

SPRINGS AND STREAMS OF HAMPSHIRE.

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The Hampshire geological basin includes a large part of Wiltshire and Dorset, but does not comprise the whole of Hampshire itself. As the consideration of the springs and streams of Hampshire is, to a great extent, a geological question, I wish it to be understood that this consideration necessarily leads us to inquire into the nature of springs and streams which do not belong to the Hampshire geological basin, but to that of the Thames or the London basin. Such are the streams of the north and the great part of the east of the county. First it may be well to state that I only purpose in this paper to allude, except incidentally, to the springs and streams of the mainland, and not to those which exist in the Isle of Wight.

It may be well to inquire what are the natural limits of the county? What is Hampshire? It is very difficult, perhaps impossible, to say how the boundaries of what we now call Hampshire were originally assigned to this part of England. In some instances these boundaries are known to be different now from those which prevailed in early Anglo-Saxon days. There is reason to believe that Amesbury was at one time included in this county, and it is certain that West Wellow, now part of Wiltshire, was, in Anglo-Saxon time, part of Hampshire; for it is stated in Doomsday Book that part of Wellow, that known now as West Wellow, was separated from this county by Waleran, the king's huntsman, by permission no doubt, and reckoned as belonging to Wiltshire. On the other hand there is reason to think that no change has occurred in the boundaries of the county along the east in the neighbourhood of Alton, for towards the end of the ninth century the limits of the county are mentioned

as being about the same as at present between Bentley and Farnham. Wessex, in early Saxon time, included Hampshire, and was an undefined extent of territory constantly expanding; but a time at length arrived when it was found desirable to assign the limits of the home kingdom or territory, and what we call Hampshire, or legally the county of Southampton, was then marked out. This was probably done at some Saxon council, held most likely at Winchester, but however, and whenever, done, it is certain that the greatest of our Hampshire streams was taken as assigning a natural north-western limit to this county, and as fixing thereby a convenient northern limit to the eastward. In reply to a possible inquiry, what shall be the limit of our royal home territory? some Saxon thane, who knew the county well, may have recommended the king to follow up the river Test from its mouth to its highest occasional drainage. This would lead him past what is now called Fullerton; he would then follow the main stream to Hurstbourn Priors; he would then leave the main stream of the Test, and follow its St. Mary Bourne branch, as far as what is now Hurstbourn Tarrant, where a valley opens out from the north, which leads up gradually to higher and higher ground, past Netherton to Combe, and thence up a very steep ascent to Walbury Camp and Inkpen Beacon. This is the northern limit of Hampshire which nature has set in the drainage valley of the Test.

A consideration presents itself in connection with springs and streams which is of the highest value in their study and investigation, and this is the permanence of their names. In all countries the names of the streams are the oldest names in that country—in many, if not most countries, the names of many springs and streams are not now generally understood, as they were understood to those who originally gave them these names. They named them after their own language, as we have named streams in Hampshire, Darkwater, Whitewater, Blackwater, &c., after our language. Such syllabic words as *ach*, *ache*, *dur*, *dufr* (or *dover*), *ox*, *ex*, *ar*, *ock*, *wey*, *lin*, *an*, *pwl*, *ousel*, refer to streams or springs or water in some condition or other, in a way which perhaps we cannot now precisely explain, for the ancient Celtic dialects have not come down to us as Anglo-Saxon has come down to us. These syllabic words enter into the

names of a large number of our Hampshire streams, or of places near them and their sources, and therefore the ancient place names of our county cannot be ignored in the study of our streams. The pronunciation of these old Celtic words is the important consideration, not the spelling; for example, ach is now often spelt ash, and as such is met with in connection with many of our springs and streams.

In Hampshire we have had races of men, succeeded by other races; we have had the Iberian and, I think, both the Gaelic and Cymric-Celt fused, perhaps, into the Romano-British, and succeeded by the Anglo-Saxon. Tribes and races have come and have gone, and the names of the streams are all that is left of their language in this county. Men live and die, but the streams flow on for ever, and the names of some of them speak to us in the language of the long past.

Another general consideration connected with our water names is that they help to keep us right in matters of history. Although we may read of the extermination of the ancient Celtic population in this part of England by their Anglo-Saxon conquerors, and be told this on high authority, yet the springs and streams flow on, murmuring still the old names given them by the Celts, a proof that such statements are erroneous, and that some at least of the Celtic people were spared, otherwise the names they gave the streams would have been lost instead of being perpetuated. The Saxon names referring to springs in Hampshire are in many instances, compounds of the words "well" and "bourn."

Hampshire contains an area of 1,621 square miles, and if we take about 33 inches as the average rainfall, we shall not be far wrong. The average at Southampton for the ten years, 1872-82, was 33.8 inches. This rainfall of 33 inches enables us to realise what a vast volume of water is annually poured over our county. Thirty-three inches deep over an area of 1,621 square miles is equal to 330 inches deep over 162 square miles, or equal to a cubical mass of water 16 miles long, by 10 miles wide, and $27\frac{1}{2}$ feet deep. Part of this water runs away over the surface, a small part goes to supply the wants of plants and animals and the wants of man. A very considerable part is evaporated; but the larger part probably, especially over the chalk country, sinks into the earth and feeds the springs.

As may be seen by the geological maps of the county, the greater part of the surface of Hampshire has chalk just below the soil, and chalk is a very absorbent rock. The chalk hills of Hampshire rise to considerable heights. At Butser Hill, near Petersfield, the chalk is from 800 to 888 feet, at War Down, Buriton, 800 feet, at Popham Beacon 540 to 600 feet, at King John's Hill, Freemantle, near Kingsclere, 754 feet, along Kingsclere Down 600 feet, at Small Down, East Meon, 717 feet, and at Wether Down, East Meon, 765 feet. The base of the chalk below Itchen Down, Micheldever Wood, and Stratton Park is estimated to be 400 feet below the sea level. At Popham Beacon its base is 250 feet below this level; near Overton railway station it is 130 feet below the sea level; and north of Polhampton, near the line of the old Roman road, the base of the chalk is above the sea level. This base of the chalk may be seen in the Kingsclere Valley, and in the eastern part of Hampshire, where the Upper Greensand rocks come to the surface. The base of the chalk beneath Southampton Common lies more than 1,200 feet beneath the sea level, and was not reached in the borings made there. In the eastern part of Hampshire the Upper Greensand rises to considerable heights; it occurs on the lower slopes of Oakshott Hanger, near Petersfield, which is 700 feet above the sea, and Ashford Hanger, which is 624 feet above the same level.

