

**The Hastings and St. Leonards pamphlet : being abstracts of reports of the London and local press on the new drainage system of Hastings and St. Leonards : also scientific and statistical information in reference to the water supply, health and death-rate, and climate of the borough of Hastings / by John Charles Savery.**

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### **Publication/Creation**

St. Leonards-on-Sea : Printed and published by Burg & Daniel, 1868.

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The  
Hastings and St. Leonards  
Pamphlet.



The Journal of the

1847-1848

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# The Hastings and St. Leonards PAMPHLET;

BEING  
ABSTRACTS OF REPORTS OF THE LONDON AND  
LOCAL PRESS ON THE

## NEW DRAINAGE SYSTEM OF HASTINGS AND ST. LEONARDS;

ALSO SCIENTIFIC AND STATISTICAL INFORMATION  
IN REFERENCE TO THE

Water Supply, Health and Death-Rate, and  
Climate of the Borough of Hastings,

BY

JOHN CHARLES SAVERY,

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House Surgeon Northampton General Infirmary, and Kent  
Ophthalmic Hospital.*

St. Leonards-on-Sea:

PRINTED AND PUBLISHED BY BURG & DANIEL.

1868.

c

The Hastings and St. Leonards

# PAMPHLET;

ABSTRACTS OF REPORTS OF THE LONDON AND  
LOCAL BODIES OF THE

## NEW DRAINAGE SYSTEM OF HASTINGS AND ST. LEONARDS;

ALSO NARRATIVE AND STATEMENT OF THE  
PROGRESS TO THE

ST. LEONARDS.  
BURG AND DANIEL,  
PRINTERS.

JOHN CHARLES BARRY

Corresponding Editor of the Hastings and St. Leonards  
Horn Surgeon, Northampton General Dispensary, and St. Ann's

and St. Ann's should not be lost to bring some other points  
and our own position as a health resort, also before them.

I would call their attention to the abstract of this

and what is the result on "The Relation  
PRINTED AND PUBLISHED BY BURG & DANIEL,  
Hastings and St. Leonards, (page 41) I have only



## Introduction.

THE new line of railway having brought us within an hour and a half of London (therefore one of the nearest health-resorts to the Metropolis) our main intercepting drainage scheme having been successfully completed, our cesspools abolished, our outfalls removed, our beach and sea purified, it is deemed desirable to bring the matter strongly under the notice of the public, and of our professional brethren at a distance, to whose good opinion we are so largely indebted for our prosperity. I undertook the duty, and thought the opportunity should not be lost to bring some other points, bearing on our position as a health-resort, also before them. Notably, I would call their attention to the abstract of that remarkably able report by DR. BUCHANAN on "The Relation of Phthisis to Dampness of Soil." (page 41). I have only

been able, by the limits of this pamphlet, to excerpt those portions which bear on this locality, but the whole report is full of important and interesting matter. I have added an account of our Water supply, a few remarks on our Death-rate, and data for forming an opinion on our Climate, which I hope will be interesting and useful in determining the selection of Hastings and St Leonards as an invalid residence.

In conclusion I have to thank my confrères DRs. BLAKISTON, GREENHILL, MOORE, and WILSON, for their assistance and co-operation in carrying out this project, as well as my fellow townsmen who have lent me their aid.

JOHN CHARLES SAVERY.

*12 York Buildings,*

*Hastings.*



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## The History of the New Drainage Systems of Hastings and St. Leonards

PRESENTS a curious concurrence with the phases passed through by that of London,\* and indicates that, spite of the outcry which has been at times raised against us, the authorities of the towns have always been ready, at any cost, to raise the standard of public health and convenience to the highest pitch, in accordance with the state of sanitary knowledge at the time.

For many years, as in the metropolis, cesspools were thought to be the proper receptacles for every kind of house refuse—the sewers, where existing, being devoted to carrying off rainfall. By degrees the overflows of the cesspools were *allowed* to run into the sewers, and in due time the whole of the house sewage was passed into the drains. It was not until 1847 that this great fact was recognised, and made compulsory by Act of Parliament, and all true sanitary improvement dates from that time. Then came the era of small pipe drainage, under which reign much of our old system was constructed in 1856-7, at a cost of £17,000. It was the result of the best advice of the day, and although we now know that the data on which it was based were erroneous, and have in the long run caused us much expense,

\* See Bazalgette "On the Main Drainage of London, 1865."



more inconvenience, and a diminished reputation, still we must give our former rulers the credit of having done the best they could for the towns at that time. Small pipes involved frequent outfalls, and, as a consequence, three culverts disfigured our sea-front. At St. Leonards there was a more primitive system adopted, and each group of twenty houses emptied their refuse into the sea by ten or twelve pipes directly under the windows of the houses.

This created some prejudice on the part of the public, and it must be confessed that the idea of bathing in a sea which might possibly be polluted with sewage was not a nice one, and in 1863 Mr. Rawlinson made such a report on the outfalls as rendered it desirable that further steps should be taken, so that, if possible, the annoyance visitors experienced should be removed.

It was at once seen that an intercepting sewer was the only practicable means for obtaining this end ; and it being thought that advantages would accrue from combined action on the part of the governing bodies of the district, the first schemes had all reference to drainage of the two towns under one system. The first plan Mr. Andrews, the Borough Surveyor, was requested to furnish in 1864, consisted of two intercepting sewers, starting from the Infirmary, one discharging at Rock-a-Nore, the other at the present outfall of the St. Leonards Commissioners. This was submitted to Mr. M'Clean, the eminent engineer, and, with some slight modifications, approved of by him ; but it was thought that the proposed outfall of so large a district would be prejudicial to the health and interests of St. Leonards, and a more extensive scheme was then devised by Mr. Andrews, for conveying the whole of the sewage westward to Glynde



Haven, having previously irrigated the flat meadows to the westward of St. Leonards. This plan was approved of, after some alteration, by Mr. Bazalgette, the Engineer to the Metropolitan Board of Works, in December, 1865 ; but it was then feared that annoyance would be experienced from the sewage meadows, and that the great drive of the neighbourhood, towards Bexhill, might be injured. On these objections being taken it was deemed that combined action was no longer possible, and Mr. Bazalgette having stated that “an outfall at each end of the town would remove many difficulties, and a very improved fall could be obtained by a fall east and west ;” and that “in an engineering point of view it is a further advantage to have to discharge on a flood tide instead of an ebb,” each board determined to carry out its own drainage system independently. The Hastings Local Board desiring their surveyor, Mr. Andrews—whose former plans had received the approbation of such eminent engineers as Messrs. M‘Clean and Bazalgette—to prepare a plan for the eastern district ; and the St. Leonards Commissioners retaining the valuable services of Mr. Bazalgette, assisted by their own surveyor, Mr. Gant. The latter undertaking being the smaller, and therefore completed earlier, it will be convenient to trace its progress first. The contract was taken by Mr. Webster, who has constructed the Southern Thames Embankment, and has now undertaken the last section of the Northern portion of that colossal work. The plan consists of an intercepting sewer, commencing at the archway and running westward under the Parade wall to tanks situated near the Bopeep Railway Station ; here the sewage is retained until about two hours after high water, when, the penstocks being



raised, the whole contents of the sewers are discharged in about twenty minutes, and carried by the receding tide for five hours longer to the westward, to be thoroughly diffused and mixed with the waters of the Channel.

The works of the Hastings Local Board are of larger proportions, but similar in design. The contract was taken by Mr. John Howell, a builder of much local celebrity along the south coast. A large egg-shaped sewer starts from the centre of Warrior Square, enlarging as it proceeds (with outfalls for storm-waters at Warrior Square and the Memorial Tower), and intercepting all the eastern drainage as it proceeds to tanks situated under the East Cliff capable of containing nearly 2,000,000 gallons. Here a similar process is carried on as at the western outfall, except that the discharge is made at dead low water, by which means the sewage is carried up Channel for five hours away from the town, and as the flood tide is sharper and more rapid than the ebb (to which Mr. Bazalgette refers as an engineering advantage), the sewage is carried to a greater distance than at the western outfall. The enormous iron pipe sunk in a trench blasted out of the solid rock discharges the whole contents of the reservoirs 2,500 feet from the tanks in about an hour from the time of raising the sluices, and therefore precludes any chance of pollution of the sea-front. Both systems have been satisfactorily carried out, and both work well and smoothly ; and from one end to the other of our extensive sea-front there can no longer be any dread of meeting matters to offend the eye or nose. Our bathing sea is pure ; our sands are clear from sewage impregnation ; our sea breezes are freed from any taint to mar their sweetness ; and nothing now remains to be done to place our main



drainage system in the position of being as perfect as the most able engineers and energetic contractors can make it, in the present state of sanitary science.

The cost has been large—£40,000 ; but if the public and the profession are satisfied with our efforts, our sacrifices will not have been made in vain.

The St. Leonards Drainage Works were completed July, 1867, and since that time have worked in a most satisfactory manner, no annoyance of any kind having been experienced either from the receiving tanks or outfall. The disgusting iron pipes have all been removed, and a sweep of clean beach now presents a safe lounge for the invalid or pleasure-seeker.

The Hastings Works were finished July, 1868, and an influential committee of the inhabitants, under the management of Mr. C. Hope, determined to mark the appreciation by the town, of the public spirit of the contractor (Mr. John Howell) in carrying out the works in the manner he has done, by a public dinner. The dinner was preceded by a formal opening of the works, to which many of the representatives of the London Press were invited, and in the course of the next week a full description of the works and the proceedings of the day were detailed.

It being rarely one person's opportunity to see all the notices of an event, and the only way to obtain a correct idea of any occurrence being to read various accounts from different points of view, I have thought it desirable to collect and republish extracts from the most important reports which have appeared, relating both to the Drainage System of Hastings, and also that of St. Leonards which was completed a year ago.



Abstracts from Articles which appeared in the  
London and Local Newspapers on the Opening  
of the New Drainage Works at Hastings.

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From "The Lancet."

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THERE is no subject of more general interest than the sanitary condition of our English watering-places, and those few sheltered nooks where the invalid may venture to take the air even in the depth of winter. Moreover, the prosperity of these places depends largely on the dictum of the medical profession, who incur a grave responsibility in recommending the removal of their patients from healthy country homes, furnished with every luxury, without the assurance that they will enjoy other sanitary advantages besides a sheltered situation and an open sea.

Yet it is precisely under most unfavourable sanitary conditions that the borough of Hastings has grown up. Originally cooped up in a narrow valley shut in by overtopping cliffs, with ill-constructed houses swarming with a rough seafaring and smuggling people, it was during the middle ages the constant seat of plague, and even in modern times fever was rarely absent from its ill-drained and overcrowded courts. From within these narrow limits it emerged some fifty years ago. Visitors were attracted by its mild and equable climate, by its lovely surrounding scenery; and, after the exact meteorological observations of the late Dr. Mackness, it was clearly demonstrated that it was well suited as a winter residence for a considerable class of invalids.



