

## Among the 'Wiches'.

*Cornhill Magazine*, 2<sup>nd</sup> Series, Vol. 19, Sept. 1892, p. 256 – 265.

*Authorship of this article is not attributed, but F.G.S. Nicolle, who procured this copy of the article for Edward Baring-Gould, pinned a note on it: "This article should be compared with 'The Cheshire Salt Region' in Good Words and the novel The Queen of Love (1894). There can be no doubt as to the authorship."*

A PARAGRAPH in a daily paper announcing the disappearance into the bowels of the earth of a house in the Cheshire salt region, a Bill in Parliament pleading for protection or redress from an intolerable evil, always defeated by superior interests, give occasional token of a great transformation in the face of a portion of Great Britain, and of the distress and embarrassment caused by it.

Now we hear of a horse and his stable having suddenly disappeared, then of a gulf opening in the market-place like that which swallowed Korah and his company, next of a whole row of houses tobogganing into a bottomless pit, then of a lake forming where green meadows had been. We become accustomed to such tidings, laugh and dismiss the thought of them, and nothing save a visit to the salt district can make us realise how serious the situation is, and what a prospect of disaster lies in the near future. Such a visit is recommendable to anyone in quest of a sensation. What happened to the Cities of the Plain is happening under our own eyes, minus the brimstone and fire from heaven. The Dead Sea is due to a subsidence of a whole tract of land, and the valley of the Weaver, with the towns of Northwich, Nantwich, Middlewich, and Winsford, is sharing the same fate from the same cause, but with this important difference—that the Cheshire district is being deliberately let down into the depths by the hands of men, and through no fault or sin whatever of the unfortunate inhabitants.

The Cheshire salt formation is in the Keuper marls that lie over the new red sandstone, and occupy the bottoms of large salt lakes that extended in a chain from the Mersey to the Severn. In times of hot, still weather the salt crystals were formed in these lakes pure as ice in times of rain and flood the salt was muddied, and is found accordingly mixed with marl of various colours.

In addition to some minor layers of salt there lie two main beds of rock salt under the surface below the level of the sea, the one 120 to 150 feet down from the surface, the other 30 feet below that. The upper deposit is 63 feet thick, the lower has a thickness varying from 87 feet to 180 feet.

In some places rock salt is mined; where that is done it is now invariably in the lower bed, which is less exposed to the breaking in of water, as it is divided from the upper bed by impermeable marls. On the other hand, the upper rock salt has what are locally termed brine-runs on its surface. The superior beds are of gravel, sand and gypsum, and the rain and river-water leak through to the salt rock, where it takes up as much salt as it can hold in solution, and lies in lagoons or pans on the rock at variable depths: at Winsford it lies nearly 60 yards; at Northwich at from 30 to 40 yards; but when a boring is made the brine rushes up the shaft to from 20 to 12 yards of the surface.

These subterranean reservoirs never overflow regularly. There are no continuous brine springs in the district, and as long as they remain full no great harm is done. Water will take up 2 lb. 10 oz. of salt to the gallon, but not a particle more. A crystal of salt in brine of this density remains wholly unaltered. If, however, a little more fresh water be added, then at once the crystal dissolves.

If the reservoirs discharged themselves into the rivers, then there would be a current of water flowing over the surface of the rock salt, continuously corroding it; but this is not the case. As these reservoirs are below the sea level, they cannot send forth their brine except under extraordinary circumstances. The discharge of brine may take place through a natural accident, or may be artificial.