The largest Hampshire stream is the Test. "The sprightly Test that rises up in Chute," as Drayton in his *Poly-olbion* briefly described the stream early in the seventeenth century. We must not look to poets, however, for scientific accuracy. The Test certainly is sprightly, but only a part of it rises in Chute, the name for the old forest land to the north of Andover. The main stream of the Test flows from Polhampton, and its highest permanent spring is at Ashe, about 300 feet above the sea level, and not far from Ashe Church. The name Ashe is derived from the Celtic *ache*, which denotes water. In *Doomsday Book*, Church Oakley also is found under the name of *Aclei*, and this place is an occasional source of the Test. The water course at Church Oakley is an example of one of the peculiarities of our Hampshire streams. Some of these streams are shy, for after flowing a little way above ground in a rather undecided

manner, they simply disappear into the chalk beneath and flow underground. This is the case at Church Oakley. In very wet seasons indeed a stream flows all the way from Oakley, past Dean Church to Polhampton, but commonly, although it may be seen at Oakley, it disappears, and the water swells the great springs at Polhampton. Oakley is 365 feet and Polhampton 300 feet above the sea level. The volume of water given off by the Polhampton springs is very great, and there are many springs along the line of the Test below it, past Overton, Laverstoke, and Freefolk.

These springs usually "rise" either in November or in December, and it has been noticed that if they rise in November they flow stronger in May, when the fishing season begins, than they otherwise do. The Laverstoke springs are at elevations of from about 245 to 274 feet. At Southington the springs are about 268 feet in height. The course of the river seems to be along a continuous line of springs. This course through Laverstoke Park was diverted, but the line of springs remains, and the land which formed the bottom of the ancient stream course is always wet from this cause. The temperature of water from chalk springs has a general uniformity of about 50 degrees Fahrenheit. This causes the water to feel colder in summer and warmer in winter, and it is this uniformity in temperature which makes springs from the chalk so suitable for watercress beds. In the early spring the watercress grows readily, for it is surrounded by water considerably higher in temperature than that in the open streams. Some of our chalk springs "steam" in winter on frosty mornings, as is the case with one at Rotten Hill, near Laverstoke. The chalk hills about Laverstoke rise on the north from 600 feet to 700 feet, and on the south from 500 feet to 600 feet above the sea. The hills within a few miles north and south are, therefore, more than 300 feet higher than the level of the springs.

A small stream from the north of Whitchurch rises near Cold Henley at about 280 feet, and higher up is St. Paul's wood, which must be an occasional source when the chalk is much saturated. The name Paul, or Pol, has probably been derived from the old Celtic pwl, a word which is well understood in Wales. This name appears in other parts of the county. The St. Mary Bourne stream, which joins the Test at

Hurstbourn Priors, has its usual source at Upton, about 368 feet in elevation, and at Hurstbourn Tarrant, 325 feet. In very wet seasons the Swift river, as it is here called from its rapid flow, rises at Vernham's Dean, 433 feet above the sea. These springs about Hurstbourn Tarrant arrested the attention of Cobbett, who mentions them in his "Rural Rides," and describes them as dry from August to nearly March, "when the water boils up in thousands of places in the meadows." As this stream bears lower down the medieval name of St. Mary Bourn, it not improbably obtained this name from the season of the year of its greatest flow. If you visit the village of St. Mary Bourne late in the summer the stream there will usually be found almost stagnant.

The Test flows through a wide expanse of marsh land past Longparish and Wherwell, and joins the Anton or Andover stream at Fullerton. In the low-lying meadows at Longparish and Wherwell are great springs. Wherwell, locally pronounced Horrel or Horwell, derives its name from its hoar, or ancient springs or wells. The springs here rise at about 152 feet in elevation.

The Anton, which flows past Andover, rises near that town in various springs, those near Water-lane towards East Anton, being about 200 feet above the sea. The springs at Charlton have about the same elevation, and those at Penton Mewsey about 234 feet. This is the highest visible source of the Anton, but there can be little doubt that the Penton Mewsey springs are connected with the phenomenon which occurs in wet seasons at Appleshaw. When the chalk is much saturated a stream rises at Redenham about 308 feet in elevation, and flows through Appleshaw village 300 feet, where you may see water-courses, generally dry, alongside of the village road. The stream flows south towards Wey Hill, to a level of 283 feet, where the road begins to rise, and here the water is absorbed by the chalk and disappears, flowing below Ramridge Park, and probably east of Wey Hill, but underground, until it reaches the water course at or near Penton Mewsey. The Pill brook, which joins the Anton at Longbridge, a mile below Andover, has its source near Kimpton 274 feet, and flows past Fyfield 252 feet, receiving a branch stream from the Thrupton springs 260 feet in elevation. The stream flows past Mullens Pond 230

feet and Amport Green 213 feet, to Longbridge 172 feet, where it helps to swell the Anton.

At Fullerton the Test is 136 feet above the sea level, and south of Stockbridge 114 feet. The Sombourn, which joins it at Horsebridge, has its source usually in and near Tanner's Pond, east of King's Sombourn, 119 feet in elevation. The springs are flowing in April, but the stream above the village is dry in September. In very wet seasons this stream rises at Ashley a mile and a half to the east, and on higher ground. This has happened on three occasions since 1851.