It is somewhat remarkable that the more ancient portion of the borough was, until quite recently, the better drained. A rude system of sewers was here in operation, flushed twice a week from a pond situate at the upper part of the town. But in the newer parts cesspools were all but universal, and when drains were first made they were devised to carry off the surface water, and it was positively forbidden to discharge foul matter into them lest they should be choked thereby. In the houses facing the sea it was then customary to keep a tub for solid refuse, and to empty the contents daily on the beach. In 1856 the evils of such an imperfect system became unbearable, and the town was drained at a cost of £16,000 on a system adapted to the natural levels. But the effect was simply to transfer the entire pollution of the town to the sands. The sewage was discharged immediately in front of the most fashionable quarters. The hollows of the beach were frequently filled with filthy mud, to the infinite disgust of bathers, whose complaints some two or three years ago bid fair to destroy the reputation of the place. Moreover, the sewers were open to the sea, which, at high tides, advanced and filled them in some cases for a length of half a mile from the outlet, and the mixture of sewage and sea water caused a deposit which choked the smaller drains, and generated offensive gases, which were forcibly driven into the houses of the upper portion of the town. These gases became a continual source of fever. Ugly rumours went abroad, and the inhabitants, threatened with a loss of their prosperity, and stimulated by the rivalry of other important bathing places, set about the adoption of remedial measures. In this they seem to have been particularly fortunate in securing the services of a most competent local engineer, and of a contractor ready to do the necessary work on the lowest possible terms, because he is himself—as an owner of house property—most deeply interested in the result. This is most apparent from the fact that the highest tender for the works required £49,000, and that they have been satisfactorily completed by Mr. Howell for £26,000. A main intercepting sewer has been constructed on the frontage of the town, commencing at St. Leonard's Archway, and terminating in a tank at the eastern suburb. This tank is capable of holding 1,500,000 gallons of sewage, and is emptied into the sea by means of a 4-foot iron culvert half a mile long, the extremity of which is perpetually under water. The tank is discharged twice a day at low water, when the current of



sea sets eastwards, and the whole is conveyed into Rye Bay, where it meets an opposing current, and is carried directly out to sea.

The adjoining township of St. Leonards, under the advice of Mr. Bazalgette, has lately completed works of a similar character, but here the levels permit of the discharge taking place at high water, when the tide runs westward. There is, therefore, a clear frontage of between three and four miles, and in place of some eight or ten open culverts discharging offensive matters, there is now clean bathing and a pure sea. Some of the old openings on the beach are, however, permitted to remain. They are closed with penstocks, but will be available in heavy falls of rain as safety outlets, and also for flushing the drains by admitting sea water when the season is particularly dry.

At the Hastings or eastern tank some speculative gentlemen are erecting machinery to deodorise and dry the sewage for manure. They have engaged to conduct their operations in an apparatus hermetically sealed, and we can only hope that they will be enabled to solve the great social problem of the day to the satisfaction of the ratepayers of Hastings, and their own profit. In either case the public will regard the experiment with interest, and ought to be grateful to them for the risk incurred.

The whole of the works were formally opened on Monday last, in presence of a large number of visitors, and the representatives of the London press. The sewage of forty-eight hours had been allowed to accumulate in the tank, which was about half full. On opening the sluice a sort of marine fountain was observed some distance from the coast, opposite to Ecclesbourne Valley. A filthy black stream discoloured the sea for a considerable distance, and passed slowly to the eastward, away from the town. The tank was emptied in about an hour and a half. For the future it will be emptied twice a day, and thoroughly cleansed on each occasion by a flush of water. A dinner in honour of the event was given at the Queen's Hotel. The Mayor presided, and many of the mag-nates of the neighbourhood were present.

Without wishing to draw invidious distinctions, we must congratulate the inhabitants of Hastings and St. Leonards on the completion of their spirited and successful undertaking, which cannot fail to place the locality amongst the foremost in the race of sanitary improvement.—*August 1st, 1868.*



## From "The Builder."

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THE completion of the main intercepting sewer of the new drainage works at Hastings was celebrated by a dinner to the contractor, Mr. John Howell, given at the Queen's Hotel, on Monday last. Virtually this completion, so far as it goes, may be taken as that of the sewerage of the whole borough ; as St. Leonards proper, the western wing of the frontage, has had its similar system at work for some months past. The *modus operandi* adopted by both places may be described as the *tank* system, the whole of the sewage being conducted by a main intercepting drain to a deposit tank, whence it is discharged at such period of the tide as is favorable to carrying it clear away from the town.

At St. Leonards this is at high water, when the set of the tide is *westward*. At Hastings, the discharge at low water leaves the flowing tide some four or five hours to carry the outpourings to the *eastward*, where it meets the outflow of the River Rother, and is dispersed to sea.

The intercepting sewer of the Hastings system extends from the Archway (the western extremity of the Local Board district) to Ecclesbourne, where the whole of the sewage of the district (with the exception of a very small portion which is drained into the St. Leonards sewers) is discharged into the sea from the tank by gravitation, at low water. The point of discharge is 800 feet into the sea, and opposite Ecclesbourne Valley. The original sewer remains from the Archway to the centre of Warrior Square, and at the latter point, where there has hitherto been one of those obnoxious outlets into the sea, the new intercepting sewer commences. From that spot to the Albert Memorial the size of the sewer is 4ft. by 2ft. 9in., egg-shape, and has a fall of about 7ft. per mile. From the Albert Memorial the sewer passes along Wellington Place, through Castle Street, along Pelham Place and East Parade, to the Bourne, the size up to that point being 5ft. by 3ft. 6in., also egg-shape. There are four branch sewers from George Street, &c., 2ft. 6in. by 1ft. 8in., egg-shape, with self-acting tide-flaps complete. From the Bourne to the East Groyne the size of the sewer is 5ft. 6in. by 4ft., egg-shape. The fall from the Albert Memorial to the East Groyne is 4ft. per mile, and the water of the



natural streams running through Warrior Square and Priory is used for flushing power, so as to prevent any deposit in the sewer. The new tank which has been constructed near the East Groyne as a receptacle for the sewage will contain about 1,500,000 gallons, and previously to the scheme being adopted it was ascertained that the greatest guagings of sewage, in dry weather, taken at the three outlets, did not exceed 600,000 gallons in twelve hours, leaving 900,000 gallons for slight rains. The bottom of the tank is about 5ft. 6in. above low water at neap tides, and 2ft. 6in. below the invert of the sewer. From the tank a 4-ft. cast-iron pipe runs out to the point already mentioned, 800ft. into the sea, with a fall of from 8ft. to 10ft. per mile. This will discharge 1,000,000 gallons per hour, and therefore the tank, when full, can be discharged in one hour and a half.

As a matter of fact, the whole contents of the tank, with thirty-six hours' sewage (in very dry weather), was discharged on Monday in the presence of several of the principal inhabitants and representatives of the press, in about an hour. As all the offensive outlets which have so long been allowed to pollute the bathing of this favourite watering-place and induce illness, are now stopped, its visitors may depend on clean bathing in a pure sea.

The works connected with the scheme have been carried out by Mr. John Howell, assisted by his attentive and judicious foreman, Mr. H. Butler, many years with Myers and Co.

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### From the "Daily Telegraph."

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HEALTH has always been, as aptly as alliteratively, linked with Hastings; and there are some remarkable works of a sanitary kind which will take us eastward through the Old Town, and its fishy and tarry atmosphere, to look at them. A blue-clad population, with its chest and its back and its arms stuffed into light worsted skins, and its lower man loosely fitted with pale stiff drab trousers, is busy mending its fishing nets and stringing by the gills any number of little fish, transparent in the sunlight, that they may be dried by the salt wind that comes dancing over the sea. Quite at the end of the fishermen's quarter, on high ground reclaimed



from the ocean, at the foot of the great high crags against which the waves used to beat, there are signs of some engineering operations that extend pretty far. Four-and-twenty circular blocks of brickwork, projecting a foot or so above the ground, are evenly distributed over a space of rather more than 200 by 100 feet. On every block is a small iron grating; and, as Mr. William Andrews, who accompanies our visit of inspection, informs us, these twenty-four constructions are charcoal ventilators of a vast tank beneath our feet. The interior dimensions of this underground tank are 210ft. length, 100ft. width, and 14ft. height; and now let us inquire the purpose of such an excavation. Mr. Andrews is the very man to tell us; though he will hardly do full justice to the projector of the work, whose deserts others are readier to recognise. It was, in fact, Mr. Andrews himself whose plan of a new intercepting sewer and tank for the better drainage of Hastings found favour with the authorities and inhabitants of the borough, greatly to the honour of their enlightenment and public spirit. In his capacity of local surveyor, Mr. Andrews submitted a report to the drainage committee in the spring of 1866; and the proposals contained in that report have been carried out to the very letter. It should be noted that, twelve years ago, a system of draining was established here, at a cost of £16,000; and the people of Hastings supposed, not without reason, that that system was perfect. It was perfect while Hastings had not greatly extended its limit, and increased its population. Several outlets for sewage, long iron pipes, ran down the beach into the sea. One of these is directly in front of the Queen's Hotel, the site of which handsome edifice was, in 1856, a part of some considerable area of vacant land since entirely built over. In fact, the best quarter of Hastings is that which has most lately sprung into existence, close to the offensive outlets. The plan of the local surveyor for amending this state of things was adopted for St. Leonards as well as for Hastings: and, at a distance of nearly four miles of coast, the two tanks with their outfalls have been constructed. We are now looking at the works eastward, by which Hastings is drained at a cost of about £30,000. In the tank under the cliffs the sewage is stored until low water, and then discharged, the action of the tide taking it eastward, and thus away from the town; so that the whole of the sewage of Hastings is got rid of in about an hour, at intervals of little more than twelve hours. The discharge is through about half a mile of iron culverts,



with a fall of ten feet in the mile. The old outlet pipes are now in course of removal, but a portion will remain closed by penstocks, to be used as safety-valves in the event of extreme floods, and to flush the drains from the sea in very dry weather.

The works east of the Old Town will be seen to include other objects not yet mentioned. Utilisation of sewage, a principle which must inevitably find general and practical acceptance sooner or later, is exemplified here by certain scientific operations on the part of private speculators. Mr. Rock, a former mayor of Hastings, and a leading man in all improvements of the town, has lent his hand to the invention of Mr. George Edward Noone; and the machinery by which a portion of the underground tank, measuring 40ft. by 10ft., is worked for the saving of manure, that would go with the rest into the sea, is so perfectly successful in operation that there can be no doubt about its coming into general use. Deodorised by chemistry and dessicated by heat, the fertilising substances are brought to the exact constituency of guano, and can be sold at about half the price of that valuable manure. At St. Leonards, where the works have been constructed, like those for the drainage of Hastings, in the best Portland cement, the contractor has been Mr. Webster, and the engineer Mr. Bazalgette. The tank is at the extreme west of St. Leonards, and the culvert takes a westerly line along the coast, precisely in the opposite direction to the culvert of the Hastings tank. There is this further difference, that whereas the easterly discharge takes place at low water, the outfall westward is at high water, as the tide then sets that way. For the Hastings work the contractor has been Mr. John Howell; and, the Government engineer having approved the plans of Mr. Andrews, the local surveyor, they have been carried out under that gentleman's supervision. Though we have but just seen them formally "opened," it should be observed that the new system of drainage has been in operation for the past fortnight.