By a natural accident this is signified, that in certain places where the salt rock comes up comparatively near the surface, it may be corroded by the water, and the superior marl falling in may force the brine to flow out at some weak place in the surface soil. Such a process is now going on in the valley of the Bradford Brook. But this is exceptional. When, however, by mechanical pumping the whole lake of brine is drained away to be manufactured into the salt of commerce, then water, perfectly fresh, flows through the gravels to supply its place, and at once takes up as much salt as it can hold, to be again pumped up. This process goes on till the entire layer of salt rock is consumed, when there will ensue a subterranean cavity of 63 feet in depth. As there is nothing whatever to sustain the roof, the superincumbent beds fall in, and in process of time the entire surface of the country over the whole salt district will be lowered something like 63 feet.<sup>1</sup>

In some tables prepared for a Committee of the House of Commons, it was stated that the quantity of salt made from brine exported from the Mersey during the ten years ending 1880 amounted to 9,067,468 tons; that signifies a denudation during these ten years of 1,170 acres of salt rock one yard deep, that is to say, of nearly two square miles. Put into the form of a river, this would give

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<sup>1</sup> Not quite, as the salt is never quite pure. The marl &c. along with the rock would remain.

a channel 60 feet wide, 9 feet deep, and about 54 miles in length. If in one year two square miles of rock salt, three feet deep, be removed, it follows as a matter of course that the level of the country over the district whence the salt is removed sinks proportionately. The case is not that of mining and inefficient propping up of the roof. There is no mining done that sensibly affects the levels. The draining of the subterranean reservoirs of brine and the reflushing them with fresh water does the mischief, and the mischief cannot be prevented if the brine is still to be drained away.

When a shaft is bored, after awhile what is locally termed 'beany metal' is reached, and when that is pierced, at once the brine rushes up the shaft, sending the workmen flying for their lives. The underground reservoir has been tapped. That brine, as long as undisturbed, is innocuous. But let it be pumped up, and fresh water descend through the permeable gravels, and it at once begins to honeycomb the salt rock. Its action is comparable only to that of warm water on snow. It will continue to do so till it can take up no more; then, converted into brine, it is again pumped up, and the same process is continued from day to day. As the salt rock is consumed vast subterranean cavities are formed, and as the superficial beds have not much cohesion, the soil and gravels sink and fill the void whence the rock salt has been removed.

A few years ago at Newbridge a shaft was sunk into the earth and reached the upper salt rock above the level of the brine pans. Then a tunnel, 21 feet long, was run into it 21 feet below the surface of the salt rock. As the company did not want rock salt, water was run in, and a little while after pumped out in the form of brine. The tunnel of 21 feet had been transformed into a vast cavern of hideous appearance, from the roof of which the super-incumbent strata were crumbling in.

At Winsford it was not till 1820 that any subsidences of the land took place, not till the pumping out of the brine had begun in earnest. Then the land began to go down in the shape of a long trough, and to form a great lake through which the river Weaver flowed. A second lake speedily followed, and now these two meres, locally termed 'Flashes,' almost unite, and cover 100 acres. The lower Flash has approached the town of Winsford, and one side of the town is sinking into it. Already a church of stone has had to be taken down, and a new iron church erected to replace it. That, however, has begun to sink, and has needed raising. Rows of houses and shops have tottered to their fall, and have had to be removed to ground less cavernous. Bridges over the river Weaver have sunk 17 feet, and have had to be reconstructed. The sewers have had to be reconstructed one above the other. The new market hall had to be rebuilt.

At Northwich was a little stream, rising in a meadow called Top o' the Brook.

Now in the place of this meadow is seen a huge lake of 100 acres in extent, and in places 40 to 50 feet deep. Within a bowshot is another great depression, and in the sinkage another lake has been formed covering 10 acres, and even deeper than the other. It stretches to a public highway, and the road has gone down 40 feet in about six years. Since 1880 a third sinking of the soil has taken place, and a third mere is formed; at present it covers but five or six acres, but it is in places 70 feet deep.<sup>2</sup>

Before a Select Committee of the House of Lords on the Widnes Brine Bill in 1890 the Chairman of the Local Government Board said: Before another generation passes I expect most of the town will be under water, if this goes on. The pumping is increasing, and the subsidence is increasing proportionately.'