Near Horsebridge the Test is joined by the Wallop stream, locally called the Nine Mile Water, or Nine Mill Water, because in olden time there were nine mills along its course. Most of these have disappeared, but the site of some of these ancient mills, which are mentioned as far back as the date of Doomsday Book, may still be identified. The highest source of the Wallop stream is above the village of Over Wallop, where springs occur in the fields, but in the latter part of the summer the brook which is seen along the roadside is dry. The highest occasional source of the stream is near Castle Farm, or, as it was formerly known, Owl's Castle, 300 feet in elevation. The Castle was probably an earthwork; the owl is a spring name, which occurs again at Owlsbury, and is locally pronounced "Oussel." Springs occur along the course of this stream, through Broughton to Bossington. The Wallop valley through which the stream flows lies higher up in the chalk than the valley of the Test, and so its springs are less vigorous; for example, the stream at Middle Wallop is 200 feet above the sea, while the Test over the hills to the east at Longstock is only 130 feet in elevation, and the stream at Lower Wallop is 160 feet, while the Test near Stockbridge is only 114 feet above the sea.

The Micheldever stream, which joins the Test before the junction with the Anton, is supplied by springs which may be seen among the watercress beds near Northbrook, a little north of Micheldever village, and by the footpath to East Stratton. These springs in very rainy seasons produce great volumes of water, which flood the road. The name Miceldever in Doomsday Book means "much water." The highest occasional source of the stream is at the south of Stratton Park, near the overlying patch of the Tertiaries,

consisting of the Reading beds, which lie on the chalk, the elevation being about 267 feet. This stream flows past Stoke Charity, Hunton, Wonston, Sutton Scotney, and north of Barton Stacey, and very pleasant walks occur along it. It receives a branch which is fed by the springs about Bullington, the highest of which is near the Stockbridge and Basingstoke road, at an elevation of about 217 feet. Except in flood time, the water at Bullington bridge is as clear as crystal. This is the general character of the water in all our chalk streams. The Micheldever stream and the Test were utilised for the purpose of forming a strong defensive position at the tongue of land near their junction. The great earthwork called the Danes dyke, one of the ancient defensive lines in the county, completed with the two streams this fortified site.

The Dean and Lockerley stream, which flows into the Test near Mottisfont, is fed by springs from the chalk in the valley at West Dean, at about 126 feet in elevation. Its occasional sources are in Wiltshire further to the west, and it receives smaller streams from occasional sources about East and West Tytherley, where the chalk crops out from beneath the Reading beds. Near Dunbridge farm there are springs at about 86 feet in elevation. The stream flows in great volume at Lockerley Mill, which is probably on the same mill site as that mentioned in Doomsday Book, and at the mill there is an artesian well into the chalk, which supplies the water that is forced by the stream up to Lockerley House. On the line of junction of the chalk with the Reading beds at Mottisfont occurs a spring of remarkable interest. It is undoubtedly the "font" which partly gives this village its name, and is one of the most beautiful springs in the county. This topographical and historical "font" is on the lawn of Mottisfont House; it is a well, perhaps, 10 feet deep and 4 feet or 5 feet wide, full of water as clear as crystal, ever flowing and yielding, perhaps, two million gallons of water daily, which runs away from the lawn, through the shrubbery into the Test.

The remaining tributaries of the Test are those which are chiefly fed by springs in the Tertiary beds of clay and sand, &c., which lie above the chalk, and known as the Reading beds, London clay, Lower Bagshot beds, Bracklesham and

Barton series. These formations are nowhere in Hampshire found as high as the chalk, or as high as the Upper Greensand in the east of the county. The water from the Tertiary springs is not so clear and sparkling as that from the chalk springs, and when seen in bulk it may be observed to be of a darker tint. The water from the Tertiary springs also in many instances contains some little trace of iron, which that from the chalk does not.

Tadburn Lake, a stream which joins the Test at Romsey, has one of its sources in a spring near Pucknall, 113 feet in elevation, where the chalk crops out from beneath the Reading beds, and it is very interesting to see the white chalk lying just beneath the dark green sand and clay of the Reading beds near here. Another source of this stream is from the springs at Ampfield (anciently Annfelde, a water name), about 230 feet above the sea. Wells and springs are plentiful about Ampfield. On the west slope of Toot-hill a spring occurs at 150 feet in elevation, which sends out a stream which flows past Ashfield to the Test.

The Oure, or Blackwater, which has its source in Wiltshire, near Whiteparish, at the junction of the chalk with the lower Tertiary beds, enters the county at East Wellow, where it is 50 feet above the sea. It is increased by springs along its course, and also by the Cadnam water which flows into it, and which has one of its sources in the wet wood, full of little springs on the slope north of Castle Malwood. Cadnam water flows past Brook and through a considerable pond or pool in Paulton's Park, where we again find the word Paul, derived from the Celtic pwl. Two of its little tributaries, the King's Gairn Gutter, and the stream flowing past Burnford, have their sources at Three Water Gutter, east of Fritham, in the New Forest, about 400 feet in elevation, and flow from the Barton and Bracklesham beds. The Blackwater joins the Test near Nursling.

At Totton a smaller stream, the Bartley water, which has its sources south of Minstead in the Barton and Upper Bagshot beds, flows into the estuary of the Test.

Another stream, which gives Millbrook its name, has its sources above Shirley, one branch, the Hollybrook, being supplied by rather fitful springs near Chilworth, the highest source being about 240 feet, and another branch, the Tanner's

brook, having one of its sources at the Bedwell spring 100 feet above the sea, a little south of Rownhams. Much discussion took place in Southampton many years ago on a project for utilising the water from the Bedwell spring for the town's supply, but the quantity is uncertain, and was wholly inadequate for the town even at that time. The ancient name of the Test was the Terstan, the old syllabic Celtic word "an" appearing in its name, as in the names Andover, Abbot's Ann, Amport (Ann de Port) Annfelde, Cadnan, and other names elsewhere in this county.

