number of these houses. In his experience Industrial Dwellings could not be erected under £56 a room, and it was absurd therefore to think of letting them under two shillings and sixpence a week. With regard to the question of common closets, common corridors, and common things generally, these were the amenities of social communities living together, and the improvement that was wanted must come he thought from the manners of the people themselves.

Mr. WILLIAM WHITE (London) had been asked to suggest that there should be a mortuary attached to Industrial Dwellings, and also that it would be a great advantage if provision could be made for gas stoves. With regard to ventilation he thought a flue should be constructed with openings near the ceiling, so as to ensure the circulation of air.

Mr. HOOPER (London), in reply, said that he had alluded in his paper to the dwellings in Glasgow, where provision was made for single room tenants. Recesses were made for the bed, the room was well ventilated, and it had a closet with sink and fuel stove and cooking implements.

The PRESIDENT of the Section pointed out, that if they made Industrial Buildings so perfect as to render them expensive, many artisans would prefer the cheaper dwellings that were already in existence.

SECTION III.

CHEMISTRY, METEOROLOGY, AND GEOLOGY.

ADDRESS

BY W. TOPLEY, F.R.S., F.G.S., ASSOC.M.INST.C.E.,
Geological Survey of England.

PRESIDENT OF THE SECTION.

"*Geology in its relation to Hygiene.*"*

IT is possible that the remarks which I wish to make in opening this Section may be considered by some to be rather out of place at a meeting of this Institute; some may think them too special and technical; but the subjects admitted to Section III. are so extensive that specialisation on the part of its President is to some extent a necessity, and I think further that a man is best occupied when speaking on a subject which he knows fairly well.

It may be that by taking a special district as our text we can well illustrate some general principles; and at the same time a description of the district in which we are now meeting may not be without interest to some now visiting it.

The geology and scenery of Sussex may be considered somewhat tame and uninteresting to those who arrive here from the wilder and more mountainous districts of the North and West; yet for many reasons Sussex is peculiarly well suited for illustrating the subject before us. The varieties of soil are here strongly marked—clay, sand, and limestone being each well developed. The conditions under which springs and under-

* The various points referred to in this Address were illustrated by numerous Diagrams, including the Maps, Sections, &c., published by the Geological Survey. Information relating to the geological structure of the district will be found in the author's "Geology of the Weald" (*Memoirs of the Geological Survey*), 1875. Reference may also be made to a paper on the "Agricultural Geology of the Weald," in "Journ. R. Agric. Soc.," Ser. 2, vol. viii., p. 241, 1872.

ground water occur, and the quality of the water obtained, vary greatly in different parts of the county, and this variation of condition almost entirely depends upon geological structure.

Speaking broadly, we may say that Sussex is divided into seven nearly parallel east and west bands, each well marked off from the next by different geological characters. If we take these in order, going from south to north, we name them in the order of their geological age, the newest coming first :—

	Nature of the Soil.
1. Drift and Tertiary Beds of the Coast, from Brighton westwards	Various.
2. Chalk	Calcareous.
3. Upper Greensand	Calcareous and sandy.
4. Gault	Clayey.
5. Lower Greensand	Mostly sandy.
6. Weald Clay	Clayey.
7. Hastings Beds	Various.

Partially covering up these strata in places there are small areas of old River Drift (gravels and loams); there are also the alluvial flats along the rivers, but none of these are of much importance in relation to the subjects to be now discussed. The Alluvium, &c., of Pevensey Level covers a large area, but this district contains only a small population.

The central parts of the Weald, forming the north and north-eastern parts of Sussex, are thus formed of the oldest beds. The strata dip generally to the south, and therefore newer beds come on as we pass from north to south. This statement, however, is true in a wide and general sense only, especially for the Hastings Beds area. There are numerous variations from this rule due to rolls of the strata, forming what are known as anticlinal and synclinal folds, which, together with the faults (or actual breaks in the continuity of the strata), have an important bearing on the physical geography of the country, and also on the course of the underground water.

Perhaps the hygienic aspects of geology could be best discussed by grouping our remarks under three main heads :—

Distribution of the population.
Water-supply.
Distribution of disease.

So far, however, as surface water-supply is concerned the first and second necessarily go more or less together, as the primitive settlements of the country were almost invariably dependent upon the occurrence of springs (or of water at shallow depth) and dryness of soil. Water-supply in its modern sense, as dependent upon deep wells, involves geological questions of a more intricate nature, and many places in the Weald of Sussex, admirably situated for once obtaining a good surface supply for a small population, are badly situated for obtaining a large supply from deep wells. The population of many villages is not increasing: even for those which have to some extent increased, the natural water-supply from springs, streams, and shallow wells would still suffice. But cesspools have hopelessly poisoned the wells and springs, and systematic sewerage has fouled the streams. No one well acquainted with the condition of rural England can doubt that a large part of the sanitary work of the present day is merely combating the evil effects of ill-considered sanitary measures in the past.

In the area occupied by the Hastings Beds we find extremes of wet and dry soils. In the great majority of cases the villages stand upon sandy sites, but often near the outcrop of a clay-bed, which throws out water at its junction with the sand above, or which holds up water in shallow wells.

The most important exception to this rule, of sandy sites in the Hastings Beds area, is the town of Battle, which owes its site to the great battle of Hastings. The English and Norman armies encamped on opposite heights : but the battle was mainly fought on the clayey flats and slopes between these heights; here the body of Harold was found, and here the Abbey was built, near which the town subsequently grew.