A walk through the streets of Northwich produces an indescribable effect on a stranger. It makes him feel giddy, and if a bad sailor, almost squeamish. The faces of the houses are contorted, as though struck with paralysis, or affecting the grimaces of a clown. Doors lean one way, windows another. Chimneys totter to their fall. Two houses are side by side: one is upright, the next-door house askew and sinking. Here is a house that has gone down so far that an upstairs window has been converted into a street door. There the roadway is buckled; beside it is a green pool out of which the rafters of a house project at an angle of 40°. You enter a shop and feel as if you were on board a Channel steamer in a rough sea, to such an extent is the floor inclined. In an upstairs parlour the planks are bent over a main beam, nigh to splitting; you walk uphill to the middle of the room from one side, slide downhill on the other. A row of houses is slipping against one house that stands upright and secure, and the lowermost habitation of the sliding row has to have slices cut out of it at intervals of time to prevent it from being bulged and broken to pieces.

The Wheat Sheaf Inn was a substantial hostelry of black oak and brick in the old Cheshire style. In 1880 it began to go underground. In 1885 the whole of the edifice had to be raised nine feet. In 1887 the cellars of the inn were no more to be found, they had sunk no one knows whither. On July 6, 1888, a horse was swallowed up alive in the stables, with its harness on, in a chasm that suddenly gaped. It was never recovered. The chasm measured 45 feet in diameter. Now the stables have been rebuilt almost in the same spot, and in large letters are inscribed thereon GOOD STABLING.

One day a farmer was driving a cow into market. He halted to talk with a friend in the main street. An exclamation from his friend made him turn, and he saw

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<sup>2</sup> The Manchester Ship Canal and the river Weaver are contributing to the filling in of this and other 'Flashes,' for the matter dredged up is cast in, to the extent of 100,000 to 150,000 tons per annum.

that a gulf that was not to be traversed had yawned between him and his cow. In 1889 another horse disappeared. A draper's shop in the High Street is sinking at the rate of an inch per month, and has been subsiding steadily at that pace for years. A paperer's shop is 12 feet wide, and in that twelve feet the inclination from the door is 14 inches. The back room measures 14 feet, and a line from the front door when level strikes 1 foot 5 inches up the back wall. The Crown Inn presents the drollest aspect, so contorted are its windows. The staircase of the Angel Inn is on an incline. Some cottages near the river are flooded when there is quite a trifling rise of the water after rain. Then the inmates live in the bedrooms, and obtain access to them by a form laid from the front door to the stair. And for such a cottage a poor man has to pay 5s. 6d. rent per week.

The subsidence is not always sudden; it is usually slow, and as the surface sinks the inhabitants of the houses act like the coral insects, build upwards, and are continually raising their habitations. Year by year land which it does not pay to keep up disappears below the level of the river, which is only 32 feet 7 inches above the sea level. The lower part of the town is 40 feet above the sea, and promises, when all the salt under it has been exhausted, to disappear entirely. Many parts of Witton Brook are already below sea level.

What the inconveniences are when gas-pipes and water-pipes snap without notice may well be judged. The question of sanitary treatment of the sewage is almost impossible of solution. But this is not all. Those who suffer have no means of redress; they cannot proceed against any individual or any company to recover damages. The street sank, and the local board proceeded to fill up. Now the houses on both sides had gone down as well. Consequently they were put to great straits by the street level being halfway up their front entrances, and on a level with the windowsills. After long and costly litigation the plaintiffs lost; the contention of the local board was allowed, that they were bound to maintain the roadway at its ancient level, and that they were in no way responsible if the houses on either side went below the surface.

In Northwich a handsome Congregational Chapel, erected in 1853, went to pieces and had to be removed in 1881. A large house that cost 1,200*l.*, and brought in a rental of 50*l.* or 60*l.*, became such a wreck that it was sold for 400*l.* to be removed. In 1881 evidence was produced that 5 public buildings, 15 manufactories, 34 warehouses, 41 taverns, 140 shops and 636 houses and cottages had been ruined by subsidence, and since that date the area of injury has extended and the amount of mischief doubled.