The Itchen was anciently known as the Icenan. A little to the north of Kilmeston is a pool in a little field by the road side, where you may drink at the head-water of the Itchen. This spring head is about 247 feet above the sea, and is the usual highest source of the stream, but its occasional source in very wet seasons is higher up at an elevation of about 300 feet, not far from Kilmeston Church. The Itchen springs are in the chalk, and they supply a stream of beautifully clear water which flows through the village of Cheriton, past Cheriton Mill to Tichborne. A little stream from Bramdean, which flows south of Lamborough Fields, the site of the battle of Cheriton, rises at Bramdean at about 260 feet in elevation. Springs and wells, which sometimes overflow, occur along its course to Cheriton, where it joins the Tichbourn, which is also joined by the stream from Alresford about a mile below that town. Alresford pond, made by Bishop de Lucy in the twelfth century to form an upper reservoir of water for the Itchen navigation, was constructed by a great embankment being projected across the valley, which is the natural waterway for several of the upper tributaries of the Itchen. In some parts of this valley the chalk is covered only by a few inches of soil, and so as the water was made to rise in the pond the action of the chalk at the western part of it made it difficult to keep all the water in, except when the chalk in very wet seasons was saturated. Consequently a swallow hole limits the holding capacity of the pond, and it has been calculated that more water leaves the pond by the swallowing action of the chalk beneath than by the natural overflow. The level of the embankment is 233 feet, while the river about one mile below is only 185 feet in elevation; so that there is

a considerable fall to allow this underground drainage to act.

The Candover stream, the longest of the tributaries of the Itchen, rises from a spring at Chilton Candover 300 feet above the sea. The chalk hills on both sides of this valley have an elevation of 500 feet. In wet seasons the stream rises at Preston Candover at an elevation of 324 feet. There can be little doubt, also, that it receives an underground supply occasionally from a higher source still, for Axford, 361 feet above the sea, lies higher up the valley between Preston Candover and Nutley. Several old roads converge here, more or less water tracks in wet seasons, and the chalk lies so near the surface that the drainage of this part of the valley is easily absorbed, and no doubt helps to swell the stream below. The stream from Bishop's Sutton flows from springs at Water-lane, 264 feet above the sea, into Alresford pond. This stream is also increased in volume by an occasional supply from the lower part of Ropley, which is 70 to 120 feet above the level of the springs at Bishop's Sutton. These streams are all from the chalk, and the water has the usual character of such streams. A stream from Bighton rises near Drayton farm at about 280 feet above the sea, and flows to Alresford pond. Its occasional highest source is in Well Copse, higher up, 350 feet in elevation. The chalk hills further to the north rise to an elevation of 500 feet. After leaving the neighbourhood of Alresford the Itchen receives no considerable tributary stream, except that from Headbourn Worthy, until it reaches the Tertiary country north of Bishopstoke, but many springs occur along the course of the stream and increase its volume. One of these springs near Wharf Mill, Winchester, has been utilized for centuries for a water supply to Winchester College, and it still supplies the Warden's house, the Brewery, and the inner quadrangle of the College. A little rivulet formerly flowed past Fulflood farm to the east part of the city ditch at Winchester, and thence along the south wall to the Itchen. The deep railway cutting east of the barracks marks the line of this ditch, but goes much below its former level, and the rivulet has consequently ceased to flow. North of Brambridge springs may be observed in the bed of the water courses near the river, and

it is about here that the junction between the chalk and Tertiaries occurs. The Otterbourn has its source in the Poleshole spring, which has been lately utilized for watercress growing. About half a mile to the west of this spring is the Otterbourn swallow hole, which receives the water that flows from the direction of Hursley, along the channels by the side of the lane past Silkstead farm. This swallow hole, as well as the Poleshole spring, occurs at the junction of the Reading beds with the chalk. The volume of water from the direction of Hursley is sometimes very great. In 1775 this village was flooded through the bursting out of chalk springs after a very wet season. A permanent spring about a mile south of Hursley is at Ladwell 209 feet above the sea, and its name shows that it may perhaps formerly have been known as Lady Well, in which case it would have had a religious character. The water from it now supplies the mansion in Hursley Park.

Bow Lake stream, which joins the Itchen north of Bishopstoke, has its main source in the chalk springs near Upham, 200 feet above the sea. It flows past the former site of the Marwell fish ponds, which were utilised in medieval time by the religious fraternity of priests formerly located at Marwell. Part of the bridge over the stream at Marwell is probably of ancient date. Another branch of this stream rises north of Hensting, when the springs flow there, which they do not always. Water channels may be seen along the roadway at Hensting, 109 feet above the sea, from which the water flows to Fisher's pond, the springs near the upper end of which are always active. The highest occasional source of the stream is in Water-lane, near Owlsbury, 306 feet, locally pronounced "Usselbury," a place on a hill with a sharp descent on all sides. Near Hensting is a well surrounded with yew trees, called Jacob's well.

At Swathling the Itchen receives a tributary stream called Monksbrook, flowing from North Stoneham, which manor belonged to the monks of Hyde Abbey for many centuries. This stream has its source at Flexford, west of Chandler's Ford, at an elevation of about 122 feet.

The Avon is but partly a Hampshire stream. Of its three main branches, which meet near Salisbury, one, the Collingbourn, enters this county at the Hampshire Cross, South Tidworth, at an elevation of 364 feet, and flows through that

parish and Shipton Bellinger to Cholderton, where it has an elevation of 299 feet. This stream is very fitful, and is, perhaps, more peculiar than any of the chalk streams I have mentioned. Beyond the limit of Hampshire, at Collingbourn Ducis, the stream may always be seen flowing, not usually of great volume, through the little valley at that place. Its source appears to be further north, towards the Upper Greensand outcrop south of the vale of Pewsey, and it flows over some drift or alluvium, or other bed impervious to water, until it reaches some bare part of the chalk south of Collingbourn Ducis. There in ordinary seasons the Collingbourn takes its leave of the upper world and disappears below. You may follow its course in the vale among the chalk hills for miles. There you may see just beyond the Hampshire border a dry watercourse among the chalk downs, with footbridges, and sluices, and all other conveniences for a flow of water, but the water level is usually far below. Some surface water may not unfrequently be seen under the bridge at North Tidworth, but the stream only comes up in wet seasons. At the Hampshire Cross the water in the wells is often 60 feet below the surface, which is the level at Cholderton. Between South Tidworth and Shipton Bellinger the bed of the stream is commonly a green sward, and may be mown or grazed, for grass and wild flowers grow in it. The village road at Shipton is the course of the stream, the level here being 323 feet, and near the church the dry watercourse is bridged over towards the churchyard. Just where the course of the stream leaves Hampshire at Cholderton, at an elevation of 299 feet, the water rises in considerable volume, and the Collingbourn further on flows above ground and behaves itself like ordinary streams. The Avon enters Hampshire at Charford, south of Downton, and the smaller streams it receives from our county are, with one exception, from the Tertiary formations of the New Forest district. The exception is the Sweetford water, which has its sources on the slope of Rockbourne Down, and flows through the interesting village of Rockbourne.