When places stand upon Tunbridge Wells Sands, and require more water or better water than the surface-wells yield, it is generally necessary to sink through the Wadhurst Clay into the Ashdown Sands. When the outcrop of the Ashdown Sands is near this method is generally successful, but when the outcrop of the Sands is far off such wells occasionally fail. A noteworthy instance occurred at the Cuckfield Workhouse, where a boring was carried 119 feet through the Tunbridge Wells Sands, then 227 feet through Wadhurst Clay, and 104 feet into Ashdown Sand, making 450 feet in all, without obtaining any supply.

It rarely happens that very deep wells are successful in the Weald, the reason being that water in deep wells has generally a long distance to travel underground from the outcrop of the water-bearing stratum to the well. In very porous strata (as the New Red Sandstone and much of the Lower Greensand) or in strata containing numerous fissures and divisional planes (as the chalk), this distance from the outcrop is not necessarily a serious obstacle; but in such fine-grained rock as those composing the Wealden Beds the case is different.

The strata, besides, are divided by numerous bands of clay, and are often traversed by faults, so that underground water

does not travel far along the lines of stratification. Faults, however, often acts as conduits, and thus aid the passage of underground water.

Hastings affords an excellent example of the difficulties which beset a town situated on the Wealden Beds, and also of good fortune in seeking for waters in those beds.

The older wells are sunk in a valley just north of the town. It seems to have been by accident that this place was chosen, but it is an exceptionally good one. A fault, apparently, has some effect in concentrating the water here; and it is remarkable that several wells should be sunk in so small a distance, all yielding water, and no one apparently affecting any other. The wells sunk at Filsham for the town of Hastings, and at Silver Hill for the Rural Sanitary Authority are near faults, and this may account for the good supplies of water there obtained.

Deep borings had been tried at and near Hastings, but with small success; the lower beds (Fairlight Clays) are alternations of clay and sandstones, and in no case have they yielded much water, except sometimes in their upper layers. Deep borings have been carried into these beds at Rye, and at Lydd on Romney Marsh, but both failed.

Beneath the true Wealden strata there are some important beds of limestone (with shale and sandstone), which were formerly much worked near Brightling and north-west of Battle; these are now known as the Purbeck Beds. It is possible that some water may be obtained from these beds near their outcrop, which, however, is not extensive; but such water would be exceedingly hard.

The sub-wealden boring traversed a great thickness of strata (1,700 feet) below the Purbeck Beds, and found no water in any of them. Deep borings in the Weald must therefore no longer be looked to as sources of supply.

I have spoken of the assistance which faults sometimes give to the passage of underground water, and of the desirability of studying them when seeking for a supply. But one other point should also be borne in mind, and that is to sink if possible where the strata form a basin and not where they form an arch. In the former case the water drains towards the well, in the latter case the water tends to drain away, and even if found in sufficient quantity would not rise in the well. An underground basin does not necessarily coincide with a surface depression; often it forms a hill, so that a low-lying site is not necessarily a good one.

The water from the Wealden strata is generally of a low degree of temporary hardness; but it always contains sulphate

of lime, and then has some permanent hardness, but as a rule this is not excessive. A more frequent trouble is the ferruginous nature of the water. The iron is not often in sufficient quantity absolutely to prevent the use of the water for domestic purposes, but it is certainly objectionable—it stains the linen and blackens the tea. Of important wells thus affected, those at Bexhill and at the Hayward's Heath Asylum may be mentioned, but the trouble is largely lessened by simply aerating the water.

The ferruginous water of Tunbridge Wells rises from the Tunbridge Wells Sand, the highest division of the Hastings Beds. This is the only mineral spring in Sussex which has retained its reputation, and this is probably due more to the beauty of the country than to the virtue of the waters. At the time when Tunbridge Wells water was most in favour, some other ferruginous springs came into note. St. Ann's Well, at Furze Hill, near Brighton, is a case in point, although this rises from the Tertiary Beds overlying the Chalk. Adam's Well, at Speldhurst, a little N.W. of Tunbridge Wells, was also a ferruginous spring of some celebrity, but its reputation only survived in curing mangy dogs.

Geological maps show a wide stretch of Weald Clay between the Hastings Beds on the north and the Lower Greensand on the south; but in this there are thin subordinate beds of sand, on the outcroppings of which many villages and farms are built. These sand-beds give rise to small springs, and yield small supplies of water to wells. There are also some thin beds of hard limestone (Sussex marble) in the clay, which often yield water in wells; but this water is rarely of good quality.

A more important bed near the bottom of the Weald Clay is the Horsham Stone and the sandy beds associated with it. This makes some light land of much better quality than the rest of the Weald Clay area. A great part of the Aylesbury Dairy Farm, at Stammerham, lies on the Horsham Stone. The springs on the farm are mostly out of the sand-beds; the wells are sunk into the clay and shale which come between the Horsham Stone and the Hastings Beds; water from the latter bursts up through the shale, and rises in the wells.

The Lower Greensand occupies a considerable area in Sussex, and some important towns stand on it; amongst these Pulborough, Midhurst, and Petworth. As a whole it is sandy, making a dry and porous soil; but there is a middle division (Sandgate Beds) in it consisting of a varying series of beds—clays, ironstone, and sand. The water from the middle division is often impure, but good water can generally be obtained by sinking to the lower division, the Hythe Beds. Petersfield,

which lies just west of the county boundary, has recently been supplied in this way. The water so obtained in Sussex is generally much softer than Chalk water; whilst water obtained from the Hythe Beds of Kent is hard, in consequence of the large amount of limestone which there occurs.