It was to celebrate the completion of the tank and intercepting sewers that a company of rather more than a hundred gentlemen dined, on Monday, at the Queen's Hotel, the principal guest in whose honour they were met being Mr. Howell. The Mayor of Hastings, Mr. William Ginner, took the chair; and there was a pleasing evidence of the unanimity of political parties, where the general good is concerned, in the constituents of the meeting. Mr. Howell, it may be mentioned, takes the lead, as a Liberal, in all



electioneering matters; but he has been zealously aided in his public work of sanitary improvement by an influential townsman, Mr. Hope, who holds opposite opinions. One of the borough members, whom the constituency is about to lose, Mr. Waldegrave-Leslie, was present; and four candidates, whose names already appear on the walls and hoardings in the town, Mr. Thruston and Colonel Calthorpe, in the Conservative interest, and Mr. Brassey, jun., and Mr. North, Liberals, met on neutral ground. "Cleanliness," runs the old adage, "is next to godliness;" and, though it may not be strictly orthodox to assert that the religion of the Bible is practically reducible to a sanitary code, there cannot be a doubt that, in obeying the laws of health, we are following the divine injunction. It is good, then, that the clergy of Hastings should be among those who take an interest in the work lately completed; and Hastings is fortunate in having a clergyman who, on temporal as well as on spiritual affairs, can express his views as eloquently as the Rev. Dr. Crosse, rector of Holy Trinity, who contributed the most admirable speech of the evening.

Externally, Hastings was remarkable for being clean above other towns; but the neatness of its outward look was no more an infallible proof of its perfect freedom from hidden abomination than the shirt-front of stainlessness and the white gloves of purity are a positive indication that the wearer takes a bath regularly before breakfast, or at some period of every day. Not that Hastings deserves the reproach of being a whitened sepulchre. What was done for the drainage of the town, years ago, was faithfully and honestly done, with no niggard outlay, and with no sign of blundering or suspicion of a job. For a time, the purpose of the work was fairly accomplished; and when it was found that Hastings had outgrown the means of cleanliness and health, the cheerful readiness of the town to pay for new and costly works cannot be spoken of too highly. It may be said that self-interest was a sufficient argument and motive for the step; and so it might have been, but that a prudent liberality is not universal. The ratepayer is a being not always to be convinced by such cogent reasoning as that embodied in the speech of Mr. Mayor, the other evening, when he observed that to the householder who pays £150 a year rent, and who lives by letting lodgings, the tax of 50s. is a moderate sum to pay for filling the town with visitors; while the labourer whose annual rent is £10 can spare 3s. 4d. to insure the abundance of



work which will last as long as trade is good. As it is, however, there has been little if any disposition to cry out against the expense of draining Hastings efficiently ; and those of all parties who have to put their hands deepest into their pockets appear to be most thoroughly satisfied with the work of Mr. John Howell and Mr. William Andrews.—*July 30th, 1868.*

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**From the "Daily News."**

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THOSE who in their annual migrations for health, rest, and pleasure, patronize the watering-places on our southern coasts will recognize Hastings as one of the most agreeable of them. The air is mild and salubrious, yet sufficiently bracing for most constitutions. The land is undulating and fairly wooded ; the drives and walks inland are through the prettiest of country lanes, thick-shaded woods, over tall hills, and down deep valleys. The coast-line is bold ; the rock, sand, and shingle of the fore-shore being backed by what a few years ago were tall shelving cliffs, but which now form streets and terraces of more or less pretentious houses, varied here and there by large handsome squares. The sea-view is uninterrupted, as far as the eye can reach, and there is an esplanade, including St. Leonards, of over three miles long. But with all its inherent attractions, its superadded accommodation, and its facilities of communication with the metropolis, Hastings does not command that amount of continuous public patronage which its inhabitants think it deserves. The growth of the town, though gradual, has been rapid during the past 20 or 30 years ; and it was soon found that the drainage arrangements, which did very well for a place that depended principally upon its markets and fisheries, were totally inadequate to the requirements of a fashionable watering-place. In short, fever broke out from time to time, Hastings got a bad name, and fashion deserted her. To retrieve and improve her position, a system of drainage adapted to the natural levels was designed and executed in 1856, giving several outlets for sewage into the sea along the front of the esplanade. One of these outlets



is exactly opposite the Queen's Hotel, another opposite the fashionable Warrior Square, and a third in front of the aristocratic Marina, of St. Leonards. This remedy proved, however, to be almost as bad as the disease; the outlets were constantly discharging their contents into the sea, and the sewage matter floating on the surface to and fro with the tide, rendered bathing from the beach anything but an agreeable operation, and disgusted the visitors. To amend this, Mr. Andrews, the local surveyor, about 18 months ago, devised a scheme which was adopted by the local board of health and approved by the government engineer, by which a thorough system of drainage is secured, and all the objections to sight and smell pertaining to the old system are obviated. The main principle of the new plan is to carry the sewage out into the sea east and west of the town so far, and discharge it at such times of the tide, that it cannot return, but must be washed away at once. . . . . The completion of these two undertakings (Hastings and St. Leonards) gives a clear sea frontage of between three and four miles, and in place of some eight or ten culverts discharging offensive matter therein, there is now pure clear bathing water over the whole of that distance. Some of these old culverts are, however, to be retained, but closed by penstocks, and used as safety-valves in the event of extreme floods, to carry off the surplus water, and also for flushing the drains from the sea in very dry weather. . . . . On Monday afternoon, at the lowest point of the tide, the penstock which connects the tank with the culvert was formally opened, and the sewage accumulation of the previous 24 hours discharged into the sea. The first effect of the opening of the sluice was apparent, in a sort of marine fountain, which suddenly rose up in the sea to a considerable height, and of no inconsiderable volume, caused by the rush of air meeting the resistance of the water. This, after playing some time, subsided, and was followed by a filthy black stream issuing forth from the culvert under water, which presently communicated its murky colour to the sea for several hundred yards round, and in the direction of its flow for upwards of half a mile in length, and which by its foetid smell left very little doubt of its component elements. Some hours later, at high water, the same thing, or very near it, occurred at St. Leonards, where Mr. Bazalgette has superintended the works. In both cases the successful issue of the plan and the thorough efficiency of the works is proved and acknowledged. An event for



which the town looks forward for future substantial benefits must necessarily have a festive celebration ; and accordingly, in recognition of the services of Mr. Howell, the contractor, whose zeal, energy, and enterprise have brought the works to a successful completion in the short space of 18 months, and at a comparatively small cost, a dinner was in the evening given at the Queen's, which will perhaps be more immediately advantaged by his labours than any other single house in Hastings.—*July 29th, 1868.*

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### From the "Morning Star."

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ON Monday Hastings was *en fête* to celebrate the completion of the new drainage works, which will render the district absolutely healthy, as nature evidently meant it to be. These works were imperatively needed, to promote not only the bodily health of the townspeople, but also of its financial prosperity. Hastings is one of those towns that live by their visitors ; its advantageous position, offering as it does to the invalid and to the healthy man the most perfect freedom of choice between breezes mild and bracing, long made it a pet place with the doctors ; and patients, both those who had and those who had not anything the matter with them, resorted to it as a matter of course. While Hastings continued to please the doctors it might laugh at fortune, but a few years ago it seemed suddenly to have lost the favour of the medical profession ; ugly rumours of its being a little fever nest got abroad, it began to smell foul in the nostrils of some of its former friends, and gradually it came to be laid under a kind of professional interdict, which it was given to understand could not be removed until it had done something for its drains. Such an interdict meant positive ruin to the proprietors of the miles of stately houses that front the sea, and the corporation was not long before it set about the work of purification. Hastings was drained in 1856 at a cost of about £16,000, but large as was this outlay, it failed to effect the purification of the town. Hastings still smelt ; the only difference between its first and its second state being that the odours had shifted their quarters, and had ceased to become offensive in one place, to become more offensive in another. Now that this system



of drainage is done with, the truth may be spoken about it without injury to the town. It was radically bad. The system was adapted to the natural levels ; from polluting the town, the sewage was simply made to pollute the beach before the town. Through a number of pipes, placed about 500 yards apart, and in front of the houses, the foul stream trickled night and day into the sea. When the tide was down, the beach was a mass of corruption ; when the tide was up, the sea water made its way into the pipes, and by preventing the sewage from escaping, made them so many underground cesspools to the very heart of the town. The skilful artist who made these drains, could have proposed but one end to himself, how to cause the greatest offence to the nostrils of the greatest number of people. Warrior-square and the promenade in front of the Queen's Hotel had always been places of fashionable resort, and, therefore, right in front of the Queen's Hotel and Warrior-square did he plant his two biggest pipes, so that every unhappy bather at these places, plunged into water nearly as foul as that of the Dunciad. This was not to be endured ; the town took counsel once more, and after much consideration, adopted a remedial suggestion made by its local surveyor, Mr. Andrews. Mr. Andrews proposed to intercept the sewage of the old drains, before it reached the sea, by constructing one main sewer, with an average fall of 5ft. 6in. per mile, to take the whole discharge eastward for storage in a large tank capable of holding 1,500,000 gallons, and thence to let it run at intervals of twelve hours into the sea, at a sufficient distance from the town to insure its never finding its way back again. It was the completion of this work, at a cost to Hastings and St. Leonards of £40,000, that Hastings celebrated on Monday, by a dinner to the contractor. There can be little doubt that the work has been done thoroughly this time. The two great tanks or receptacles for the sewage at Hastings and St. Leonards are about four miles apart, and are quite clear of the town. They are so constructed that, even if they were in the very heart of the place, but little effluvium would arise from them. The Hastings tank is absolutely closed in, except that it has twenty-four ventilators on the top, which, being filled with charcoal, perfectly deodorise the air that passes through them. It lies, as we have said, at a considerable distance from the town, but the sewage has to travel still farther, through about half-a-mile of 4ft. iron culverts, with a fall of about 10ft. per mile, before its discharge



into the sea. This discharge is so rapid that a quantity of sewage, to the depth of about 7ft. in the tank, can be got rid of in about three-quarters of an hour. The works at St. Leonards are precisely similar in principle of construction, though they are necessarily not so large as those at Hastings. They were completed by the Private Improvement Commission, a body quite distinct from the Local Board, at a cost of £10,000. Here the discharge is to the westward, and it takes place at about high water, the action of the tide being then to the westward. The completion of these two undertakings gives a clear frontage of from three to four miles of beach between Hastings and St. Leonards free from every taint of impurity. In place of some eight or ten open culverts discharging offensive matter in that length, there is now clean bathing in an open sea. Most of the old outlet pipes are to be removed, a few will be closed by penstocks and suffered to remain for use as safety valves in the event of extreme floods, and for flushing the drains from the sea in very dry weather.