The usual sources of this stream are from springs at about 186 feet. The level in the village is about 169 feet, and the stream is occasionally so great in volume as to flood the road, so that a high pathway has been constructed by its side below the village. In dry seasons, while the Avon, like other

chalk rivers, may be seen flowing on, scarcely at all affected in volume by the drought, its New Forest tributaries may be noticed to be nearly or quite dried up. One of these tributaries, the Latchmore brook, has its sources in and about Eyeworth woods, and one of these sources is a fine spring called Iron's well, at Fritham. The water from this spring is chalybeate, but by rapid oxidation its iron is deposited along the banks of the stream. The spring is also known by the name of the "Leper's Well." The wide-spread prevalence of leprosy in Hampshire in ancient days is beyond dispute. The lepers' hospitals at Winchester, Southampton, Christchurch and near Carisbrook, in the Isle of Wight, sufficiently prove this. That the lepers sought relief by ablutions in the ferruginous water of some of our Hampshire springs is probable, and this Lepers' Well is, according to tradition, one of these springs. From lepers to mangey dogs is a considerable change, but this change has occurred in the curative uses of the water at Iron's well. We have no longer lepers, but we have dogs afflicted with the mange, a disease which causes the hair partly to fall off. Iron's well, by common repute, is useful in curing these dogs. The spring has a little wooden structure over and round it, with a board wanting at the top, by which you may drop your dog into the chalybeate water, and a convenient arrangement exists, by which, after he has finished his ablutions, he may scramble out on the other side.

The upper sources of the Latchmore brook are in the woods near Island Thorns, 400 feet in elevation, and it joins the Avon south of Fordingbridge.

Ashford water and Dockens water are other New Forest streams flowing to the Avon, which have their sources in the Barton and Bracklesham geological formations. Dockens water is one of the three streams which have their sources at Three Water's Gutter, east of Fritham, about 400 feet in elevation. Turner's brook, Huckles brook, and Lin brook all flow to the Avon from the Forest, and derive their water from the Barton, Bracklesham, Upper Bagshot, or Headon beds.

Drayton says of the Avon:—

"When down from Sarum's plains
Clear Avon coming in, her sister Stour doth call,
And at New Forest's foot into the sea do fall."

The Stour is scarcely a Hampshire stream, for it enters the county at an elevation of about 42 feet only, and soon reaches the sea at Christchurch.

A few miles west of the mouth of the Avon a small stream known as the Bourn which has given its name to the important town of Bournemouth, flows through its beautiful valley into the sea.

We have a second Avon, a New Forest stream, called Avon water, which has its source near Holmsley Railway Station, and its elevation at Ossemsley Ford is 122 feet. It is increased in volume by water flowing from Durn's town, 141 feet, and it flows past Pennington to the sea at Keyhaven.

The Dane's stream has its source on Bashley Common, 170 feet above the sea, and flows past Upper Ashley, Ashley Clinton, and Milford to the sea east of Hurst Castle. Ashley is entered as Achlei in Domesday book.

The Boldre stream has its highest source on Ocknell plain or enclosure, west of Stoney Cross. Here it is called the Highland water, but it ceases to flow here in dry seasons. Near Buckland Rings, north of Lymington, there was a small spring to the north of the great earthwork which was for generations held in great estimation for its reputed curative properties in ophthalmic disorders. This was probably one of the Holy Wells of Hampshire, and its water is of a chalybeate nature. The Lymington railway has so altered the place that I think all belief in the virtue of this water has gone even if the spring could now be found.

The Ex, or Beaulieu river, has its source near Lyndhurst Road Railway Station, and flows from a boggy place at Fulliford, 50 feet above the sea level, through Withycombe shade, the site of the old Decoy pond, to the tidal water at Beaulieu. The most noted spring connected with the Ex is that called the Monk's well, near Hill-top, Beaulieu, 120 feet in elevation, which yields a copious and never-failing supply of excellent water. Not far away is a copse called Oxlease, a name not improbably derived from the stream. A place named Oxlei is mentioned in the New Forest in the Domesday book.

The Darkwater is a small stream which flows past Holbury and Gatewood to the Solent at Lepe. The dark nature of the water from which the stream is named may be well seen at Ipers Bridge.

We must now leave the south for the north of Hampshire, in which part of the county the most important stream is the Loddon, the "Lodona" of the poet Pope, and to which Warton also wrote a sonnet.

As you stand on the crest of the chalk ridge close by the lonely churchyard of Farley Wallop, and look northwards, you have spread out before you on the right the beautiful country of the Loddon. The main stream rises about a mile west of Basingstoke, at an elevation of about 265 feet. It flows through Basingstoke, and is largely increased in volume before it reaches old Basing by the great flow of water from the springs, which may be seen near the upper road between Basingstoke and Old Basing. These springs are in the chalk, and have an elevation of about 263 feet. An occasional source of water flowing down to the level of these springs is in Spring Wood, Hackwood Park, 320 feet in elevation.

The Loddon flows from the upper chalk country through the northern Tertiary area of Hampshire. It passes through Stratfieldsaye Park, where part of it has been widened for ornamental purposes, and it leaves our county at the north of this park.

The Weybrook, which is one of its tributaries, has its spring head at the junction of the chalk and Reading beds, a little west of the church at Sherborne St. John, the elevation of the spring being about 256 feet. It flows at once in considerable volume through the meadows in which it rises, and in its course passes through Vyne Park at an elevation of about 212 feet, and Beaurepaire Park at 200 feet, joining the Loddon at Lillymill, 170 feet above the sea.