The Lower Greensand has been looked to as a source of water supply from beneath the Chalk. The numerous instances in which attempts have been made to obtain such water under London are well known, as unfortunately is also the failure which has attended these attempts. A deep well sunk many years ago at Warren Farm, Brighton, was more successful, but the quantity of water so obtained was not large.

A deep well was sunk many years ago at Chichester, but this only reached the Gault.

The Gault forms a band of clay land between the Upper and Lower Greensands. It is mostly in pasture, and has a very small population. Only one village in Sussex (Heyshot) stands on Gault; whilst one (Hardham) is on Gault covered by gravel.

Water on the Gault can only be obtained by sinking down to the Lower Greensand. This rarely fails to obtain a good supply of soft water, but a boring recently made at Firle has been less successful. The Lower Greensand is there very thin, and the sand is rather clayey, and the boring passes through this and into the Weald Clay without obtaining a supply of water.*

The Upper Greensand forms a narrow band, cropping out under the South Downs. It is remarkable for the number of villages which stand upon it; the original settlements having been determined by a very fertile and comparatively dry soil, and by an abundance of water. Very powerful springs break out along the Upper Greensand terrace, sometimes at the base of the Upper Greensand, but sometimes a little above it, from the lower beds of the Chalk. Mr. Clement Reid, who is now re-examining the country for the Geological Survey, is of opinion that many of the supposed Upper Greensand springs come from the Chalk, the Chalk water finding its way down through fissures into the Upper Greensand. The outcrop of this formation is too narrow to account for all the water which it yields.

I may here incidentally allude to a question of much interest, in which geological structure has had a striking influence, not only on the original settlements of the country, but also on the land-divisions which are now known as parishes.

* My colleague, Mr. C. Reid, informs me that, since this Address was delivered, the tubes have been partially withdrawn and another attempt made to pump water from the thin bed of Lower Greensand, this time with more success.

The villages at the foot of the Downs, which generally stand on the Upper Greensand, belong to parishes which extend up the Downs to the South, and also extend over the Gault and more or less over the Lower Greensand area to the North. Where the Lower Greensand area is narrow, the parishes extend down the steep slope or escarpment of the Lower Greensand into the Weald; but where the Lower Greensand is wide, there are other villages whose parishes are wholly on that formation.

Near the edge of the Lower Greensand there are other villages, but the parishes belonging to these extend down the escarpment of the Lower Greensand into the Weald. The escarpment of the Chalk and of the Lower Greensand thus have quite opposite characters as regards the parishes in which they are contained. The Chalk escarpment belongs to villages lying below (or to the north of) it; the Lower Greensand escarpment belongs to villages lying above (or to the south of) it.

The Chalk escarpment around the Weald is divided into 125 parishes, 119 of which belong to the villages situated below the escarpment. Of the six exceptions to the rule only one (Piecombe) occurs in Sussex. The exceptions to the rule as to the Lower Greensand escarpment around the Weald are more numerous—15 out of a total of 103. From these and from many other facts, which it would be out of place here to discuss, it is inferred that the oldest settlements in the S.E. of England were beneath the Downs, along the coast, and in the wider valleys between the coast and the Downs.*

Brighton and the Sussex towns to the west of it give interesting examples of excellent water supply from shallow wells on the old plan of water supply, and also from deeper wells on the new plan.

The superficial deposits which occupy the plain between the Downs and the sea from Brighton westwards, yield water in shallow wells; but this is insufficient for a general supply, and moreover is now generally fouled where population is thick. But beneath these superficial deposits and the Tertiary Beds which underlie them, there is the Chalk, a great reservoir of underground water. No town in England has taken fuller advantage than Brighton of geological conditions as affecting its water supply. The system adopted has been fully discussed by

* I have discussed this question more fully in a paper read before the British Association at Brighton in 1872, and subsequently published in the Journal of the Anthropological Institute, Vol. iii., p. 32, 1873; also in the Geology of the Weald (Memoirs of the Geological Survey, p. 396, 1875). Mr. F. E. Sawyer has also investigated the early settlements of the country in a paper published in the Archæological Journal, Vol. xli., page 35, 1884.

Mr. E. Easton on previous occasions, and by Mr. Alderman Hallett at this meeting. Water is constantly flowing through the Chalk along numerous lines of fissure, large and small, and in part along the lines of flint. This water finds its way out to sea in great quantities at and near low-water mark. During the construction of the Brighton Intercepting Sewer, 15,000,000 gallons of water were pumped every twenty-four hours. Often marine vegetation cannot grow because of the amount of fresh water coming out of the Chalk, and farmers frequently take their cattle to the shore in the time of drought.

The object of waterworks is to intercept some of this water, and this is best done by sinking wells to about low-water mark and then driving galleries to intercept the lines of fissure. The flow of underground water in the Chalk has been well studied by Mr. Baldwin Latham, near Croydon, and he has shown that its flow can be mapped out into a system of underground lines which do not always coincide with surface-valleys. Sometimes, indeed, the underground flow passes under a surface-hill from one valley to another. This, perhaps, will be found to be the case with the southern Chalk area when its water system is more fully mapped out. There seems, however, to be an important underground flow at Goldstone Bottom, which has made a curious surface-depression, the bottom of which is some 30 feet below the lowest point of the surrounding rim; this is probably due to the dissolving action of the underground water.*

At the Newhaven Water Works (East Blatchington) a well is sunk, 179 feet, to Ordnance Datum; galleries are driven in four directions which find some water in a bed of flints; there is also a bore hole 145 feet below one of the galleries which yields water. Worthing, Littlehampton, and Bognor all obtain their water from wells sunk into the Chalk, supplemented by bore-holes below sea-level.