The £30,000 that these works at Hastings have cost will be paid off by the town in thirty years by a charge on the rates. By this means the burden will never fall with undue weight upon the inhabitants. There can be little doubt that within a very few years the work will have paid for itself twenty times over in the increased prosperity it will have brought to the town. There is nothing now which the most fastidious of valetudinarians can carp at, in the neighbourhood of Hastings and St. Leonards. The population of these towns will receive the encouragement they deserve, for the spirit with which they have tried one costly plan of drainage, so soon after the failure of another.—*July 28th, 1868.*

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**From the "Morning Advertiser."**

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THE thorough drainage of our great towns and the utilisation of the sewage, are problems which have for many years past engaged the attention of sanitary reformers and economists, but the offal, like edged tools, has invariably proved hurtful to those who carelessly meddled with it. Witness the pestiferous fever which some years ago followed upon the drainage of Croydon, where the sewage was collected into a vast reservoir, alike deficient of natural



outlet and of deodorising machinery. That failure of a step taken in the right direction, discomfited for a time all those who were interested in the question ; but science never stands still, and, to the enterprising, failure is but a fresh stimulus to renewed exertion, and exertion follows exertion, until complete success crowns the efforts of the enterprising. This has been signally illustrated at Hastings. There is scarcely to be found on our coasts a more agreeable watering-place. Historical associations, beauty of situation, and a thousand nameless charms, recommend it as a seaside residence to the valetudinarian ; but unfortunately for it, the more its popularity increased, the greater the influx of visitors, the more the character of the place in a sanatory point of view became diminished, for the effluvia of the sewers became so great that it got the mastery over the salubriousness of the sea breeze, and the discharge of the filth upon the coast was sufficient to frighten the least squeamish of bathers. This being the case, the inhabitants took affright ; for if the popularity of the town as a seaside resort once became damaged, then their occupation, like that of *Othello*, was gone. They accordingly set themselves to remedy the evil ; and in 1846, at a cost of £16,000, established a system of drainage adapted to the natural levels. The fault of that system was, that it dispersed rather than removed the evil, creating several outlets for the sewage along the sea front. These outlets discharging constantly, at all times of the tide, became offensive to sight and smell, the more so as the population went on increasing and hence some modification of that system became necessary, until at last Mr. Andrews, the local surveyor, came forward with a plan, which was adopted by the Board of Health and approved by the Government engineer. By this system the old drains are all intercepted ; and, instead of running down each watershed and discharging at the natural outlet, the main sewer takes, with an average fall of 5ft. 6in. per mile, all discharge eastward, to a large tank capable of holding 1,500,000 gallons. The sewage is stored in this tank until low water, and then discharged, the action of the tide taking it eastward and thus away from the town, so that the whole of the sewage of the town is got rid of in about an hour, at intervals of little more than twelve hours. The discharge from the tank is through about half a mile of 4ft. iron culverts, with a fall of about 10ft. per mile. The cost of these works now being carried out is about £30,000, to be paid off in



thirty years by the corporation. In addition to these works in Hastings proper, the adjoining township of St. Leonards has also carried out its own works of similar character, the discharge in this case being to the westward, and at or about high water, the action of the tide being then to the westward.—*July 28th, 1868.*

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### From the "Morning Post."

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.....There are two great drawbacks in some of our watering-places—one is the distance and consequent difficulty of access to them in this age of rapid travelling, when half-a-day is more thought of than a day was by our forefathers in the last century. Nothing short of a direct route, bringing a watering-place within an hour or two of London, will nowadays suffice for rendering it available to a very large class of people overworked with business—or pleasure—during the spring and summer. Another drawback is that, places which have been too accessible—if we may so speak—are little else than London at the seaside, and therefore do not present the attractions of a real watering-place. Then, again, it has been found that those spots which are the most eligible, because the most rural and retired, have been so neglected as regards drainage and sanitary arrangements generally, that their intrinsic disadvantages are upon a par with their inaccessibility. It is gratifying to learn that St. Leonards-on-Sea is now, for passenger traffic at least, within a couple of hours' distance (for we measure distance by time in these days) from London. The place is therefore easily accessible to those whose parliamentary duties, or whose devotion to the hardly less, if not more, onerous and fatiguing cultus of fashion, will allow them but scant time for the study and practice of the laws of health. ....Now that the system of drainage, designed by Mr. BAZALGETTE, the civil engineer to the Metropolitan Board of Works, has been carried out, the place seems to have become a pattern of cleanliness, and its naturally salubrious air is free from the contamination, which to a greater or less extent is sure to prevail wherever imperfect drainage exists. It has always been a subject of regret and complaint that the most picturesque and in every respect healthy and attractive bathing-places, so far as nature could make them so



have been too often artificially spoiled, and rendered even repellant, in consequence of the beach having been converted into a receptacle for the fluid and solid refuse of the adjacent town or village . . . .

. . . . In both these respects it appears that St. Leonards-on-Sea has now to be added to the unhappily short list of really eligible watering-places. The drainage works planned by MR. BAZALGETTE have been executed by one of the contractors for the Thames Embankment, MR. WEBSTER, and as they have occupied only about six months in completion, and the direct line of railway has been only just opened, the transformation which has thus suddenly come over St. Leonards, is remarkable as showing what may be done in a very short space of time, in improving those spots on the coast which have so many natural advantages to recommend them, but which have been suffered, through neglect of sanitary regulations, to become almost as useless for the health-seeker as if they did not exist. . . . . It is no use making a line to a

place until passengers are ready to visit it in sufficient numbers. We see an exemplification of this at St. Leonards-on-Sea—the drainage works and direct railway communication, in an hour or two's spin with London may almost be said to have been simultaneously accomplished—*June 17th, 1868.*——The important question of drainage has occupied the attention of the more active inhabitants of Hastings for many years past, and the town council have had various schemes set before them, for enabling them to abandon the existing system upon which the sewage of the town was disposed of. As far back as the year 1856 a sum of £16,000 was expended in draining the town upon a system adapted to the natural levels, and hence giving several outlets along the sea-front. Those outlets, discharging constantly at all times of the tide, became offensive to sight and smell; and as the town rapidly grew in extent, and the population increased, it was thought indispensably necessary to adopt an improved means of carrying out the important object. Hastings was known to be a favorite watering-place, as well from its many advantages in respect of inland scenery, as from its extensive and interesting seaboard . . . . .

On Monday last a large number of gentlemen interested in science, or in the welfare of the place, assembled on the shore, at some distance from the dwelling-houses, to witness the process of the new system of drainage in active operation. By this system the old drains have been intercepted, and instead of running down



each watershed and discharging at the natural outlet, the main sewer carries its contents eastward, with an average fall of 5ft. 6in. per mile, to a large tank capable of holding 1,500,000 gallons. In this tank the sewage is stored until low water, and discharged into the sea far away from the town, at intervals of little more than 12 hours.—*July 29th, 1868.*

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### From the "Globe."

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TO THE list of places that have lately been supplied with a new and efficient system of drainage, the town of Hastings may now be added. In 1856 the town was drained at a cost of £16,000, on a system adapted to the natural levels, thus giving several outlets for sewage into the sea. At all times of the tide these outlets were discharging, and they became very offensive both to sight and smell, especially as the population increased, and the water was consequently very objectionable for bathing. The frequent discharge, too, was obnoxious to health, and fever and other diseases broke out in the upper part of the town, in consequence. Improvements were made which modified the nuisance to some extent, but it was felt desirable to entirely remove all complaints. Many plans were suggested, but eventually that of Mr. Andrews, the local surveyor, was adopted by the Local Board of Health, and approved by the Government engineer. The cost of these works now being carried out is about £30,000. Charcoal boxes are placed on the top of the tank on circular brickwork through which the purified air passes. The pipe through which the drainage escapes was opened officially yesterday, in the presence of some of the local authorities. A rush of water similar to a water-spout, caused by the atmospheric pressure, immediately followed, and the sewage could be seen rushing into the water and passing away eastward with the tides entirely away from the town. In addition to these works in Hastings proper, the adjoining township of St. Leonards has also carried out its own works of similar character—the discharge in this case being to the westward, and at or about high water, the action of the tide being then to the westward. The completion of the two undertakings gives a clear frontage of



between three and four miles ; and, in place of some eight or ten open culverts discharging offensive matters in that length, there is now clean bathing in a pure sea.

The town of Hastings is well worthy a visit, and is in many ways preferable to many another watering-place on the south coast. The ride through Kent and Sussex from London is very pleasant, the rail passing through hop fields in all their refreshing greenness, and the corn fields now in the height of their glory. There is an unusually large number of attractions, too, in the neighbourhood, the remains of castles which were founded in the time of William the Conqueror, the old churches, the surrounding scenery, each presenting features of more than ordinary interest. The bathing will now be as good as any on the coast, and the hotel and other accommodation superior to what is found at watering-places generally. The distinction between the old and the new town is very marked, some of the houses in the former having stood for centuries, whereas the latter has within the last fifty years witnessed changes—at one time being built upon, the buildings were then all of them removed, and after twenty years' desolation, the present town was built. It is to be hoped that the improved system of drainage may also prove an additional assurance to visitors of the salubrity of this favourite watering-place.—*July 28th, 1868.*

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### From the "City Press."

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AN entirely new and thoroughly efficient system of drainage was opened at Hastings, on Monday last. In 1856, the town was drained at a cost of about £16,000, on a system adapted to the natural levels, and hence giving several outlets for sewage along the front. These outlets discharging constantly at all times of the tide became offensive to sight and smell, the more so as the population increased ; and after much consideration to amend this, the plan of the local surveyor, Mr. Andrews, was adopted by the Local Board of Health, and approved by the Government engineer. By this system the old drains are all intercepted ; and, instead of running down each watershed and discharging at the natural



outlet, the main sewer takes, with an average fall of 5ft. 6in. per mile, all discharge eastward, to a large tank capable of holding 1,500,000 gallons. The sewage is stored in this tank until low water, and then discharged, the action of the tide taking it eastward and thus away from the town—so that the whole of the sewage of the town is got rid of in about an hour, at intervals of little more than twelve hours. The discharge from the tank is through about half a mile of 4ft. iron culverts, with a fall of about 10ft. per mile. The cost of the works is about £30,000. In addition to these works in Hastings proper, the adjoining township of St. Leonards has also carried out its own works of similar character—the discharge in this case being to the westward, and at or about high water, the action of the tide being then to the westward. To Mr. Hope, Mr. Charles Duke, and Mr. Dobell, the thanks of the representatives of the press are especially due for the information and attention they received.—*August 1st, 1868.*

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### From the “Rock.”

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FOR several years Hastings, notwithstanding its great natural advantages, has, owing to an imperfect system of drainage, been at a slight disadvantage as compared with other health resorts. That untoward state of things has now been remedied, and the new drainage works, inaugurated by a grand *fête* on Monday last, have now placed Hastings on a level with the best drained localities in the kingdom. The improved drainage works were planned by Mr. Andrews, the local surveyor, executed by Mr. Howell, and will cost about £30,000.—*July 31st, 1868.*

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### From the “Illustrated Times.”

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ON Monday afternoon a new and thoroughly efficient system of drainage was opened at Hastings. Twelve years since, this town was drained at a cost of £16,000, on a system adapted to the natural levels, and the sewage flowed into the sea from several outlets. At all times of tide these outlets discharged, causing



much offence, and the water wherein visitors bathed became exceedingly foul. At the upper portion of the town fever appeared, but the lower part was free from epidemic. The reason assigned for this was, that the noxious gases naturally escaped at the highest part of the borough, and hence the appearance of fever in the upper levels of the town. The authorities adopted the open system, and ventilated the sewers by means of charcoal boxes. To a certain extent this improvement had the desired effect, and the town became more healthy; yet the open system was a nuisance, and the constant discharge of filth into the sea at the height of the bathing season was a matter of constant complaint. After much consideration to amend this state of things, Mr. Andrews, the surveyor of the Local Board of Health, proposed a plan which was adopted; and the first fruits were witnessed on Monday. On that day the pipe whence the drainage escapes into the sea was officially opened, and the sewage accumulated in the tank, allowed to escape into the sea about a quarter of a mile to the eastward of the great tank. The first effect was a rush of water, like a fountain, into the air, caused by atmospheric pressure. The sewage could be seen rushing into the clear water and then passing rapidly to the eastward with the tide, completely away from the town. The experiment was entirely successful, and there is no doubt that Hastings is completely drained and the water in the immediate vicinity untainted. Mr. Howell, the contractor, has carried this work out in a most perfect and complete manner. The adjoining township of St. Leonards has also carried out works of a like character.—*August 1st, 1868.*

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**From the "Sussex Advertiser,"  
and "Hastings and St. Leonards Chronicle."**