The Lyde, another tributary stream, has its chief source in the great springs on Andwell Moor, at an elevation of about 237 feet. This name, Andwell, is a water name, partly Celtic and partly Saxon. Our Saxon forefathers did not quite understand what "an" meant, and so apparently attached the word "well" to the older name.

The Lyde at Andwell carries away some millions of gallons of water daily. A branch of this stream has its source at Maplederwell, a place with another interesting water name derived from *pwl*, *dur* and *well*. The spring is in the chalk close to the churchyard, about 242 feet in elevation, but the flow is very uncertain. In wet seasons the stream rises half

a mile higher up, and the water makes a channel for itself across the fields. Some years ago when it was proposed to "tap" the upper sources of the Loddon and its tributaries to supply part of the water requirements of London, it was stated before a Parliamentary Committee that the Mapledewell stream yielded 1,800,000 gallons of water a day. This, perhaps, it does in March, but in the latter part of a fairly dry summer it does not yield a pint, and the watercress at the spring head is barely kept alive, for the main underground flow of water near here is toward the great springs at Andwell. The two largest tributaries of the Loddon are the Whitewater and the Blackwater, the Whitewater having its sources in chalk, and the Blackwater having its sources in the Tertiary beds. The Whitewater springs are at Biddenwater, about a mile south of Greywell, the elevation being 268 feet. Its highest occasional source is higher up towards Upton Grey. The springs at the Whitewater yield many million gallons of water a day, so that the stream is of considerable width and depth as it flows past Greywell, and past the ruin of Odiham Castle.

A branch of the Whitewater rises at Ashley head spring, close to Crondall, about 273 feet above the sea. It flows north, joining another stream from near Itchel, 265 feet. These streams have their sources at or near the outcrop of the chalk from beneath the Tertiary beds, and, after their junction, flow past Hartford bridge, south of Bramshill, to the junction with the Whitewater at Heckfield.

The Basingstoke Canal carries off from our county about 2,500,000 gallons of water a day. This is conveyed to the basin of the Wey from the basin of the Loddon, to which, naturally, it belongs and formerly flowed. The springs which supply the canal are at Greywell, near the tunnel, the elevation being about 252 feet, which is the summit level of the canal from Basingstoke to Aldershot.

The Blackwater has its highest source south of Aldershot, near Ashbridge, at an elevation of 250 feet above the sea. This is near the Aldershot water works, to supply which it has been "tapped." The Blackwater forms the north-eastern boundary of Hampshire from its source to its junction with the Whitewater at 147 feet in elevation. Its height at Blackwater village is 200 feet. It flows past Yatley and north of Eversley and

Bramshill. After their union, the Blackwater and White-water join the Loddon a little beyond the Hampshire border.

The Enborne, which flows eastward along the north-western border of the county, has its sources near East Woodhay. It leaves Hampshire at Wasing and joins the Kennet beyond. From the vale of Kingsclere the Enborne receives two lesser streams which rise from springs of much interest. One of these, the Kingsclere stream, rises at the spring head a short distance south of Kingsclere, at an elevation of about 350 feet, and close to the Upper Greensand outcrop. Occasional springs also occur up to 372 feet, or higher. The chalk hills to the south rise rapidly to an elevation of 700 feet.

The Itchingswell spring, from which the other stream is chiefly supplied, occurs at the junction of the chalk with the Reading beds. This spring has an elevation of 335 feet, and is near to the site of the old church and graveyard at Itchingswell. The occasional sources of water to the stream are higher up towards Ladle Hill, from the northern slopes of which the water course is either through Sidminton Park to Itchingswell, or along the road at the western extremity of the park; where a very deep channel, dry in summer, may be seen near the Burghclere road. The Itchingswell spring forms a small rivulet of considerable volume at its source.

The Wey, which carries off the water from the springs of a considerable area of the eastern part of Hampshire belongs, like the Loddon, to the London geological basin. The highest geological formation which supplies the Wey is the chalk, and the lowest is the Lower Greensand. Alton claims to have the Wey, and Bramshot claims to have the Wey, and as it is certain that this river cannot be in these two places, it will be convenient to speak of the Alton stream as the northern branch of the Wey, and the Bramshot stream as the southern branch. The Alton springs occur both north-west and south of that town. Those on the north-west, at Willhall, have an elevation of about 360 feet. King's pond, near the railway station, has an elevation of 330 feet, and is supplied by springs south of the town. The name Ashdell, close here, is an old water name. The Alton springs yield a very great volume of water, and the stream east of the town is of considerable size.

Near Ansty Mill it receives a stream which has its source

near Hartley Mauditt, not far from Selborne, and flows through the little valley between Hartley Mauditt and Farringdon. At Great Cakers Bridge it receives an occasional source in a stream which in wet seasons flows from the Upper Greensand at West Worldham, down one of the most interesting waterways in the county, called Water Lane, which is at times both a lane and a water course, the water having cut for itself through successive ages a deep glen in the Upper Greensand or "Malm rock." About a mile below Alton the northern branch of the Wey receives a little stream of singular interest, the Holybourne, which gives its name to the village near it. The Holybourne is supplied by a spring from the chalk near the Upper Greensand outcrop. The spring has an elevation of about 350 feet, and is close to the churchyard. Formerly, the water issued from its natural spring almost opposite the west door of the church, and about 20 yards from it; but when the churchyard was enlarged, the spring head and stream were culverted for about 30 or 40 yards to the pond, which adjoins the churchyard wall, and in which the water of the Holybourne now rises. What its ancient sanctity was derived from it is perhaps now impossible to say. The main stream from Alton to the eastern limit of Hampshire follows close by the strike or line of outcrop of the Gault clay.

