill. This is a small ravine not so grand as Thorn's Gill or Ling Gill but possessing a very fine cave from which the stream emerges. There are sharp rocks near the lofty entrance passage but once past these the cave can be explored easily for a considerable distance. The Calf Holes, situated about $\frac{1}{4}$ mile above Brow Gill Cave and on the side of a cart track near Old Ing Farm, are connected with the latter, although complete exploration is difficult work as the passage is almost blocked midway with boulders. From the interior of Brow Gill Cave, however, the noise of the water falling down the Calf Holes can be heard distinctly.

Old Ing Cave is near Old Ing Farm, but it is very difficult to locate and enquiry should be made at the farm. It is a double cave of engulfment and debouchure and lies at the bottom of a shakehole. This is a fine cave of great height and exploration is easy both upstream and downstream.

High Birkwith is soon reached from Old Ing Farm by following the well-marked track down the moor for nearly half-a-mile. Just before High Birkwith Farm and in a deep rocky, tree-lined gorge is High Birkwith Cave. The entrance is in the left bank of the stream at the head of the canyon immediately below a disused lime kiln. This cave is a long narrow cleft and it is necessary to stoop to gain entry.

Near the mouth is a dark forbidding lake arresting further progress into the cavern beyond to all but experienced cavers.

S.E. of High Birkwith is desolate Horton Moor and Penyghent (2273 feet), where there are many more caves and potholes, among them Hunt Pot, Hull Pot, Jackdaw Hole, Sell Gill Pot and Penyghent Long Churn Caves.

A track from the Station Inn branches off the Hawes road and creeps under the railway viaduct. After a journey of almost $1\frac{1}{4}$ miles Gunnerfleet Farm is reached and a wooden bridge carries the track across Little Dale Beck, thereby joining another allotment road. There is a choice of two routes upstream by way of the little hamlet of Winterscales. A footpath leads from Gunnerfleet farmyard and reaches Winterscales along the right bank of the river. By crossing the bridge and turning right the allotment road also leads to the hamlet, but the footpath is the shorter route and more pleasant as it commands a continual view of the little river splashing and rippling merrily below.

Winterscales consists of two occupied farmsteads, lying snugly among trees on the edge of the gurgling stream. From here the beck is followed up the moor along the desolate valley between Whernside and Blea Moor. There is a path of sorts leading through the marshy ground, and it twists and turns valiantly to avoid the worst of the bog. After a scramble of some $1\frac{1}{2}$ miles a bridge crosses the railway—the Little Dale Beck is now splashing along the Blea Moor side of the railway—and another stream from Whernside flows in from the west and after being carried across the railway, joins the stream from Blea Moor. Just beyond here the railway enters Blea Moor Tunnel which cuts through the hill and carries the line into Dentdale, a valley of infinite beauty and grandeur.

The stream from Whernside is called Force Gill. Following the gill upstream over bog and heather, the waters begin to flow more rapidly but the district seems uninteresting and desolate, when suddenly, upon rounding a rocky defile, a grand and unexpected spectacle is encountered. The valley is dominated by a rugged cliff, 50 feet high, set in an amphitheatre, and the stream pours down in a splendid waterfall, 40 feet high. The cliff is composed of shale overlain by sedimentary limestone and grits and the view from the top of the fall is magnificent.

Continuing upstream several small cascades of varying height are passed, and the ravine ascends slowly for nearly half a mile. Upon a turn to the left towards the grand massif of Cable Rake, the Upper Force thrusts suddenly into sight—another cliff juts across the valley and down it the stream hurls itself in an ecstasy of foam and spray. This waterfall is 49 feet high and the waters descend in a twisting cascade, said to resemble a mare's tail. The cliff is an outcrop of variable strata with grits and sandstone predominating.

About half a mile above this point this same beck issues from the upper limestone series of rocks just near the 1800 feet contour line and above Greensett Craggs, a lower spur of High Whernside. Upon casual inspection the cave mouth appears insignificant as the little valley is strewn with stones. Closer investigation, however, reveals a descending cave passage or cellar hole, which leads into a roomy cavern, lofty and wide. It is one of the highest lying caverns in the neighbourhood and is called variously Hagtorn or Greensett Cave.