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IF some of the good old folks, who inhabited Hastings when it was known chiefly as a flourishing fishing town, could return to the scene of their former habitations, they would be almost startled from a sense of propriety, by the changes that have taken place. They might ramble among the boats and boat-shops, or even as far as the old Town Hall, and they might gossip with the tan-frock fraternity, without perceiving any great difference between the



present and the past; but should they continue their walk to the westward, stroll along the three miles of magnificent esplanade, and gaze upon the tall and stately mansions which overlook the same, they would in all probability be filled with admiration and surprise. Notwithstanding their veneration for the old stage-coaches and coaching times, they would doubtless be ready to admit that the change from the road to the rail has not been altogether unprofitable to the premier Cinque Port. But if in the midst of their silent contemplation, they were suddenly to become acquainted with the ways and means by which Hastings has kept up her fame as a fashionable watering-place, they would perhaps give a very significant shake of the head, as an indication of difficulty and doubt—not to say of disapproval. Even the “oldest inhabitant” in the present day—whoever that venerable individual may be—is perhaps inclined to look upon some of the expenditure for public works with a degree of displeasure, having very little, if any, idea of the requirements of the place or the capabilities for meeting increased local taxation, but entertaining a very proper dislike to having a heavy debt hanging overhead for the sake of notoriety. The idea, for instance, of nearly £40,000 being spent for amended drainage works, not for the adoption of an entire and general system—for in every respect save one the drainage of the town has been perfect—but for the construction of a main intercepting sewer and tanks, by which the sewage matter may be simply removed from the sea in front of the town, or rather prevented from rushing thither, and discharged at a considerable distance eastward and westward—and this, too, as some have said, simply to remove the prejudices of the people and not to promote any great sanitary reform. Such may be the view which some belonging to the old school would be inclined to adopt, with respect to the extensive and important drainage works that have now been completed; but surely no one who is alive to the real interest of the place can share the opinion. All who seriously consider how necessary it is that Hastings and St. Leonards should maintain its high character in a sanitary point of view—how all-important it is that it should pay particular attention to appearances—and by that means preserve what may be termed a clean face, must be of opinion that the cleansing process could no longer be delayed with anything like prudence or safety. The Town Council were not hasty in coming to this conclusion, or in deciding upon the par-



ticular plan by which improvement should be carried out. More than 18 months have been occupied in the execution of the work; but, as is often the case in such matters, a much longer time was taken up in talking about it. For nearly three years the Council repeatedly discussed the subject, and consulted with the St. Leonards Commissioners, as to the best means of removing all cause of complaint, and the result is that the Commissioners have successfully carried out a well-devised scheme for the district, at a cost of about £10,000, and the Council through Mr. Howell, have now completed with equal prospects of success, a scheme which is necessarily much more extensive, and which is to cost about three times the amount. The details of that scheme as devised by the ingenuity and practical skill of the Borough Surveyor, Mr. Andrews, are familiar to most of our readers. . . . The successful issue to which the vast undertaking has been brought, notwithstanding the difficulties that have been encountered, is a proof, not only of the means which the contractor has at command but also of the enterprising zeal with which he carries forward whatever work he commences, and it may likewise be said to reflect great credit upon the town. Hastings has undoubtedly set an example which other towns would do well to follow. The importance of the undertaking cannot be over-estimated, and highly beneficial results may reasonably be expected to follow the large outlay which has been incurred. The proposal for celebrating the completion of the work by a public demonstration, originated with Mr. George Curling Hope, of Robertson Street, who with a commendable degree of public spirit, brought the subject before some of his fellow-townsmen and with their co-operation took judicious steps for carrying it out. The arrangements were made quite independent of any action on the part of the authorities of the town, and may be considered a well-deserved compliment to the contractor, and a testimony on the part of influential inhabitants, that they regard with the utmost gratification the work that has been done.—*July 28th, 1868.*



## From the "Hastings & St. Leonards News."

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It is sometimes asserted that there is no "public spirit" in the borough of Hastings. Perhaps the charge has some foundation, if public spirit mean joining in the various political and social movements of the day. But if it mean also the good government of the town, and an ample provision for the wants of visitors, then the charge might be indignantly hurled back in the face of those who make it. The local government of the borough, as a rule, can take an equal stand with most of the large fashionable towns of the kingdom; and hence, on local subjects, the townspeople have not the need for agitation which exists in many boroughs. Those who fairly watch the proceedings of the Town Council and Local Board, in a spirit of charity and good feeling, must, we think, admit that a considerable amount of foresight, combined with prudence, attaches to the decisions of that body. The new intercepting sewer is a case in point. Ten or a dozen years' experience, and the progressive light of sanitary science, taught us to accept the warnings of home teachings, as well as the authoritative cautions of complainers from without. It was seen that, though a capital system of house drainage had been laid down, the exit of the sewage matter in front of the town was a mistake. Like prudent men, after much deliberation, the Local Board decided upon rectifying that mistake; and to-day we heartily join in the rejoicings of our fellow-townsmen upon the practical completion of the work. . . . It must be clearly understood that no sewage matter whatever is now discharged in front of the town. The old Warrior-square outlet has been disused for fully a year; and that at the Queen's Hotel for upwards of three weeks.

The scheme for the new intercepting sewer emanated from Mr. William Andrews, the borough surveyor. Indirectly it had the sanction of two or three engineers noted in drainage works. Viewed in the light of the experience of other towns, one can hardly see the possibility of a drawback. On the contrary, the more that is learned about modern practice in drainage, the stronger is the conviction forced, that the scheme will become a success in the highest possible degree. . . . Whilst giving a *resumé* of the new drainage scheme, it would be unfair to omit mention of what was done twelve months ago within the juris-



diction of the Commissioners of St. Leonards. Their scheme was devised by Mr. Bazalgette, the noted engineer of the Metropolitan Board of works; and completed by Mr. Webster, of Charing Cross, a gentleman who has carried out important works in the metropolis, and whose tender for the third section of the Thames Embankment (Temple to Blackfriars) has recently been accepted. The plan was that of an intercepting sewer, on the beach, outside the parade wall, from the Archway to the end of West Marina; and thence along the roadway to an arched tank near the Goods Station of the South-Coast Railway. The cost will nearly reach £8000. The time of discharge is at the ebb, two hours after full tide. The drained area being small, the plan answers admirably.

The outlet scheme of the Hastings drainage should now be noticed, in connection with its formal opening on Monday afternoon. . . . Observation has taught that, very soon after the tide commences to flow, an easterly current sets in. The effect of this current was practically demonstrated on Monday. The sewage had been retained for thirty-six hours; and at about 12.30, Messrs. Howell and Andrews escorted a party of gentlemen as near as practicable to the mouth of the iron outlet pipe, off Ecclesbourne. . . . At a given signal the penstocks were raised, and in a few minutes, the water came rushing forth—at first comparatively clear; but in a few minutes changing to an inky blackness, carrying a perceptible odour. The discoloured water made its track very apparent; and in a short time the inspectors had the satisfaction of seeing it float away eastward. One of the party, an officer of the Council, had sufficient curiosity to watch the progress of the stream from the East Hill; and he afterwards reported that every trace of the sewage had disappeared by 2.30. Everyone present regarded the trial as having been most successful. Ordinarily, it is supposed the sewage will be discharged in about an hour. . . . By the completion of the two systems of drainage, a frontage of fully three-and-a-half miles has been cleared from contamination.—*July 31st, 1868.*



## From the "St. Leonards & Hastings Gazette."

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### EXTRACT OF A LETTER FROM THE REV. ALTON HATCHARD.

. . . . I am happy to inform you that the St. Leonards Commissioners have removed all the nine channels of pollution that disfigured the sea shore under their control.

An intercepting sewer has been constructed, which commences at the St. Leonards Archway, the boundary between Hastings and St. Leonards proper, and passes under the beach at the foot of the parade wall, intercepting and carrying away all the sewage and drainage until it reaches the western extremity of the town. It then passes along and under the Bexhill road, and falls into a reservoir formed in the beach westward of Bopeep railway station. This reservoir is so constructed as to contain within it all the sewage, until the period when the tide turns westward, and by the strong sea current of the ebb tide, it is then carried miles away to sea, in the direction of Beachy Head, never to return; the reservoir is again closed before the tide turns toward St. Leonards, and again twice during the 24 hours, receives the sewage of the town, preventing its discharge into the sea, even at a distance from the town, excepting at that period when the receding tide sweeps it far away into the ocean.

All this is accomplished by the natural and simple laws of gravitation, so that it is not liable to the contingent derangements attending on pumping.

There are several side entrances for access to the sewers, and thorough ventilation through charcoal is provided. . . . If you will kindly make known for us the fact that we have the cleanest beach of any watering-place within the same distance from London, we may confidently anticipate as many visitors in the spring and summer for bathing as resort to St. Leonards when the fogs and chilly blasts of autumn begin to be experienced.—  
*107, Marina, St. Leonards-on-Sea, August.*



**From the "Hastings & St. Leonards Herald  
and Observer."**

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THE last pipe has been laid down, the dinner—without which it would appear that no great undertaking can be accomplished amongst Englishmen—has been eaten, and the Drainage Works are declared to be completed. This is the news that will be received joyfully, not only by the inhabitants of the two towns—to whom the works have for the last few months proved a great though a necessary annoyance—but by the thousands of the public who annually visit the shore of Hastings and St. Leonards, to recreate their wearied spirits and rebuild their enfeebled bodies. Both in pocket and temper the borough has suffered but it is not too much to say that all that is now over. For two years we have industriously sowed health and pleasure, the reaping time is at hand, and for years to come we may expect golden harvests. Even before sanitary improvements became the order of the day, Hastings, and in this we include St. Leonards—for is not that sweet, cleanly, healthy town, our Belgravia?—was the resort of invalids and pleasure-seekers. Its climate cooler in summer, warmer in winter, its invigorating open sea, its pure air—made it essentially a home for the sickly, while its advantages for bathing over other watering-places, its esplanade, its proximity to the sea, the waves washing as it were the very foundation of the houses along its frontage, its beautiful scenery of hill and valley richly wooded and cultivated, its inviting walks and drives—made it one of the most agreeable residences for the visitor in search of pleasure and health combined. Nevertheless there were drawbacks, to the town becoming what she is fitted by nature to be—the Queen of watering-places—and it will not do to excuse these drawbacks by the reply that in this respect we were no worse off than some sea-side towns, and better off than many. The painful fact daily stared us in the face—all that nature and man had done to render the town attractive and health-giving was marred by an inefficient system of drainage. Then the authorities began to awake, a contract was entered into to carry off the sewage into the sea from several outlets, sixteen thousand pounds were paid for the work, and the town rejoiced that it had rid itself of the



feculent matter, disgusting to the eye, offensive to the smell, and dangerous to health. However after some time it was found that the drainage was still far from perfection, the discharge from the outlets met the eye of promenaders and to some extent fouled the waters wherein bathers sported. The work must be done all over again. But when or how? Not on the same plan, for that had failed in its object; every one talked, hundreds had projects, some were for leaving "well alone," the discharge, they admitted, was at times disagreeable to visitors and inhabitants alike, but then it injured no one, and Hastings and St. Leonards were fast rising into importance, an evidence, said they, that the visitors were perfectly satisfied with what they got, and we need not burden ourselves with taxation. The subject was debated in all sorts of shapes, the authorities after three years' talk, decided that something must be done. Mr. Bazalgette, the eminent engineer of the Metropolitan works was engaged, and a contract entered into with Mr. Webster. Hastings contented itself with the plan of its surveyor—Mr. William Andrews—while the contractor was Mr. John Howell. "Belgravia," as we have called it, was in six months cleansed and sweetened, by a most effectual system of drainage, which carried its sewage far away to the west. But with the Hastings works all did not go so smoothly. Mr. John Howell commenced operations at the tank in October, 1866, but many difficulties—certainly not anticipated—retarded the completion of the works. Pipes were burst up, solid rock had to be cut through and blasted; and it was not until last week, that the gigantic operations may be said to have been consummated. Nearly £40,000 has been spent on the Hastings Drainage, while the works at St. Leonards were carried out for £10,000. Yet we ought not, cannot begrudge that sum, remembering the extensive character of the operations. The plan is a very simple one, and the credit of its design and execution belongs solely we believe to Mr. William Andrews.—*July, 1868.*



## Abstract of Report of Medical Officer of Privy Council on Phthisis Death-Rate as affected by dampness of soil.

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I HAVE to recall that in my last annual report a section to which I attached particular importance related to changes produced in the public health in certain towns where of late years improvements in drainage and water-supply had been made. The largest result of the investigation then reported on (an investigation relating to 25 towns, with an aggregate population of 600,000 inhabitants,) was to show very strikingly the exemption which local populations obtain from cholera, typhoid fever, and other endemic bowel affections, in proportion as the local air and soil and water are kept free from excremental pollution. . . . But the inquiry had also some other results, of different degrees of value. And among such results one which stood in particular relief concerned the local distribution of PULMONARY PHTHISIS.