The southern branch of the Wey is a stream, which differs in its interest from any other in Hampshire. The main stream enters our county from Sussex, and it forms the boundary of the two counties in Hammer bottom. This was the site of the most important of the ancient iron works of Hampshire, and some of the woods about here still contain heaps of iron slag here and there, which are the remains of former smelting operations. The springs in Hammer bottom have an elevation of 400 feet. The stream here flows west, after which it turns to the north and flows past Bramshot. This is a country of springs, the most interesting of which are in the beautiful glen scenery of Wagner's Wells, at an elevation of from 400 to 500 feet above the sea. These springs are at the extreme east of Hampshire, and in the Lower Greensand formation. The Wagner's Wells stream flows from Grayshott to Ludshott through a series of beautiful ponds, at different elevations, until it joins the Wey near

Bramshot flour mill. This southern Wey then flows past Bramshot paper mill to Lindford, where it receives the streams from Woolmer Forest. One of these streams flows, except in dry seasons, from Woolmer pond, and the other, with which it unites, has several branches, one of which flows from a pond on Weaver's Down, another from Forest Mere pond and through Roodly pond, another from Wheatsheaf pond and Bohunt pond, and another from Fowley pond. These streams unite and form the Hollywater, at an elevation of about 245 feet above the sea. The masses of ironstone petrifications of all shapes, some resembling grooved worked stones, which occur among the sands of this district, and in which organic nuclei may be seen, around which the ironstone particles were gradually deposited, prove the character of the water in comparatively recent geological time, a character it retains to this day. Such a chalybeate water in medieval time may well have been esteemed the Holy-water, and visited by lepers and other impotent folk. The geological formation appears to be the Folkstone and Sandgate beds of the Lower Greensand.

Another branch of the southern Wey is the Oakhanger, which has its source at the well head at Selborne, 415 feet above the sea, at the outcrop of the Upper Greensand from beneath the chalk, and it has been described by Gilbert White. The Oakhanger has rather a rapid fall, and receives a branch from Oakhanger pond at 264 feet in elevation. It flows to Kingsley, where its height is 235 feet, below which it is called the Oxney, a name which appears to be of Celtic origin. The Oxney joins the Wey below Lindford. Near Lindford also the stream from Headley joins the Wey. Headley is one of the least known of our Hampshire villages, but is one of the most interesting. It has a character of its own, plenty of sand on a clay or loamy outcrop, and in one part of it, the part called Arford, plenty of water and springs at an elevation of about 255 feet.

In the eastern part of Hampshire, north of Petersfield, where the inland scenery is perhaps the most beautiful in the county, the high, well-wooded hills or hangers are partly those of the Upper Greensand, and the vales at their feet are chiefly formed of the Gault clay. It is on the lower slopes of these Upper Greensand hills that the springs

which feed some of the branches of the Rother occur, where the Gault crops out from beneath. This feature in the scenery is also seen near Selborne. In very wet seasons, when the Upper Greensand hills are saturated, the Gault below on which they rest becomes slippery from the great flow of water, so that landslips have occasionally occurred, as at Hawkley and Hartley Mauditt. One of the branches of the Rother has its sources near Empshott and Hawkley. The springs near here have an elevation of about 300 feet, and the Upper Greensand hills rise to 480 feet. Above the site of the ancient little mill at Hawkley is Ash farm, a name derived from the water source. The small stream here formerly drove an overshot wheel at Hawkley mill, one of the most interesting remains of an ancient mill in the county. Although now disused, the wheel remains, and an inscription on the house tells us that this is "Hockeley mill—ancient mill of the Bishops of Winchester; taken from them by Sir Adam de Gurdon, given back under King Edward, 1280 A.D., &c." The Ashford stream, another of the tributaries of the Rother, has its source on the slopes of Ashford hill, above Lutcombe bottom, 400 feet above the sea. Ashford hill rises to 700 feet. The stream has a rapid flow over the Gault, and at Steep mill its elevation is 270 feet.

Noar hill, near Selborne, is the watershed between the Rother drainage to the English Channel, and that of the Wey to the Thames and North Sea. The springs of the Rother, south of Noar hill, are in the lower chalk, and have an elevation of 390 feet. South of Petersfield the streams which flow to the Rother are fed by springs from the chalk. The Upper Greensand here forms the base of the low-lying country, and the chalk forms the hills. One of these streams has its sources in the springs about Buriton, anciently called Mapledurham, a Celtic water name. The Buriton springs are from 255 to 300 feet in elevation, and the chalk hills rise close above to 600 feet, and further away to about 800 feet at Butser hill. North of Buriton, is another stream fed by springs at about 265 feet in elevation. The Criddle stream, from the west, has its sources in springs near the Upper Greensand outcrop to the east of East Meon. The Rother leaves Hampshire at the south-east of Steep, near which place the springs have an elevation of about 170 feet. Near

here, in St. Mary's Well Hanger, is St. Mary's well, 172 feet above the sea.

About five miles south of Petersfield, in a valley among the chalk hills, is the village of Charlton. No permanent stream flows through this valley, but eastward of the village a remarkable "lavant" occurs. This lavant is a flow of water from springs in the chalk of an uncertain and intermittent nature, which occur in the winter or early spring, depending on the time and degree of the winter rainfall and the consequent saturation of the chalk. The lavant springs occur at varying elevations, depending on the nature of the seasons; the higher the lavant, the greater is the flow of water, which finds its way into Chichester harbour, near Emsworth.

In regard to the volume of water they give out, some of the greatest springs in Hampshire are those which occur in and around the parish of Havant. Within a mile or two of Havant are the great springs of Bedhampton and Farlington, which have been utilised for the Portsmouth water supply. The volume of water given out by the springs round Havant has been estimated at not less than 100,000,000 gallons a day, and its temperature at the springs is about 50 deg. Fahrenheit, that of ordinary chalk water. One of the shortest rivers in Hampshire is that which flows to the sea from Havant. Its course cannot be much more than a mile, and it is of sufficient volume to work a mill.

The stream to the sea from the Farlington springs is another of the same character.

The Wallington river flows into the head of Portsmouth harbour at Fareham. Its chief stream rises near Anmore, and flows through part of Widley and Southwick park. It derives its supply chiefly from the Tertiary formations which cover the chalk on the north of Portsdown hill, and you may stand on the bridge at Southwick, and see the stream either in great volume or at other times almost dry, depending on the period of the year and the season. A branch of the Wallington river has its sources in the country a few miles north of Boarhunt and Southwick, part of the ancient forest of Bere. Its highest occasional source in wet seasons is at Hambleton. In 1879 a great "lavant" occurred at Hambleton; the water rose in all the low-lying parts of the little

town, and springs broke out in all directions, to the consternation of the inhabitants. On that occasion springs occurred as high up the village as the churchyard.