Chapter VII Gragareth

GRAGARETH summit (2250 feet) is about 6 miles from Ingleton. The most convenient route is by way of Thornton-in-Lonsdale and Kingsdale. From Ingleton the road passes the Falls Walk Entrance, passing beneath the viaduct, and presently forks. Bearing right, Thornton Church is soon reached. Turn right here, passing the Old Stocks, and continue up the road past the Vicarage in trees on the left, ascend the steep hill past Thornton Hall and the hill summit will be gained three-quarters of a mile beyond the Hall, where the elevation is 882 feet. The rocky hill seen on the left at this point is Hunt's Cross, where the limestone strata are contorted to a tremendous extent. The road now drops into Kingsdale, an old world valley shut in by Whernside and Scales Moss on the right and by Tow Scar and Gragareth on the left, whilst in the distance to the north beyond Kingsdale Houses the track twists and turns over the moors to Dent and Dentdale. At the bottom of the hill, about $\frac{3}{4}$ mile from the road summit, the green track from Twistleton Hall and Thornton Force comes in from the right, having crossed the Kingsdale Beck by a narrow wooden footbridge. One half-a-mile beyond here on the right-hand side of the road the Kingsdale Beck, later to become the Thornton Beck and later still the Twiss, emerges from the base of a small cliff called Keld Head, after a subterranean journey from Yordas Cave and Rowting Pot. The original bed of the stream stretches almost in a straight line from here towards the head of the dale and carries water only after heavy rain. About one mile from Keld Head a track leads to Braida Garth Farm, which lies on the right in a plantation at the foot of Scales Moor beyond the dried-up bed of the river. Continue past this track until level with the outer plantation wall, which strikes up from Braida Garth and ascends Keld Head Scar on the left. Enter the left-hand allotment beyond this wall, through a gate, and ascend the scar. At the top there is a not very well marked green lane—the Turbary Road—running along the scar at right angles. Now it is a straight climb up to the ridge of Gragareth. But on the way a great abyss in the moorland called Rowten, Rowting or Rowantree Pot should be viewed. It is close to the wall which we

have followed up the scar, and on the edge of the Turbary Road. The mouth is crowned by rowan trees and a tumultuous stream pours down the chasm through a dangerous "eyehole" which is practically on the roadside. Rowting Pot is almost 450 feet deep and is unprotected. Near the pothole, some 200 yards to the west towards Gragareth Ridge, Rowting Caves are to be found, and these can be entered and followed some distance. The waters from the caves re-appear in the eyehole before plunging into Rowting Pot.

Marble Steps Pot, marked on the Ordnance Survey Map as High Douk Cave, lies on the southern slopes of Gragareth and is reached most conveniently by following the Turbary Road from Masongill Farms. The hole is among trees on the left-hand side of the road one and a half miles from Masongill and at an elevation of over 1200 feet. Marble Steps Pot can also be reached from Rowting Pot by following the Turbary Road in a south-westerly direction for about $1\frac{1}{2}$ miles, when the pothole will be found in a plantation on the right. Marble Steps Pot is 400 feet deep and is surrounded by a fence.

Low Douk Cave is about 400 yards south of Marble Steps and is a grass-grown shakehole which can be descended easily. There is a wide cellar hole at the bottom which looks promising but soon becomes choked. Thorney Pot lies nearly one mile from here on the right side of the road going in the direction of Rowting Pot. The hole pierces the moor for over 35 feet and is surrounded by a tumbling wall.

Under half-a-mile from Thorney Pot and between it and Rowting Pot, some distance from the track on the left towards Gragareth Ridge and near the centre of the allotment, a small stream loses itself amongst stones. Close by is the entrance to Swinton Hole. The explorer must drop down a small manhole and crawl for about 15 yards before reaching the lofty portions of the cave, and as a rule there is a great deal of water. This is a dangerous cave and the tyro should proceed with caution,

In the next allotment from Rowting Pot and situated in a hollow some 400 yards to the north of it, is a narrow cleft crowned by a mountain ash. This is Gingling Hole, pitting the moor to a great depth. Bull Pot lies on the edge of Shout Scar about 400 yards further north from Gingling Hole but lower down the moor. It is a very contracted hole almost walled in by boulders but it descends in several pitches joined together by narrow twisting canal-like passages.

Situated in a plantation again north of Bull Pot is Yordas Cave, one of the loftiest and most fantastic caverns in Yorkshire. The entrance is very unpromising but the cave soon opens out into a huge chamber with the roof towering to a prodigious height. Among its many creations Yordas Cave possesses a waterfall, a naturally-

formed pulpit, a series of stalactites shaped like an organ, a "Chapter House," and a "fitch of bacon." Legend has it that a Nordic Giant named Yordas once lived in this cave, periodically hunting about the countryside and given to devouring small boys. Not far above the road in the next stream channel beyond Yordas lying to the north is Batty Cave, containing a lofty little chamber, into which there is a drop of 15 feet.