It was evident, namely, that in some of the towns which had been improved the mortality from Phthisis had notably diminished. And when detailed examination was made of the cases which gave that indication, in contrast with the different class where phthisis had not been lessened in amount, it appeared that the diminution or non-diminution



The death-rates by PHTHISIS in the 15 under-mentioned towns had, after improved land-drainage, fallen, *per centum* as follows :—

SALISBURY	-	-	49
ELY	-	-	47
RUGBY	-	-	43
BANBURY	-	-	41
WORTHING	-	-	36
LEICESTER	-	-	32
MACCLESFIELD	-	-	31
NEWPORT	-	-	32
CHELTENHAM	-	-	26
BRISTOL	-	-	22
DOVER	-	-	20
WARWICK	-	-	19
CROYDON	-	-	17
CARDIFF	-	-	17
MERTHYR	-	-	11

of phthisis depended on whether the sanitary improvements of the place had, or had not, included any considerable drying of the soil. In cases where this condition had been fulfilled, the reduction of phthisis occurred both too uniformly, and also in too great amount, to be regarded as of accidental coincidence. In a table then given, the reduction on previous phthisis-mortality, for the first 15 towns spoken of, was shown to be such as I now restate in the adjoining table. And the fact that in some of the cases

the diminished fatality of phthisis was by far the largest amendment, if not the only one, which had taken place in the local health, became extremely interesting and significant, when the circumstance was remembered that works of sewerage, by which the drying of soil is effected, must always of necessity precede, and do indeed sometimes precede by years, the accomplishment of other objects (house drainage, abolition of cesspools, and so forth) on which the cessation of various other diseases is dependent.

The above facts, though not enough in themselves to prove as certain the very important ætiological relation which they suggested, were at least amply sufficient to show that a very promising line of inquiry had been opened. And my lords having on my representation been pleased to



direct that this should be continued, Dr. Buchanan, the practised and skilful inspector who was engaged on the former general investigation, has now given me a further report of results obtained by him in a subsequent special research. That report is subjoined *in extenso*. It presents an elaborate examination of the distribution of phthisis, as compared with variations of soil, in the three south-eastern counties of England, beyond the limits of the metropolis ; and it confirms, I think, beyond any possibility of question, the conclusion, previously suggested, that *dampness of soil is an important cause of phthisis to the population living upon the soil*.

The Geological Survey of England, advancing to completeness in its records of the great formations of the country, has hitherto mapped the minute surface geology only in the counties of Surrey, Kent, and Sussex. From the present point of view it is plain that surface peculiarities must be taken into account quite as much as the great divisions of the geologist—that brick earth, drift gravel, river alluvium, and the like, have an importance in themselves apart from the character of the larger formations over which they lie. The three south-eastern counties, therefore, form the only area where the survey yet affords materials for profitable detailed examination of soil as affecting the health of residents on it ; and the present report will concern itself exclusively with them. It happens that there is no part of England better adapted to the enquiry—in which varieties of soil would be greater, and differences of other sorts less obtrusive.

Fifty-eight registration districts, being all those of the three south-eastern counties (with the exception of such as



lie in the metropolitan area) have been brought under detailed examination. They were considered in two chief ways : first, as to the true consumption rate of their population, with attention to other conditions besides that of soil likely to influence this rate ; and, secondly, as to the numbers of population in each district living upon various kinds of soil under various topographical conditions. The results of the two sorts of investigation were then brought together, and, as far as practicable, summary statistical conclusions have been drawn from them.

Then follows a table in which the 58 districts are arranged in the order of their death-rate from consumption. Persons between the ages of 15 and 55 have alone been considered, and the mean of the death-rates of the two sexes is that which has primarily determined the position of districts on the table. But where the male rate was obviously subjected to disturbing influences from which the female rate was comparatively free, the position of a district on the table has been determined by the latter rate ; and where disturbing conditions have been eliminated in a district, the position given to it below is determined by the corrected, and not by the registered, rate of mortality.

The Sussex Registration Districts occur in the following positions in the table :—2 Hastings, 11 Steyning, 22 East Grinstead, 25 Eastbourne, 28 Hambledon, 29 Battle, 40 Rye, 41 Brighton, 43 Cuckfield, 45 Uckfield, 46 Hailsham, 47 Ticehurst, 48 Worthing, 50 Lewes, 58 Chichester.

Next to this examination of the amount of phthisis in each registration district, the geology of these areas has been taken up. For each district an examination has been made, as carefully as the conditions of the enquiry has permitted,



into the character of the soil on which the population live. In this investigation the dip of the beds, the elevation and slope of the surface, and generally the water-holding (with some other) qualities of the ground, have been regarded as well as the geological formations that entered into the structure of the district.

The 58 registration districts of the south-eastern counties are described then in the order in which they appear on the table which shows their relative death-rates from consumption. For each district is shown (1) the acreage and population; (2) the general geological and topographical features; (3) the character of the formations and soils upon which its chief towns and villages are placed; (4) the numbers, as nearly as can be judged, of the residents upon each description of soil; then the registered phthisis rate for males and females is given, and the account ends by stating any circumstances that may cause the true rate to differ from that which is registered, and by making such allowance for these as is possible.

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*HASTINGS, Sussex. Acres, 14,027. Population, 26,631.*

The district of Hastings is from 300 to 400 feet high in its central parts, and the ground forms three hills with deep valleys running to the sea. It comprises the towns of Hastings and St. Leonards only. They lie on the lower beds of the Wealden series, which are grouped under the name of the "Hastings Beds," and consist of alternations of sand and clay; in this case the area of the district being about two-thirds of sand and one-third of clay. The Castle Hill is Ashdown Sand, on which also the main parts of the







may be summarized, so as to present the facts in a prominent way. The one (A) is to take groups of the districts in the order in which they stand for phthisis, and examine these groups as to the general perviousness or imperviousness of soil, trusting to other considerations of elevation, slope, &c., compensating each other within the group. This is, upon merely arithmetical grounds, an objectionable method, for all the facts concerning a particular district get overlaid by those affecting other districts; absolutely negative cases get concealed; and thus the groups cannot safely and profitably be contrasted. The other method (B) is to select out of the 58 districts such as are most comparable with each other in regard of their position and geological structure, and to see how their phthisis is affected by the perviousness or imperviousness, elevation or lowness, slope or flatness in the members of such more limited series.

Leaving the method of grouping, and passing to the examination (B) of more naturally comparable districts, the prevalence of *phthisis upon pervious soils from which water can drain away, as compared with its prevalence upon retentive soils*, may first be investigated. The Wealden area of the south-eastern counties offers an excellent set of districts for the purpose of such a comparison—districts which differ from each other, too, in very few respects save in the matter of soil. The area in question comprises the Weald Clay, and the Hastings Beds of alternate sands and clays. Very different facilities of getting rid of water are presented by the elevated sands of the Hastings series and the flat plain of the Weald Clay; and, although there are no districts wholly of sand to contrast with others wholly of clay, the different effect of these soils respectively upon phthisis may



be judged of by the different prevalence of the disease in districts formed by sands and clays in different proportions. Taking those districts where the majority of the people live in the Wealden area, and arranging them in the order of their consumptive mortality, the table shows the per-centage of people living on sandy soil and clay in each. Gravels over Weald Clay, being of intermediate importance, have been divided (in making the last columns) as if they were half sand and half clay.

*Districts the majority of whose population live on Weald Country.*

Order of District among the Fifty-eight Districts, in order of Phthisis Mortality.	Per-centage of Population resident on						Total on	
	Higher Beds, mostly Lower Greensand.		Weald Clay.		Hastings Beds.		Sands and Half Gravels over Weald Clay.	Clays and Half Gravels on Weald Clay.
	Sands of.	Clays of.	With Gravel.	With- out.	Sands of.	Clays of.		
2. ? Hastings ... ..	—	—	—	—	95	5	95	5
15. Cranbrook ... ..	—	—	1	6	82	9	82	18
22. East Grinstead ...	—	—	—	12	82	6	82	18
23. ? Tunbridge ... ..	—	1	24	7	64	4	76	24
25. Uckfield ... ..	—	—	—	1	87	17	87	17
28. Hambledon ... ..	49	—	20	31	—	—	59	41
29. Battle ... ..	—	—	—	—	80	20	80	20
40. Rye ... ..	—	4	—	—	79	17	79	21
42. Maidstone ... ..	43	1	45	11	—	—	66	24
43. Cuckfield ... ..	21	1	—	25	48	5	69	31
46. Hailsham ... ..	—	—	—	34	61	4	61	38
47. Ticehurst ... ..	—	—	—	—	67	33	67	33
51. Tenterden ... ..	—	—	—	29	42	29	42	58
53. Horsham ... ..	—	—	—	56	44	—	44	56
56. Petworth ... ..	30	—	—	70	—	—	30	70

The following general conclusions then result from the present inquiry :—

(1.) Within the counties of Surrey, Kent, and Sussex there is, broadly speaking, less phthisis among populations living on pervious soils than among populations living on impervious soils.



(2.) Within the same counties, there is less phthisis among populations living on high-lying pervious soils than among populations living on low-lying pervious soils.

(3.) Within the same counties, there is less phthisis among populations living on sloping impervious soils than among populations living on flat impervious soils.

(4.) The connexion between soil and phthisis has been established in this inquiry—

(a) by the existence of general agreement in phthisis mortality between districts that have common geological and topographical features, of a nature to affect the water-holding quality of the soil ;

(b) by the existence of general disagreement between districts that are differently circumstanced in regard of such features ; and

(c) by the discovery of pretty regular concomitancy in the fluctuation of the two conditions, from much phthisis with much wetness of soil to little phthisis with little wetness of soil.

But the connexion between wet soil and phthisis came out last year in another way, which must here be recalled—

(d) by the observation that phthisis had been greatly reduced in towns where the water of the soil had been artificially removed, and that it had not been reduced in other towns where the soil had not been dried.

(5.) The whole of the foregoing conclusions combine into one—which may now be affirmed generally, and not only of particular districts—that WETNESS OF SOIL IS A CAUSE OF PHTHISIS TO THE POPULATION LIVING UPON IT.