The Meon or Titchfield river, which flows into the mouth of Southampton Water, is in some respects unlike any other in Hampshire. It has its highest permanent sources about a mile south of East Meon, where its spring head may be seen in the chalk, about 400 feet above the sea. About half-a-mile to the east is another spring at about the same elevation, which gives off a stream called the Oxenbourn, a water name partly Celtic and partly Saxon. These are our highest chalk springs in Hampshire. The chalk near here rises 300 feet higher, and attains an altitude of 700 feet. The Meon flows through the winding chalk valley of the Meon country for many miles, and receives no considerable tributary stream until it reaches the Tertiary country near Wickham. South of Soberton, not far from the stream, is a pool or well called St. Clare's well, which was probably in ancient time one of our holy wells. The springs near Wickham are caused by the London clay outcrop from beneath the Lower Bagshot sands. A few miles further on, the Meon again meets with the edge of another chalk outcrop, the western part of the Portsdown ridge or anticlinal. Here the stream is increased in volume by great springs about 35 feet above the sea at Great Fontley, and near Little Fontley farm. These old place names have been derived from the springs.

The Hamble has its chief sources near Bishop's Waltham. The springs to the north of the town are in the chalk at an elevation of about 128 feet. Those near Waterlane farm are about 134 feet. Higher up are Ashton and Ashton farm, where wells occur at 200 feet. A branch stream joins the Hamble south of Bishop's Waltham from Stokes lane, south of Upham, the water source being about 150 feet. Other streams flow to the Hamble from the moors, south-east of Waltham pond, and from the moors south of Hoe, the elevation in each case being about 100 feet. Another stream flows to the river from the direction of Swanmore, and many wells occur along its course up to 190 feet. Shawford lake, another stream flowing to the Hamble, has its sources at Row Ash, about 99 feet, and Pudbrook lake has its sources near Wildern farm, Hedge End, at about 100 feet in eleva-

tion. The Lower Bagshot beds, which lie upon the London clay over part of the country between the Hamble and Titchfield river, has a number of springs at its base, which supply rivulets that flow to one or other of these rivers. One of these from Park-gate, Titchfield, flows into the Hamble at Curbridge Creek.

There are many other springs and lesser streams in Hampshire, which in this short paper I have not space to mention. I have endeavoured to show how closely connected the geology of our county is with our springs and streams, and also to show that we have in our water names relics of our Celtic predecessors in this part of England. I have mentioned many names containing the syllabic words ash, ox, an, and others. I hope we shall preserve these old names. Before I conclude, I wish to draw attention to several considerations connected with springs and streams of some antiquarian and scientific interest. First, reverence was anciently paid to springs and wells in both Pagan and Christian times. Well worship can be traced from the most remote antiquity in Europe, Asia, and Africa. It appears to have been common both to the pagan Celts and Saxons. After the Saxon Christian conversion, it was difficult to put down this well worship. Many edicts of the Church were directed against it, from the fifth to the eleventh century. The latest which I have met with was that issued by Canute, and probably promulgated in Hampshire, in which "the barbarous adoration of the sun, moon, fire, *fountains*," &c., were forbidden. What could not be suppressed in regard to the worship or reverence for springs and wells, appears at last to have been sanctioned under the patronage of the saints, and we have St. Clare's well, St. Mary's well, St. Boniface's well, and St. Lawrence's well (the two latter in the Isle of Wight), and others remaining as examples of such holy wells. Secondly, we have traces in Hampshire of the ancient reverence of the Romans for springs and wells. "We pay divine honour," says Seneca, "to the sources of great rivers," and so, I suppose, they paid lesser honour to the sources of smaller streams. However this may be, it is certain that the sites of many Roman villas and dwelling places have been discovered in Hampshire near the spring heads of streams. The Roman pavements which have been found at East Dean, Thruxton,

Crandall, and Bramdean belonged to villas near spring heads. Roman buildings, or remains which leave no doubt that settlements existed, have also been discovered near the sources of streams, occasional or permanent, at Preston Candover, Redenham, Hambledon, Castlefield Andover, Bishop's Waltham, Upham, Bighton, and No Man's Land, Bramshaw, on the borders of the county.

Another consideration worthy of note is that the sites of some of our ancient Hampshire churches appear to have been selected in reference to the sources of streams. I have already mentioned the instances of the churches of Holybourne, Maplederwell, and Itchingswell, and there are other examples.

It is certain that many of the most ancient Hampshire roads are old water courses. In walking along these roads there can be no doubt that we are following the tracks which were used by the ancient Celtic inhabitants of this part of England. These roads occur all over the county, but their consideration is too large a subject for this paper.

Lastly, the contamination which the water undergoes and its purification in different parts of the courses of streams are interesting scientific considerations. This contamination arises from the drainage of houses and also of cultivated fields, from which the surface water flows into the streams. On the other hand, every waterfall, artificial weir, or shallow pebbly bed over which the water rapidly flows, and every water mill, by breaking up the stream into fragments and mixing the water with air purifies it by oxidation. This oxidation usually increases the nitrates in the water by the combination of oxygen with organic matter, but in some instances also it removes the nitrates. This latter process is shown by the following figures, supplied to me by Mr. Brierley (Public Analyst for Southampton), of analyses of samples of water, taken on the same day, from different parts of the River Itchen between Bishopstoke and Mansbridge, a distance of about two miles:—At Bishopstoke, the nitrogen in the form of nitrates was 0.1498 grains per gallon; lower down, at Fishhouse, it was 0.2577 grains per gallon; above the mill dam, at West End, it was 0.5755 grains per gallon; below the mill dam, the nitrogen in the form of nitrates had decreased to 0.3682 grains per gallon; and at Mansbridge it

had again increased to 0.4321 grains per gallon. The water, in passing through the mill, was found to have been purified of a considerable part of its organic matter, and also to have lost nearly two-fifths of its nitrogen in the form of nitrates by the mechanical action to which it had been subjected.

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