Some interest attaches to the water supply of the shingle flats of Langley Point and Dungeness, for wells are sunk into the shingle within fifty yards of the shore, and obtain a fair supply of fresh water. This water rises and falls with the tide, and in very dry weather it may sometimes be slightly brackish. The rain falling on the shingle immediately runs through it, and is held up by the silty alluvium beneath. In Selsea Peninsula water is also obtained from shingle underlying brick earth and loam; but this is from an older shingle lying above the level of the modern beaches.

* W. Whitaker, On the Waterworks at Goldstone Bottom, Brighton. Geological Magazine, 1886, p. 159.

Distribution of Diseases.—Dr. Buchanan's researches into the geological distribution of consumption in the south-east of England must be well known to all present; it is therefore unnecessary to devote much attention to this most interesting question. He found that the great predisposing cause was dampness of soil, and that consumption prevailed in any district in proportion to the amount of damp and clayey soil which there existed.* This was the only conclusion which fitted in with the facts, and with few exceptions it fitted remarkably well. But there were some districts to which the general conclusions seemed to apply with less directness than elsewhere, and amongst these somewhat anomalous areas were some of the West Sussex districts.

An enquiry such as that undertaken by Dr. Buchanan can only be founded on published statistics relating to registration districts and sub-districts; but as these generally include great varieties of soil and feature, the investigation is beset with difficulties. Medical officers of large districts have excellent opportunities of studying this question, as all requisite details are at their command.

Dr. C. Kelly, the medical officer for West Sussex, has fortunately greatly interested himself in questions of this nature, and a large amount of important information upon the geographical and geological distribution of disease is to be found in his annual reports. Dr. Kelly states that in West Sussex dampness of soil does not alone explain the prevalence of consumption in certain districts; but that, if to dampness of soil we add exposure and bleakness of situation, there is a more general agreement.

Dr. Kelly finds that in West Sussex the mortality from phthisis and from all causes is very nearly the same in each variety of soil, but that the mortality from diphtheria and from lung disease varies considerably, being much higher in wet and retentive soils than in dry and pervious soils.

The decreasing death-rate from consumption is an important fact. In a very small degree this is perhaps due to a more correct terminology of disease; but as the death-rate from lung disease shows only a slight increase, this can only account for a very small part of the improved consumption rate. It is pro-

* "On the Distribution of Phthisis as affected by Dampness of Soil," Appendix 5, to 10th Report Medical Officer of the Privy Council (for 1867). The geological information for this report was supplied by the Geological Survey. The special geological points involved in the inquiry were also discussed by Mr. W. Whitaker, in a paper "On the Connection of the Geological Structure and the Physical Features of the South-East of England with the Consumptive Death-rate," "Geol. Magazine," 1869, p, 500.

bably in part due to improved drainage and to the removal of subsoil water from near the houses; but agricultural drainage generally must also be credited with a large part of this improvement. Boggy area is drained; the water is carried off the surface of the land more quickly than in former times, and the air is therefore less damp.

Dr. Kelly brings out most clearly the prevalence of Diphtheria upon damp soils, especially upon the Weald Clay. An intensifying cause may be found in the fact that the population is sparse and scattered; the children having long distances to go to school, over roads which are very wet and muddy in wet weather.

Much has been written upon the distribution of Goitre, and most writers endeavour to show some striking relation between its distribution and certain geological conditions in districts where it prevails. Many of the results are curiously contradictory. The favourite idea formerly was that it prevailed in limestone districts; if so, surely all chalk areas ought to be subjected to it, and also all towns deriving their water supply from chalk wells. Another suggestion, equally groundless, is that goitre is due to water containing magnesian carbonate. There is more to be said for the view that goitre prevails where limestone rocks are more or less impregnated with metallic sulphides, especially iron and copper sulphides; although it is very doubtful if even this explains all the facts.

McLelland showed in 1861 that limestone areas containing metallic ores, &c., are liable to goitre; and St. Lager* discussed the matter more fully in 1867, showing that the presence of iron sulphides in any rock or soil was a predisposing cause. Prof. G. A. Lebour† has more recently discussed the geological distribution of goitre, and has adopted Dr. St. Lager's conclusions.

There is no doubt, however, that much more information than we at present possess must be collected before any safe conclusions can be drawn as to the influence of geological conditions (if any) upon the distribution of goitre. Certainly if ferruginous water be a predisposing cause, goitre ought to be very generally distributed through the Weald. Fortunately we have in Sussex an opportunity of fairly testing this theory. The water-supply for the County Lunatic Asylum at Hayward's Heath has been a constant source of trouble in consequence of its ferruginous character. The water comes from a well boring 210 feet deep; at seventy-one feet from the surface there is a band of iron pyrites, which is probably the main source of the iron. Of late years this iron has been largely removed by aeration, but there is still some in the water.

If constantly drinking ferruginous water derived from sulphides is a cause of goitre, we ought to expect some development of the disease in the case of those who have been long in the Asylum. Dr. Saunders informs me that of the 820 patients now there, 283 have been there for ten years and more, whilst 100 have been there over twenty years. There are amongst the 820 patients six cases of well marked goitre, and five more of slight thyroid enlargements; but in all these cases the symptoms were present before admission.