Chapter VIII Leck Fell

THE caves and potholes to be next described lie for the most part on the desolate expanse of Leck Fell on the south-western slopes of Gragareth. The best starting point for Leck Fell is Cowan Bridge, between Ingleton and Kirkby Lonsdale. A 2½ miles walk up the moor on the right along an allotment road brings one to where the high moors of Gragareth Hill lie on the right, Casterton Fell on the left, and in the distance ahead looms the grey-rounded summit of the Great Coum, sinister and solitary. Near the summit of this track there is a lonely farm Leck Fell House, situated right on the bog of Leck Fell, beyond which, in a morass, the track peters out at a point known as the "Three Shires Head." Here the counties of Westmorland, Yorkshire and Lancashire meet.

Where a wall runs down from Gragareth and crosses the allotment road close to a sheep-pen, and near the point where the wall bends towards the sheep-pen, lies hidden one of the most stupendous and lofty caverns in England. This is Lost John's Cave. It can be entered by either of two routes. A small sink hole on the inner side of the wall drops ten feet into a winding passage which joins the main passage some yards within and is here joined by the alternative route entered from the opposite side of the wall running down from Gragareth. The stream which has formed the cave enters the labyrinth at a lower level and in times of flood makes exploration difficult. This is a massive cave descending into the mountain limestone for a depth of nearly 450 feet by various slanting and vertical cave passages. It is a dangerous cave, actually a pothole *within* a cave, and a considerable amount of specialised equipment is needed to negotiate the deep ladder pitches in its nether regions.

About 200 yards south of Lost John's Cave and higher up the slopes of the fell is an impressive pothole, which is often dry. It is nearly 80 feet deep and edged with vegetation. The name given to it is Lost Pot on account of the great difficulty often experienced in locating it.

In the lower allotment just below the farm, there are several noteworthy potholes all bearing descriptive names. Short Drop

Cave lies about 50 yards from the track and 20 yards from the allotment wall. It is a minute hole which drops suddenly and care should be taken in investigating it. From this point a cluster of trees can be seen in a hollow near the centre of the allotment, where a wire fence surrounds a deep pothole. This is Rumbling Pot, or the Fairies Workshops, names given by the late Robert Balderston, whose book *Ingleton, Bygone and Present*, is now unhappily, out of print though invaluable to the would-be explorer of this district. Rumbling Pot is over 200 feet deep and from its depths there issues an irritating tapping sound, considerably louder when a stone is cast into the gulf. Long Drop Cave is a few yards to the west of Rumbling Hole in a hollow and it is more dangerous than Short Drop, although of similar formation.

From here follow the hollow of conjoined shakeholes down the field and the Eye Holes will soon be reached, a series of minute potholes in the moor of no great depth but geologically most interesting. In the same allotment, at the end of the depression, a fence surrounds yet another hole similar to Rumbling Pot and about the same depth. It has peculiar characteristics which explain its grim name of Death's Head Hole.

In the next allotment west of Death's Head Hole and near the dividing wall is a chasm called Gavel or Navel Hole, deep and of great length and width. A partial descent can be made on the side nearest Gragareth down a series of gigantic steps, but this is not advised as there is very little foothold and a slip might well end in disaster.

Further caves and potholes are reached by descending to the valley down which Easegill Beck flows from Great Coum to Cowan Bridge. Striking out in the direction of the summit cairn on Casterton Fell, the first point of interest reached in a precipitous gorge. Progress is made difficult by a tangle of bracken and heather and care should be exercised in approaching this ravine as its rocky sides, crowned with trees and foliage are over 100 feet in depth. Easegill Kirk, as this limestone gorge is called, was once a massive cavern, the roof of which has collapsed, leaving an open valley of great grandeur. The beck, the Easegill, later becoming Leck Beck, which formed the Kirk, has deserted its former bed and now re-appears below the gorge close to the Witches Caves. These are dismal, black cave mouths, the larger one being low, and the interior is rank and fetid with ramsons and sometimes with the carcasses of animals.

Climb out of the gorge on the opposite side to Gragareth and make off across the allotment in a north-westerly direction. A solitary farm (Bullpot House) will be seen by the track on the slopes of Barbon Low Fell and Casterton Fell, about one mile from the Kirk. Slightly below the farm and south of it, Bull Pot of the Witches is

found in a depression encircled by a wall. It is an ugly black rift, half-filled with silt and decayed vegetation. The main hole is 85 feet deep and the rocky sides are wet and slippery. Explorers will be well advised to take great care in the descent. Ropes and rope ladders are essential. In a line with Bull Pot and lying east of it a zig-zag hole pierces the moor to a depth of nearly 80 feet. This pothole, Cow Pot, is open and surrounded by a crumbling wall. It has been formed by faulting and the subsequent action of water.