(6.) No other circumstance can be detected, after careful consideration of the materials accumulated during this year, that coincides on any large scale with the greater or less prevalence of phthisis, except the one condition of soil.



## Water Supply.

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A TOWN of health resort without a good water supply would be a great anomaly, and it is a point upon which opinions are so variable, that few places altogether escape fault being found for some cause or other. It is only when one appeals to the severe tests of the chemist and hygeist, that we can be perfectly certain of the goodness of a source and independent of unskilled criticism. A tasty water to drink is usually hard and unfitted for domestic purposes, while a soft water is often more vapid to the palate, although admirably fitted for all the purposes of life ; and as persons are apt to judge, hastily, by their taste, much reliance must not be placed on mere opinion of the goodness or badness of a water, unsupported by actual facts. We have at times been attacked by the public press—notably by the *Saturday Review*—both as to the quantity and quality of our water supply, without the slightest foundation for such an attack, as I hope to be able to show: our quantity, from the official returns of the Water Committee ; the quality, by analyses of independent chemists. The towns are supplied with water by two systems of works. Reservoirs—constructed by damming across some of the valleys of the neighbourhood—and artesian borings ; the former being fed by surface springs, the latter by the deep reservoirs of the underlying



beds. Hastings has reservoirs at the head of Ecclesbourne, Hastings, and the Priory Valleys, which are dependent on surface springs, and have a storage capacity of 30,000,000 gallons. St. Leonards is supplied by a middle system of headings driven into the base of the sand-cliffs. Hastings has also a boring of 480 feet, whence water is driven by powerful engines to the height of 300 feet, and forms the high-level service of the town. Another deep well is now in process of sinking, to keep pace with the increasing wants of the town, and the supply is so copious as to give every confidence in the result.

St. Leonards has within the last two years also incurred the expense of a boring to the depth of 298 feet, the supply from which, being at the rate of 80,000 gallons daily, will obviate the necessity of any recurrence to surface supply.

From the returns of the Water Committee, I find that the daily supply is 500,000 gallons. To this must be added about 60,000 gallons supplied to St. Leonards every day, which, at 25,000 for population (3,500 resident out of borough district and about 1,800 supplied from other sources), gives about 22 gallons daily per head. 20 gallons is authoritatively stated to be sufficient for all purposes, even of a manufacturing town. Our supply is therefore *abundant as to quantity*.

As regards quality, we have the first authority for stating that it is of a high standard of purity. Professor Taylor, F.R.S., the analytical chemist of Guy's Hospital, thus stated his opinion of three samples submitted to him for analysis in 1859. Sample 1 was obtained from the old reservoirs; Sample 2 from the artesian boring at the pumping station; and Sample 3 from Shornden reservoirs:—



“ They were colourless, and without smell or taste, for  
 “ the most part clear and bright, depositing on standing but  
 “ a small amount of sediment, chiefly of a silicious or sandy  
 “ nature. In all the samples, the same mineral constituents  
 “ were found—namely, sulphuric acid and lime, as sulphate  
 “ of lime ; chlorine, representing common salt or chloride of  
 “ sodium ; carbonic acid, and air. No. 3 was remarkable  
 “ for its comparative purity or freedom from saline matter.  
 “ It contained a mere trace of sulphuric acid and lime, as  
 “ sulphate of lime : the principal mineral ingredient in it,  
 “ was chloride of sodium, or common salt. No. 1 gave  
 “ rather stronger indications of the presence of sulphate  
 “ of lime than No. 3 ; and, after 48 hours, there was a  
 “ visible deposit of the constituents of this substance.  
 “ The quantity of chlorine, or chloride, appeared to be  
 “ the same as in No. 3. Sample No. 2 contained the largest  
 “ amount of saline matter. There was a well-marked  
 “ quantity of sulphate of lime, and a comparatively large  
 “ proportion of common salt. This water No. 2 also  
 “ differed from Nos. 1 and 3 in its strong alkalinity as  
 “ a result of the presence of a large proportion of bicar-  
 “ bonate of lime. No. 3 gave no indications of the presence  
 “ of this salt, and No. 1 gave but a faint trace. No. 2,  
 “ however, gave those reactions which generally characterize  
 “ a water derived from chalk, or a chalky soil. Nos. 1 and  
 “ 3, on the other hand, resembled pure soft waters derived  
 “ from beds of sand.”

A more recent analysis, (April 1868) by a chemist of some reputation—R. Claudet, Esq., of the Assay Offices, Coleman Street—gives the following result :—

Sulphate of Lime	...	...	...	6.605	grs.	℥	gall.
Chloride of Calcium	...	...	...	0.265	„	„	„
„ Magnesium	...	...	...	5.296	„	„	„
„ Sodium	...	...	...	4.615	„	„	„
Nitrate of Soda	...	...	...	7.230	„	„	„
Chloride of Iron and Alumina	...	...	...	0.175	„	„	„
Silicia	...	...	...	0.735	„	„	„
Organic Oxidizable Matter	...	...	...	0.131	„	„	„
				25.049			



In his observations on the water Mr. Claudet continues:—  
 “ It contains 25 grains of mineral constituents, with only a  
 “ minute trace of nitrates and ammonia, denoting the nearly  
 “ total absence of oxidizable matter, vegetable or animal.  
 “ The presence of a moderate amount of nitric acid, in the  
 “ form of nitrates, is rather a proof of its goodness than the  
 “ reverse. Indeed I think this is an excellent and perfectly  
 “ healthy drinking water.”

Last year (1867), with a hope of having an opportunity of employing it for the benefit of the town, I occupied much time with a hygienic analysis of each of the sources from which the town is supplied, with the following results:—

SOURCES.	Total hardness Clarke Test.	Remove- able hardness	Per- manent hardness	Organic matter. By Per- manganat. Grs. per gallon.	Chlorides Grs. per gallon.	Solids. Grs. per gallon.
Ecclesbourne .....	6.3	1.8	4.5	1.29	7.3	17.0
Old Reservoirs .....	5.9	0.7	5.2	0.73	8.1	18.0
Shornden .....	4.9	—	4.9	0.50	7.7	13.0
Old Roar.....	7.3	2.8	4.5	1.96	5.7	10.0
Well and Borings.....	10.8	6.6	4.2	0.35	5.5	24.0
St. Leonards Tank ...	9.8	6.7	3.1	1.33	10.6	28.0
„ Well and Borings	4.9	3.2	1.7	—	—	—

The organic matter was estimated by the permanganate process, which is only of approximative value, but is the best at present known, unless elaborate apparatus and great manipulative skill be available. The quantity of chlorides is large in all the samples, but not more than must be expected from the proximity to the sea, and the loaded state of the air with salt spray in every wind from that direction.



## Death-Rate.

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NOTHING is more difficult, than to adjust the numerical statements of facts on fluctuating data ; and of these, few are more variable than the rate of increase of a watering-place.

Any statement of the death-rate of a locality—especially when that locality depends for its very existence on its health character—should be made with extreme caution, and a firm conviction not only of the absolute accuracy of the facts themselves, but also of the legitimate deductions to be drawn from them by persons who have no other data whereby to correct the general impression.

For 20 years, according to the showing of the Registrar-General, our death-rate had been at 18 per 1000. In 1859 he had pointed out the great healthiness of this locality over some other English watering-places, when, without any previous warning, he suddenly asks in August, 1864—"Why is the death-rate of Thanet still 23? Why is the death-rate of Hastings 24?" It would, it is true, be of small moment had the statement been confined to the Registrar-General's reports, but so delicious a statement was too good to be lost, and the *Times* wrote a slashing leader on the sins of omission and commission, and the duties and responsibilities of Boards of Health in general, and Hastings in particular.



“Why was the death-rate 24?” It was owing to a severe outbreak of scarlatina over the whole of England, which carried off in this locality more victims than fell before it in the ten years 1851–60. Fresh importations of “*convalescents*” kept up the dying flame, and became fresh centres of infection. It was not owing to any endemic cause that the rate rose, but to the inseparable circumstances of every health resort.

As I said before, it is almost impossible to state what the death-rate of a district is between the census epochs. Here we have reason to believe\* that, in 1863, a great and sudden increase in the population took place, which would very much reduce our death-rate. As near as we can at present state it, allowing an increase of 500 per annum (the rate of increase of the last 20 years), the corrected death-rate is as follows:—

		Hastings.		London.		England.
1841 to 1850	...	18	...	—	...	—
1851 to 1860	...	18	...	23.6	...	22.2
1861	...	17.8	...	23.1	...	21.6
1862	...	18.5	...	23.5	...	21.4
1863	...	19.5	...	24.4	...	23
1864	...	24	...	26.5	...	23.8
1865	...	20.6	...	24.5	...	23.3
1866	...	21.2	...	26.4	...	23.6

Giving a mean of 20.8 for the last six years; or, rejecting the anomalous year 1864, a mean of 19.2.

Our *annual* death-rate has *never* been 24; and to allow the stigma of such a statement to rest on a watering-place is unfair, unscientific, and cruel.

\* By the kindness of Mr. Andrews, I am enabled to state that the average number of houses built from 1858 to 1860 was 64 per annum; in 1861, 110 were built; in 1862, 138; in 1863, 193. This increased population would reduce all the rates by at least 1.



## Climate.

It is not the object of the present pamphlet to give a medical history of Hastings and St. Leonards and its climate; that is a point which we hope to do thoroughly and completely at a future period, when a new census will have discriminated between visitors and residents. Our object now is simply to place on record and render easily accessible the *facts* of climate upon which medical opinion may be based. It is not our object to prove that the locality is the best possible for every kind of disease, and under every circumstance, but to state in as plain and concise a manner as possible the elements which have been deduced from a long series of meteorological observations, and to furnish a few other data to serve as comparisons for those who have not access to the facts themselves.

The great peculiarity of the climate is its *equability*, by this term I mean its freedom from great extremes of heat and cold, and its comparatively warm character in winter and coolness in summer, with a very small daily range. I wish carefully to call attention to the term "comparatively" for it is often a source of disappointment to visitors to find that we have not an absolutely warm climate in winter; they expect to find a temperature of 60° when it is 20° in London, and feel aggrieved to see a flake of snow or half an



inch of ice. We do not claim such an absolute immunity from the vicissitudes of seasons; what we claim, is, that in winter our mean temperature is higher, our extreme cold much higher, and the range much less than many, in fact, most parts of England, and more genial than many favored places of health resort. Again, the peculiarities of the "invalid" climate, if I may so term it, do not exist in all parts of the town, they are dependent for the most part on conditions of defence from the colder winds, and an exposure to the warming influence of the sun. The observations upon which the following data of the "invalid" climate were founded, were taken in the Marina, St. Leonards, and compared with others taken at the same time at the Literary Institution, George Street, and High Street, Hastings; these all read closely together, and present the state of our knowledge of those portions of the towns best fitted for the winter residence of the pulmonary invalids, who would do well, however, to consult their local medical attendant before fixing definitely their place of residence. But besides this we have two well-marked climates—one which I would term the "residential" climate, occupying the sides and summits of the first range of hills, defended from the more boisterous and colder blasts from the north and east, but exposed much more than that portion of the towns lying beneath the cliffs, which is peculiarly the resort of the invalid. The other a bracing windy climate on the top of the hills, represented by the Fairlight and Cemetery Stations, whose range is much greater than the "residential" or "invalid," the mean temperature modified by latitude, but not otherwise much differing from the surrounding country, except in its freedom from high summer temperatures.