It is much to be desired that this question could be exhaustively studied. It can only be done by medical men in actual practice, or at any rate it is they who must supply the data. The Wealden district is a very favourable field for this investigation, and I would venture to commend it to the notice of the profession in Sussex, as one that might well be worked up for the International Congress of Hygiene which is to meet next year in London. I shall be very glad to render such assistance as is in my power in supplying the geological information required.

* "Études sur les Causes du Cretinism et du Goitre endémique." Paris, 1867. (Noticed in Med. and Chir. Rev., July, 1868.)

† On the geological distribution of Endemic Goitre in England. Newcastle Meeting of Medical Association, 1881.

Mr. Woodruff (Brighton) moved a vote of thanks to Mr. Topley for his valuable paper. The geological formation of Sussex was always interesting, and Mr. Topley had increased it by presenting it in a fresh manner. Sources of water supply, the distribution of disease, indeed all the points raised by him might be studied with great advantage.

Dr. Tatham (Manchester) formally seconded.

Sir Thomas Crawford (London), in putting the vote of thanks to the Section, pointed out the importance of studying these geological questions from a Sanitary point of view.

The vote of thanks was unanimously carried.

On "The Climate of Brighton," by Frederick Ernest Sawyer, F.S.A.

For about a century and a half Brighton, ever increasing, has flourished as a "health resort," and it is therefore important, in considering the various branches of its *Sanitary* history, not to omit reference to its Climate, to which, coupled with Sea-Bathing, its proud position as "the Queen of Watering-places" is due. Emperors, Kings, and Princes, too numerous to mention, have enjoyed the benefits of its pure air; whilst poets, novelists, and authors, have spread its praises abroad.

Sydney Smith observed that "Brighton was a place of which all rich and rational people in the metropolis should take small doses from time to time." Thackeray (a constant visitor) had doubtless heard of this dictum, which he expands in *The Newcomes* into the oft-quoted passage—"It is the fashion to run down George IV.; but what myriads of Londoners ought to thank him for inventing Brighton! One of the best physicians our city has ever known is kind, cheerful, merry Doctor Brighton;" whilst Mr. G. A. Sala, who may almost be claimed as a native, says—"From my fidelity to Brighton I will never swerve; it is to me the place *par excellence* in which to get well and keep well; but after Brighton give me Ajaccio."

Much has been written about the climate of Brighton, and medical works containing few (if any) meteorological statistics, have produced many rash assertions on the subject. One of the most peculiar is that of Dr. A. L. Wigan, entitled "Brighton and its Three Climates," nearly a third of which is devoted to a treatise on the necessity of paying a doctor his proper fees, and obeying his orders. His statements respecting the climate are unsupported by any meteorological tables, and some are gross exaggerations, such as, "You pass from a calm air [under the cliff] at 55 or 60 degrees, to a keen wind at 35 or 40, which from its rapidity, produces the effect of a frost." Such extraordinary differences in temperature have never been recorded by any observer. The fact is Dr. Wigan, as many persons do, confused temperature with wind and humidity. Air in motion produces evaporation from the surface of the skin, and consequently an apparent sensation of cold, when there may be no actual difference in the temperature from that on a calm day or

in a more sheltered spot. The "Three Climates" may therefore be relegated to the limbo of myth, and we can commence our subject by a consideration of the physical geography of the town.

Physical Geography.

The chief feature in the formation of the Downs on which Brighton is built, is the central Y shaped valley which separates the meteorological districts of the town. At the junction of the arms of the Y valley, rises up gradually Hollingbury Hill, which is 500 feet above sea level, whilst the road round St. Peter's Church is only 48 feet above the sea. On the east of the valley the Downs rise suddenly, reaching at the Workhouse a height of 300 feet sloping off rapidly to 80 feet on the Marine Parade, and affording to the houses on the Eastern cliff almost complete shelter from the north and north east winds. On the west of the valley the hills are not so high, but reach, in Clifton Terrace and Buckingham Place, 200 feet in height; from these spots the ground gradually slopes off to the west, forming a large and moderately fertile plain, which continues through Shoreham, Worthing, and Chichester on to Portsmouth. Over this plain the mists and rain clouds pass, and meeting the long line of watershed formed by the Downs, deposit their moisture in the Weald of Sussex, and greatly increase its fertility, which enriched with the rain, and protected from storms by the Downs, is thus able to produce large forests of trees which do not grow on the more exposed hills round Brighton.

Of the two arms of the Y valley, the western one spreads out through Preston and Patcham, and ends in the Downs at Clayton, whilst the eastern one goes through Falmer to Lewes, opening out into the Weald, and is from its course the path of the south-west gales and storms of rain. It is a source of surprise to some visitors to the town that there is no river or stream running down the central valley, and that there is none within at least five miles of the town; but this is occasioned by the porous character of the chalk, which prevents the water from collecting, as may be seen on the Downs, where, in order to get over this difficulty, the ponds dug to collect the rain are coated with clay (or *pugged*, as it is termed locally) to prevent the water from soaking through the chalk. If a heavy fall of rain occurs the streets will be found dry within half an hour after it ceases. The absence of a tidal river or harbour, of course adds greatly to the health of the town, there being no muddy banks to emit unpleasant odours and cause disease. From the Domesday Survey and various ancient records we learn that there was formerly a small river known as the Wellsbourne,

which flowed down the Patcham valley and entered the sea at Pool valley, which forms the remains of the ancient harbour of the town. Eight hundred years ago the whole central valley was a shallow lake, known as the Wellsmere, and from Brighton to Lewes the country was much like the Upper Engadine is now —the valleys occupied with little lakes (cf. Stanmere, Falemere, Burgemere).