Landowners and the owners of houses have hitherto appealed in vain for relief. All they desire is such a tax placed on the salt as shall pay for the damage done by its extraction from the rocks under their feet. At the present rate of extraction

of the salt, 1,200,000 cubic yards of solid foundation are removed annually, and this is equivalent to a uniform subsidence of 248 acres one yard thick each year. The salt industry is on the increase. Vast quantities are exported to the East Indies, and the unhappy owners of property and inhabitants of the salt district foresee the inevitable results—the transformation of a district of rich pasture land and of populous towns into an enormous lake studded with an archipelago of islands.

Now let us see where the earth is sinking by a natural process. This is well shown in the Bradford Brook valley, which is but three miles long and is watered by an affluent of the Weaver. The little valley of the Bradford Brook presents one of the most extraordinary sights in England. About 3 miles from where it enters the Weaver, at about 60 feet above its mouth, on the top of a hill and in the midst of a large field, opens a crater filled at the bottom with water, covering some 5-1- acres. The sides rapidly slope to the water's edge, and are incessantly sliding in, the crater widening and the mere at the bottom extending its surface. This crater was formed in 1860. Previously there had been on the spot a small pond in the middle of the field, at which cattle drank. A gentleman of the neighbourhood was fishing in it for jack one day, when he perceived the water to be suddenly agitated, then that the rushes and bushes growing about the margin disappeared, and that the earth was slipping away under his feet. He hastily escaped, and saw a considerable area sink bodily into an abyss; trees went down upright, the trunks disappearing, then the boughs, and finally the topmost twigs were lost to sight. As he looked on in amaze he was suddenly aware that a fissure had formed behind him, and he was again obliged to fly; it seemed for the moment as though the entire field were in movement, and were precipitating itself into the bowels of the earth.

Simultaneously with this subsidence, some way down the valley, a hole gaped in a hill-side, at first no larger than a dog-kennel, and from it roared forth a spout of brine that filled the brook, overflowed the banks, and for some hours drove the wheel of a flour-mill situated below. Then it ceased, but its course was marked by dead trees and shrubs.

Marston Hole, as the crater just described is called, is, however, but one of several in the same line. In 1879 an orchard suddenly went down, and in its place now lies a lake. Out of the water near the edge still rise the dead trunks of apple trees and of an ancient yew. The whole meadow, nay, fields and meadows all round within a radius of half a mile, are furrowed with rifts and wrinkles like the crevasses formed in a glacier as it rolls over a mountain precipice. And precisely as the ice rolls down and disappears, so is the land rolling down into the centre of deepest depression, there to be engulfed and take the place of the salt that has been decomposed. An old way that led up the valley now plunges

into the mere, and emerges at its head.

At the same time that this lake formed, another blow-hole opened and sent out a brine geyser some 40 feet to 50 feet into the air, with a roar as of thunder.

A third subsidence took place in 1880, and another tarn formed, and at the same time a third 'Roaring Meg' spoke and spouted. Other subsidences and blow-holes have appeared since, and, indeed, the entire country in this neighbourhood bears evidence of rapid transformation.

In the case of the Bradford Brook the Salt Companies are guiltless of the mischief done. Here the explanation is to be found in natural causes. The salt rock reached sufficiently near the surface where stands now Marston Hole to be corroded by the atmospheric water, and as there is a descent of the strata from this point, as also of the surface of the land, a column of water at the higher end of the siphon drove forth brine at the lower arm, forming an arm by breaking through the weakest portion of surface, which was of pervious gravels and gypsum. Indeed, on the occasion of some of these blow-holes opening, great nuggets of gypsum have been hurled forth and have fallen in the valley below.

A visit to the salt works should be combined with a visit to the scenes of subsidence produced by the pumping of the brine to supply the works.

A shaft is sunk till the 'flag' or 'bean metal' has been pierced and the brine run is tapped, then a double iron pipe is let down and suspended from above. When fresh water is sent in, it is through the outer ring, between the first jacket and the inner pipe, and the brine is pumped up by a steam-engine through the innermost tube.

As soon as the brine reaches the surface it is run into reservoirs, whence the various pans for evaporation draw their supplies. Of these pans there are two sorts — those for the boiled and those for the scalded salt. Brine boils at 226° F., and it is at this temperature that ordinary table-salt is made. The slower the evaporation the larger the crystals formed; so that the large-grained salt is not boiled at all, but the brine evaporated at temperatures varying according to the degree of coarseness desired.