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DISTANCES TO PLACES OF INTEREST

(from Ingleton).

Force Gill	8 miles	Rowton Pot	4 miles
Thorn's Gill	7½	Pillar Pot	3
Bull Pot of Witches	7	Thornton Force	1½
Gaping Gill	6½	Beazley Falls	1½
Easegill Kirk	6½	White Scar Caves	1½
Whernside top	6	Pecca Falls	1½
Lost John's Cave	6	Twistleton Nunnery	1
Gragareth top	6	Snow Falls	1
Clapham Cave	5	Easegill Force (Ingleton)	1
Yordas Cave	5	Skirwith Quarry Cave	1
Gatekirk Cave	5	Thornton Church	¾
Douk Caves	4½	Swilla Glen	¾
Marble Steps Pot	4	Cat Leap Falls	¾
Ingleboro' top	4	Storrs Common Cave	½
Weathercote Cave	4		

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GLOSSARY.

ALLOTMENTS	Enclosed areas of moorland.
ALLOTMENT ROAD	Cart track passing through allotment.
BEDDING	Distinct division between layers of rock (as seen in Swilla Glen).
BEDDING CAVE	Cave formed in a bedding plane.

BOGGART } BOGGERT }	Hobgoblin, presumed to inhabit certain potholes in the district. e.g. Boggart's Roaring Hole.
BOG RIVULETS	Very small mountain streams draining swamps and bog areas and often percolating into the limestone strata.
BOULDER CLAY	A stony clay, the result of the action of glaciers in the Ice Age.
CALCAREOUS	Containing lime.
CALCITE	Deposit of Calcium Carbonate.
CARBONIFEROUS } LIMESTONE }	Limestone Rock laid down during the Carboniferous period in geology.
CAVE OF DEBOUCHURE EXIT	Cave which releases water. This cave usually has an upward trend.
CAVE OF ENGULFMENT SWALLOW	Cave which receives water. This cave usually has a downward trend.
CELLAR HOLE	Small hole at the bottom of a pothole or at the mouth of a cave which usually communicates with a larger hole or cave system below.
CHOCK STONES	Collection of stones closing up or wedging a possible pothole or cave.
CONJOINED SHAKEHOLES	A regular line of surface holes suggesting the presence of caves below.
EYEHOLE	A small surface pothole, generally communicating with a large pothole.
FAULT	A displacement of rocks caused by subsidence and volcanic action, e.g. Craven Fault.
FAIRY CHURN	Noise emanating from some pothole, supposedly caused by fairies who dwell therein.
FOLDING	Volcanic elevation and depression of rocks, causing mountain and hill formation and often causing the rock to become crushed and distorted. e.g. Hunt's Cross.
IMPURE LIMESTONE	Contains other rock formations, mostly shales or sandstone.

- JOINTS** Vertical cracks between masses of rocks, especially apparent in limestone.
- LADDER PITCHES** Perpendicular drops inside caves and potholes which can only be descended with the aid of rope ladders.
- MANHOLE** A small edition of Cellarhole.
- MASTER CAVE** Main drainage area. A cave which engulfs or expels the main supply of water in the area.
- PRE-CAMBRIAN ROCKS (ARCHAEOAN EPOCH)** The most ancient rocks.
- SHAKEHOLE** Symmetrical grass-grown hole in the moor, usually produced by subsidence due to cave systems below.
- SINKHOLE** Small hole or boggy depression absorbing water.
- TUFA** Variety of calcium carbonate usually deposited from springs or in caves, frequently deposited on vegetation.
- TURBARY** The right of digging turf or peat on another man's land.
- UNCONFORMITY** In the structure of Ingleborough the lowest base rocks (Pre-Cambrian) are folded and tilted, whilst the overlying beds of Carboniferous Limestone are regularly stratified. Thus, between the two series there is a distinct break in the succession of rock formation. This is called an "Unconformity" and it represents great periods of upheaval and depression, of mountain building and rapid denudation, with a complete absence of rock deposition. At Ingleton a few feet of rock covers the period from Archaeoan to Carboniferous, not less than several hundreds of millions of years, e.g. the rocks of Thornton Force.

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