Barren Hills.

The absence of trees at Brighton has been to some a subject of complaint, whilst others consider it an advantage. The sea-salt in the wind is unfavourable to vegetation—the *Euonymus*, however, flourishes; but trees are generally stunted. Dr. Johnson, who several times visited Mrs. Thrale at her house in West Street (now the site of the Concert Hall), detested the Downs, and observed that "it was a country so truly desolate, that if one had a mind to hang one's self for desperation at being obliged to live there, it would be difficult to find a tree on which to fasten the rope." An old alliterative proverb refers to Brighton as "a Town without Trees, and a Sea without Ships." Peter Pindar, again, writing in 1802 in praise of Margate, says:—

> "What's Brighton, when to thee compared? Poor thing!
> Whose barren hills in mist for ever weep."

This is, however, a libel, for the town is very free from mist, as I shewed in an elaborate table published in the *Daily Telegraph* of Oct. 1888.* Trees have now been planted by the Corporation in many thoroughfares; but there is no doubt that the general absence of decaying vegetable matter has conduced to the health of the town.

Temperature.

The proximity of Brighton to the sea affects the climate in three ways:—

1. By reducing the mean daily range of temperature.
2. By raising the temperature in the winter months.
3. By lowering the temperature in the summer months.

The appendix to this paper contains a summary of the writer's meteorological observations for more than twenty years, being taken from an article contributed to Mr. D. B. Friend's Brighton Almanack for 1890, to which reference must be made for complete meteorological tables. From Table I. it will be seen that the mean daily range of temperature yearly was 11·8 deg.; being 15·9 deg. in June, diminishing to 7·7 deg. in January. These daily ranges are of course small compared with those of

* This Table is given on page 256.

inland places. The lowest temperature was 11·4 deg. on January 22nd, 1881 (the time of "the great snow-storm"). On the 15th of that month the min. temp. was 15·5 deg.; on the 17th, 16·7 deg.; and the 20th, 17·3 deg. With the exception of these four days no lower temperature than 18 deg. was recorded, viz., in December, 1870 (the winter of the Franco-Prussian War). This clearly shews the influence of the sea, as in the interior of the country we find the temperature fell below zero at many places. Fashion has, perhaps, somewhat empirically, fixed the Brighton season for the period from the end of September to the middle of December; and it is a curious fact that it is then that the advantages of Brighton are most apparent, the chills of autumn being avoided, and mean temperature in excess of that at Greenwich, as will be seen by the following table:—

Mean Monthly Temperature.

(arithmetical mean daily max. and min. temperatures.)

	Brighton. Deg.	Greenwich. Deg.
September	58·0	56·6
October	50·4	49·5
November	43·8	42·4
Mean	50·7	49·5

The mitigating influence of the sea on the heat of summer is apparent, for we find that the temperature has not risen above 90 deg. The highest in my own register during twenty-three years, being 86·7 deg. on July 17th, 1868. During the summer months the well-known phenomena of the land and sea breezes are particularly noticeable at Brighton, the most marked being the easterly. The land breeze N.E. or E. blows until from 10 to 11 a.m., and a morning will open very sultry and oppressive until the cool sea breeze sets in. This lasts until sunset, or sometimes until midnight, when the land breezes begin again. A cool and comfortable day is thus enjoyed, even in the height of summer. When these breezes are westerly, the land breeze is from N.W. or W., and the sea breeze from the S.W. or S., occasionally S.E. Sometimes the land breeze begins in N.E., is followed by S. or S.W. sea breeze and then a N.W. or N. land breeze again, or the reverse way, but this is not often.

The mean temperature of the year (arithmetical mean daily max. and min. temperatures) is 49·8 deg., the monthly means ranging from 63 deg. in July to 38·8 deg. in January. The warmest month in the last twenty-three years was July, 1868, with a mean of 66·8 deg., and the coldest January, 1881, with 33·2 deg.

Wind.

The climate of Brighton has been classed amongst the *bracing*, but this must be from the fact that its pure air is almost always in motion rather from any lowness of temperature, which, as already seen, is not experienced here. In a "Book of Nonsense" (I think by Mr. C. H. Ross) I once read that—

> "There was a young lady of Niton,
> Who went for a visit to Brighton;
> But when she got there, so keen was the air,
> She shivered, and went back to Niton."

Our visitors, however, do not shiver and leave the town, but find it a pleasure to return again and again, as I trust will be the case with the members of The Sanitary Institute.

From September, 1872, to December, 1874, the velocity of the wind was recorded by me with a Robinson's anemometer, erected at the Chain Pier-head, Brighton; and from the observations of twenty-seven months it appears that the mean horizontal distance travelled by the wind daily during that period was 329 miles, or nearly 14 miles an hour, so that there is no lack of fresh air.

Rainfall.

The mean annual rainfall of twenty years was 28·35 inches; and as will be seen by Table III., the most rainy month is November, with a total of 3·40 inches; and the driest, March, with 1·67 inches. The greatest fall in twenty-four hours was 1·99 inches, on June 22nd, 1876, being the largest recorded by any observer in Brighton. It is somewhat remarkable that no heavier fall of rain has occurred, but it may be due to the fact that the town is very free from thunderstorms and that there is no river-bed up which a storm can travel. Thunderstorms have often been observed approaching the town from the sea, and then either dividing into two parts and proceeding up the channels of the Ouse and Adur (the two neighbouring rivers), or else passing undivided along one of them. In either case Brighton only experiences the edge of the storm.