The pans for boiling brine measure, on an average, 36 feet by 26 feet, and are 18 inches deep. Coal — or, rather, 'slack' — fires are maintained under them at one end night and day. As the brine boils and parts with some of its water in steam, a corresponding amount of salt crystallises on the surface, and as it crystallises is raked to the side and put into moulds. One hundred tons of brine make 23 tons 10 cwt. of salt; and it takes half a hundred-weight of slack to make a ton of salt. If the salt scum be not at once raked off the surface, it sinks to the bottom. The salt that forms round the sides of the pans is termed 'cats.' Once a week the fires

are let out and the pans are scraped. It is found that a hard crust or 'scale' has formed at the bottom, of magnesium chloride and gypsum, white as snow, but so hard that it has to be removed with hammer and chisel. The men who attend to the pans are termed 'wallers' — i.e. boilers — and each waller is expected to keep his pan in clean condition, free from scale, and receives no extra wages for so doing. The men work in almost complete nudity, wearing only a pair of breeches or trousers, for they are enveloped in dense steam. On the sides of the pans are the 'stand-insides' — i.e. troughs about 18 inches below the platform — or, as it is locally termed, 'hurdle' — that intervenes between them and the walls of the building. A slightly elevated rib, 2 inches to 3 inches in height, rises at the extremity of the hurdle, dividing it from the 'stand-inside.' This occasions accidents. When the steam is very dense a man sees imperfectly, and, tripping on the rib, falls forward and goes into the pan. For one who is thus precipitated into the boiling brine there is no hope. Men have been known to fall in, who staggered to their feet and, bewildered by pain and blinded by steam, have struggled away from the margin and lost themselves in the centre of the pan, only to be drawn back to the margin by the rakes of their comrades.

But though the waller is subject to chance of accident, his trade is a remarkably healthy one. He does not suffer from decline. Cholera, small-pox, scarlet fever pass over the waller without touching him. Hardly a case of influenza occurred in the seasons of 1890-1 and 1891-2, which made such havoc with all classes and in all trades and professions. And accidents, when they do occur, are due largely to carelessness or to drink. A wise foreman will never suffer a waller to go to his work if he sees that his head is at all affected by liquor.

When the salt has been placed in moulds it is left for a short while to drain, and then the blocks, of a quarter of a hundredweight or less, are removed to the stove or hot chamber, at a temperature of 110° F., to become thoroughly dry.

The unmoulded salt — locally termed 'butter-salt' — is sent away in trucks. It is mostly despatched to the East Indies.

One curious fact relative to the boiling is that a small lump of soft soap or gelatine, if added to the brine, serves to purify the brine, in which is chloride of calcium as well as chloride of sodium. A lump of the size of a walnut suffices for 20 tons.

The 'cats,' or salt that has become encrusted round the edges of the pan, is sent to the pottery works for glazing pipes and pitchers.

Fine as is the salt formed over boiling brine, yet it is not fine enough to please the public for table salt, and the salt is passed through a mill and is reduced to flour, after which it is packed in waterproof paper bags, or canvas bags, or stone



jars. The human hand never touches it from first to last. Indeed, it is so dry that if some of the flour-salt be taken on the palm of the hand it rapidly discolours through absorption of the moisture of the skin.

The 7-lb. bags are sewn up by women and girls. Of these comparatively few are employed, the main work in the salt 'wiches' being done by men and boys.

When, in the Gospel, salt is spoken of as losing its savour and then as being good for nothing, rock salt is signified, subjected to atmospheric moisture, the chloride of sodium melting out of it and leaving behind only the grit of earthy particles. The Salt Companies are treating the district of the 'wiches' in this manner ; they are draining out of it all that is of goodness and savour, and leaving behind a refuse heap — not, indeed, to be 'trodden under feet of men,' but to be swum over by fishes, and be the haunt of eels.