## Meteorological Facts.

### Climatic Data for Hastings and St. Leonards.

(Six years observations.)

	Janry.	Febry.	March	April.	May.	June.	July.	August	Septmb.	October.	Novmb.	Decbr	YEAR.
Mean Temperature } Upland Climate }	37.0	37.4	40.5	45.0	51.3	55.0	58.4	58.6	55.6	51.1	41.2	39.4	47.5
Ditto, Residential } Climate .. .. . }	38.4	38.9	42.7	45.4	51.0	55.4	58.9	59.1	55.6	52.5	43.2	38.8	48.3
Ditto, Invalid Cli- } mate .. .. . }	40.2	40.0	43.8	47.0	52.2	57.1	61.0	60.4	58.3	54.1	45.7	42.0	50.1
Mean Daily Range...	7.0	6.7	8.3	9.9	10.3	9.4	11.5	9.5	8.8	8.5	7.3	6.2	8.6
Mean Monthly do....	21.5	21.4	24.6	28.2	25.3	24.0	21.0	20.0	21.5	26.5	21.4	23.6	23.2
Deg. of Humidity } Saturation=100 }	90	85	84	80	82	85	83	78	80	81	83	83	83
Mean amnt. of Cloud	6.0	6.3	5.8	4.6	4.9	5.2	4.7	4.7	4.8	5.3	5.9	6.6	5.4
Ditto Rain...	2.35	1.58	1.70	2.48	2.80	1.85	1.97	2.86	2.74	4.44	2.63	2.19	28.87
Mean No. of Days } on which it fell }	11.0	9.3	11.2	7.0	10.0	10.0	7.6	9.6	11.1	13.6	12.5	11.0	124

I would now endeavour to prove these three propositions.

1.—That Hastings is warmer in winter than most other places.



2.—That Hastings is cooler in summer than most other places.

3.—That Hastings has a less daily range than most other places.

FIRST.—*Hastings is warmer in winter than most other places.*

This may mean that its extreme cold is less or that its mean cold is less, and so may refer to two distinct features of a climate, both of which, however, are true in respect of our own. I will first show the position it has held on occasions in which the rest of England has been affected by severe cold.

In January, 1855, the great cold, during which the Thames and Severn were frozen for miles, and the readings were at zero near London, here the coldest point was  $15^{\circ}$ .

In the great cold of December, 1859, when the cold registered at Clifton was  $10^{\circ}.2$ ; in Devonshire 0; near Nottingham  $4^{\circ}$ ; here the cold never fell below  $25^{\circ}$ , and was warmer than 51 other stations recorded by the Registrar General.

In the cold of January and February, 1861, when the thermometer at Exeter and Clifton sank to  $9^{\circ}.7$ ; in Norfolk to  $1^{\circ}$ : here we were warmer than 63 other returned localities, and equal to Ventnor, viz.,  $24^{\circ}$ .

In February 1866, a cold of  $12^{\circ}$  was registered at Sydenham, here it was  $30^{\circ}$ .

In January 1867, a cold of  $-7^{\circ}$  was recorded at Staines; here the thermometer never fell below  $25^{\circ}$ .

These facts show that in great extremes of cold this locality enjoys considerable immunity from its effects; and it now remains for me to show that *generally* we are also warmer in winter than most places, which will be proved if the mean of all lowest be shown to be higher.



In the winter of 1859 '60, in December, our mean of all lowest,  $35^{\circ}.9$ , was above that of 48 other stations.

In January, 1860, with a reading of  $39^{\circ}.5$  we were warmer than 52 other points, including Torquay and Exeter.

During the next winter great cold was experienced in the rest of England; and in December, 1860, we had a mean of all lowest of  $36^{\circ}.4$ , which was warmer than 55 other stations.

In February 1861, our reading was identical with Ventnor and Guernsey, and above every other locality.

In the next winter, in December, we were also identical in our reading with Ventnor, and above every other station.

We had a colder January and February, in 1862 than usual, still our mean of all lowest was above Bournemouth, Osborne, Bridy, and London, and 52 other stations.

The reason why we should thus be protected from vicissitudes of temperature need not be sought for far. This portion of the country is altogether *slightly* warmer, from the fact that the prevailing winds in winter, coming from the north and north-east, traverse a large extent of German Ocean, before reaching us; this mass of water is much warmer than the land, and the tract of country lying between it and us is not of sufficient extent to chill the air before it reaches us. Again, the Channel in the front of us is several degrees warmer than the land, and any southerly breeze will increase the temperature; but this latter element we only enjoy in common with the rest of the south-coast. Thirdly the air in winter is usually near its point of saturation with moisture, and more notably so, near the sea; therefore at night the radiation is much retarded by the formation of cloud between the earth and space, and this prevents the ground cooling so much as it does under a more brilliant sky. Another and perhaps the



principal cause of the mildness of our lower localities, is the shelter which the hills afford from the N.W., N. and N.E. winds ; these are all cold winds and mostly dry ; air which is dry, on meeting with a moistened surface, gives rise to cold, and this effect is greatly increased by rapid movement of the air, which brings fresh particles into contact with the surface ; whereas, if the air be at rest, it soon becomes charged with its normal amount of moisture, and a further loss of heat is prevented, the heat accumulated from the sun by day being slowly imparted to the lower air by night, and preventing the temperature falling so low as elsewhere.

SECONDLY.--*Hastings is cooler in summer than most other places.*

I endeavoured to shew that this was the case in my last pamphlet on the climate of this locality, but I find that the opinion still prevails that we are hot in summer. That this is erroneous I shall now attempt to prove : and that it should be so, is quite easy to be explained. The earth in the interior of the island becomes much hotter than the sea surrounding it, and the cool air over the ocean flows from its surface to the heated region ; here in its turn it soon becomes rarefied, and is again displaced by the cool breezes from the sea, In June, July, and August, it is the S.W. wind that principally blows, and it is precisely this wind which traverses the greatest expanse of ocean before it reaches us ; and, therefore, moderates the heat in these hottest months ; in fact, the hotter it is inland, the cooler relatively do we become, as the air being more rarefied over a large expanse of country requires a larger amount of cold air from the sea to replace it. July is the hottest month, and in it the mean temperature of the ocean in this latitude, according to MAURY, is about 60°. There is thus often a difference of 20° and upwards between the tempera-



ture of the centre of the island and deep water. We therefore, being situated at the line of junction of the two, enjoy the advantage of escaping from the excessive heat.

Let us now see how we fare when the heats of summer have been very great.

The summer of 1859 was very hot : and at Leeds a temperature of  $89^{\circ}$  was registered in April, and the same day in London one of  $84^{\circ}8$ . Our reading was  $65^{\circ}$ .

On July 13th : In London, the extreme heat of  $94^{\circ}$  was recorded in the shade ; Guernsey and Derby registered  $83^{\circ}$  ; Torquay, Aspley, and York  $82^{\circ}$ . We were lower here than any other station, viz.,  $75^{\circ}$ .

On August 12th, 1861 : At Exeter  $84^{\circ}5$  was registered ; at Camden Town  $89^{\circ}5$ . Here the reading was  $70^{\circ}2$ .

In May, 1864, a heat of  $89^{\circ}5$  was recorded at Highfield. Here it was but  $75^{\circ}$ .

In May, 1867 ; At Tonbridge  $93^{\circ}$  was registered. Here it was  $71^{\circ}$ .

In the great heat of 1868, the highest point reached here was  $81^{\circ}$  on one occasion ; the usual maximum reading being from  $76^{\circ}$  to  $78^{\circ}$ .

From these high readings it is clear that we do not suffer so much as is supposed from extreme heat ; so the mean of all highest is usually below that of *most* other places, for I do not claim for the climate, that it is cooler than the whole of England.

In July, 1859, we were 10 degrees cooler than London, and 42 other stations, including Torquay, Ventnor, Exeter, and Gloucester.

In July, 1860, we were cooler than 40 other stations, our mean being  $65^{\circ}1$  : and below Exeter, Osborne, and London.

In July 1861, with a mean reading of  $66^{\circ}5$  we were cooler than 45 other stations.



In July, 1862, we were less than 20 other places, and equal with ten ; being cooler than Exeter, Bournemouth, Bath, and London.

THIRDLY.—*Hastings has a less daily range than most other places.*

The mean daily range of a place is the difference between the mean daily extremes of heat and cold, and marks more strikingly than any other meteorological fact the exposure to, or immunity from, vicissitudes of climate ; consequently the lower this element is, the more equable may the climate be assumed to be.

In order to determine the relations of the climate of Hastings in this respect, to that of the rest of England, I have compared our results with each one of those recorded by the Registrar General for four years ; and I find that out of 2531 instances our range was less than other stations 2434 times, being more than other stations only 97 ; or, assuming the returns to be furnished by 52 localities, we had a less daily range than 50. But as all the stations do not make their returns regularly, and as no station has an universally smaller range than ours, these figures only exhibit the *relation*, not the *actual* facts : for the number of stations in connection with the Registrar General during the four years has been above 80 ; and the actual number of stations at which there has been a less daily range are 3, viz., Guernsey, out of 46 readings, was less than here 32 times ; Aspley out of 46 readings, was less 29 times, equal twice, and more 14 times ; and Scarborough, out of 46 readings, has 24 less and 22 more than here. While at Torquay, Ventnor, Clifton, Worthing, and Llandudno, the proportion was considerably in favour of our locality ; and at Bournemouth, Harrowgate, and London, the range was in every case above ours.



Comparison of the Meteorological Data of the Southern Health-Resorts—Hastings, Ventnor, Bournemouth, and Torquay.

		Mean Temperature	Mean Daily Range.	Mean Monthly Range.	Degree of Humidity. Saturation—100.	Rain—Inches.	Days on which Rain fell.
HASTINGS.. 6 years	December ...	42.0	6.2	23.6	83	2.1	11
	January ...	40.2	7.0	21.5	90	2.3	11
	February ...	40.0	6.7	21.4	85	1.5	9
VENTNOR ... 7 years ...	December ...	43.9	6.7	27.0	85	3.1	13
	January ...	41.5	7.0	23.0	81	3.3	15
	February ...	41.5	7.7	24.0	77	1.8	10
BOURNM'TH 6 years	December ...	44.0	13.0	29.0	77	2.2	10
	January ...	40.5	11.2	31.9	86	2.9	12
	February ...	42.7	12.5	31.7	82	1.3	11
<i>Quarter Ending March 31st,</i>							
HASTINGS ... ..		41.0	7.3	22.5	86	5.6	31
VENTNOR ... ..		42.6	7.9	24.0	77	7.7	40
TORQUAY ... ..		42.6	8.0	—	84	7.5	39
BOURNEMOUTH... ..		41.9	12.8	32.0	82	6.6	34

From the foregoing table we may deduce the fact that the peculiarity of the climates of the three winter residences of the pulmonary invalid (Hastings, Ventnor, and Torquay) consists to a great extent in the smallness of their range of temperature, both daily and monthly, and the large amount of aqueous vapour contained by the atmosphere in solution without a liability to deposit it as fog—Bournemouth differs much from all the others—its range is much greater—its maximum and minimum readings being higher and lower than those of the other stations. Its mean temperature in December seems to be 2° higher than ours, this however is only apparently so and arises from the series of years not being absolutely coincident—in the four years which correspond the variation is but 0°.3.

The Torquay tables do not shew *monthly* results and therefore cannot be so compared.