Sea Bathing.

It seems wrong to conclude a paper on the climate of Brighton without briefly drawing attention to the important matter of sea-bathing, to which the town first owed its popularity. It must be confessed that this is now sadly neglected. We find people going abroad at great expense to try foreign baths, when a course of salt-water baths here would be found of great benefit, particularly in strengthening and bracing the limbs of delicate children and women. Formerly, it seems that people were not

so much afraid of the sea as at present, for we read of Dr. Johnson bathing here in October, 1776, a month when sea bathing has now usually ceased. His friend Mrs. Thrale invited him here expressly for the bathing, and the attendant on seeing Johnson swim, said "Why, Sir, you must have been a stout-hearted gentleman forty years ago!" Later on we find the gossiping Fanny Burney, bathing in November, and writing thus in her "Diary":—

> "Wednesday, November 20th [1782]—Mrs. and the three Miss Thrales and myself all arose at six o'clock in the morning, and 'by the pale blink of the moon' we went to the sea-side, where we had bespoke the bathing-women to be ready for us, and into the ocean we plunged. It was cold but pleasant. I have bathed so often as to lose my dread of the operation, which now gives me nothing but animation and vigour. We then returned home, and dressed by candle-light, and, as soon as we could get Dr. Johnson ready, we set out upon our journey in a coach and chaise and arrived in Argyle Street at dinner time."

It is a matter of great surprise to me that the Corporation do nothing to encourage sea-bathing, and do not provide for the poorer classes any sheltered baths to be used in stormy or inclement weather, or indeed any form of salt water baths.

We have an excellent Chalybeate spring now known as St. Ann's Well, containing (as I learn from several medical works) one of the most powerful iron waters in England, and I am assured by medical friends that four persons out of every five would enjoy better health by taking small doses of iron regularly as a tonic. In conclusion, therefore, I cannot do better than advise strangers to invigorate themselves with our pure fresh air, and to strengthen themselves by sea-bathing and a course of these iron waters.

APPENDIX.

Summary of Observations made at Nos. 55 and 31 Buckingham Place, Brighton.

The observations were made in latitude 50° 49′ 56″ N. and longitude 0° 9′ 13″ W. The instruments used being verified standards chiefly by Negretti and Zambra and Casella. They were 206 feet above the mean sea level as calculated by the Ordnance Survey Officers. The air thermometers were exposed on an open modified Glaisher stand with a N.W. aspect. The readings of the maximum and minimum thermometers were taken respectively at 9 a.m. and 10 p.m. daily until December 31st, 1876, and after that date both at 10 p.m. until September 30th, 1886, when they were taken at 9 a.m. daily. The rain-

guage had a 5-inch funnel, and was, until the middle of 1874, placed one foot above the ground, and then on a post five feet above the ground to obtain better exposure. It is considered, however, that all the observations are equally comparable. Rainy days are those on which ·01 of an inch or more of rain, snow, or hail fell. The mean degree of humidity is calculated (by Glaisher's Hygrometrical Tables) from the difference between the dry and wet bulk thermometers. It represents the percentage of moisture the air contains.

Table I.—*Air Temperature in the Shade.*

(21 Years—1868 to 1888.)

Months.	Max.	Date.	Min.	Date.	Range.	Mean Daily Max.	Mean Daily Min.	Mean Daily Range.	Mean.
	Deg.		Deg.		Deg.	Deg.	Deg.	Deg.	Deg.
January ...	54·7	19, 1877	11·4	22, 1881	43·3	42·6	34·9	7·7	38·8
February ...	56·7	27, 1868	20·5	12, 1870	36·2	44·5	36·2	8·3	40·3
March	61·4	30, 1873	22·8	11, 1874	38·6	47·3	36·2	11·1	41·8
April	71·5	28, 1869	27	21, 1881	44·5	54·2	40·6	13·6	47·3
May	78·5	27, 1868	31	8, 1879	47·5	60·3	45·1	15·2	52·7
June	79·8	16, 1870	38	4, 1871	41·8	67·1	51·2	15·9	59·1
July	86·7	17, 1868	42·6	16, 1883	44·1	70·5	55·4	15·1	63
August	84·5	17, 1876	43·3	23, 1885	41·2	69·5	55·3	14·2	62·4
September ..	77·2	7, 1868	34	27, 1885	43·2	64·3	51·8	12·5	58
October.....	72·0	8, 1869	27	28, 1869	45·0	55·8	44·9	10·9	50·4
November ..	60·4	14, 1876	24·6	30, 1879	35·8	48·3	39·5	8·8	43·8
December ...	56·4	1, 1876	18	23,* 1870	38·4	43·6	35·6	8·0	39·6
Results	86·7	July 17, 1868	11·4	Jan. 22, 1881	75·3	55·7	43·9	11·8	49·8

* Also 24th and 30th.

Table II.

Months.	Barometrical Pressure (14 Years—1872 to 1885. Corrected and Reduced to 32 degrees at Sea-Level. Highest.	Date.	Lowest.	Date.	Range.	Mean at 9 a.m.	Mean degree of humidity, 9 a.m. Saturation = 100 per cent.
	Inches.		Inches.		Inches.	Inches.	
January.....	30·983	1882	28·514	1872	2·469	30·058	91
February	30·868	1883	28·902	1873	1·966	29·968	91
March	30·741	1883	28·437	1876	2·304	29·974	82
April	30·635	1883	28·981	1879	1·654	29·890	76
May	30·645	1881	29·144	1885*	1·501	30·001	72
June	30·504	1874	29·487	1881	1·017	29·992	73
July	30·471	1882	29·206	1877	1·265	29·991	73
August	30·490	1874	29·179	1876	1·311	29·966	74
September ...	30·523	1873	28·867	1883	1·656	29·971	81
October.....	30·644	1877	28·885	1880	1·759	29·924	85
November.....	30·656	1879	28·618	1880	2·038	29·924	88
December.....	30·818	1879	28·515	1876	2·303	29·977	90
Results	30·983	Jan. 18, 1882	28·437	Mar. 12 1876	2·546	29·970	81

* On May 13th, 1886, the reading at 9 a.m. was 29·101.

Table III.

Months.	Rain. (20 Years—1869 to 1888. Mean Monthly Fall.	Greatest fall in 24 hours.	Date.	Mean No. of Rainy Days.	Minimum Temperature on Grass. (1870 to 1885—16 Years.) Mean.	Lowest.	Date.	Mean No. of Nights at or below 32 deg.
	Inches.	Inches.			Deg.	Deg.		
January	2·72	1·09	10, 1877	16	31·7	8·7	22, 1881	17
February.....	2·13	1·02	26, 1874	15	33·0	18·8	24, 1875	13
March	1·67	0·75	11, 1885	13	33·1	15·5	14, 1870	14
April.....	1·63	0·94	16, 1871	12	36·9	22·5	25, 1875	6
May	1·72	1·21	28, 1878	11	41·3	26·0	3, 1877	3
June	2·00	1·99	22, 1876	11	48·2	34·3	17, 1883	—
July	1·88	1·52	14, 1875	12	51·7	38·7	16, 1883	—
August.....	2·33	1·23	19, 1879	12	51·3	39·0	24, 1887*	—
September	2·80	1·54	3, 1884	13	47·4	26·8	23, 1872	—
October.....	3·30	1·27	22, 1870	16	40·7	21·6	31, 1873	3
November	3·40	1·41	18, 1880	17	34·5	21·8	19, 1871	12
December	2·72	1·06	13, 1870	15	31·2	11·3	27, 1870	17
Results of Year.	28·35	1·99	June 22, 1876.	163	40·1	8·7	Jan. 22, 1881.	85

* Also August 19th, 1885.

Mr. Baldwin Latham (London) said that he did not know any one in the county who had done more valuable work in meteorological research than Mr. Sawyer. Few people knew the great value of a thorough pursuit of meteorological study. It was extremely important to the Sanitarian, and Mr. Sawyer's observations, it was interesting to know, appeared in the Registrar-General's returns, and in the Annual Summary. Brighton, in fact, was one of the very few towns in the Registrar-General's returns, from which observations were not absent. Therefore Brighton set a good example, which he trusted other towns would follow, so that they might have a record of the observations in all the large towns. There could be no doubt whatever that the study of meteorology threw great light on the causes of unhealthy years; those years, in which there was a more free movement of the air, were found to be the most healthy. He also suggested that a survey should be taken of the level and movements of underground water.

Mr. W. White (London) asked why, in so many towns which excelled as sanitary resorts, there was so little attempt to soften the water?

Alderman Dr. Ewart (Brighton) replied that the question of softening the water had been most carefully considered by the Town Council. Proposals had been made to soften it, as it issued from the chalk at Goldstone Bolton. But when the question was carefully

gone into, it was found that the water was not sufficiently hard to justify the town in undertaking the consequent expense. Nor did they care to undertake the risk of having their water supply contaminated at the fountain head, which the establishment of such works might involve. But the real fact of the matter was, that putting this question aside, the water of Brighton was not sufficiently hard to demand any such procedure. In cases of rheumatism, gout, dyspepsia, hard water, he admitted, would be more or less injurious. But then they had by Clark's process a means by which every householder could soften his own supply. As invalids in Brighton were the exception to the rule, he thought that it would be absurd to soften the water of a great community for the sake of those who were in a very small minority, and who could gain the end they wanted for themselves with very little difficulty. As showing the wholesomeness of Brighton water, he said they would not in all England find a healthier community of children than in Brighton.

Sir THOMAS CRAWFORD (London) said that all who had seen the magnificent waterworks possessed by Brighton, must be convinced of the admirable arrangements made by the Brighton authorities for securing the purity of their water supply, and the best arrangements for its distribution. He had personal experience of the hard water at Blackheath, as supplied by the Kent waterworks. It was very much harder than the water supply of Brighton, but there was one thing to be specially noted, and that was the healthiness of the Blackheath children. He did not think that a little chalk in the water was by any means a bad thing, nor did he believe that Brighton would be doing wisely by attempting to soften its water. Proceeding, he mentioned for example Dublin, which was perhaps the unhealthiest town in the United Kingdom, to show that a pure and soft water supply was not the only feature necessary to secure health.

As the discussion had taken an unexpected turn with regard to the softening of water, the PRESIDENT of the Section suggested that Mr. Baldwin Latham, a great authority on the subject, might like to add to his previous remarks.

Mr. BALDWIN LATHAM (London) accordingly availed himself of the opportunity to say that as far as the purposes of washing were concerned, it was desirable to soften the water. It was a fact, however, that the healthiest districts were those where the water supply was hardest, whilst it was only extremely soft water that produced lead poisoning. With reference to the Kent Waterworks Company, they had studied this question. The first thing they did was to buy a waterworks having a softening process in full operation. Very soon, however, they abandoned this process and delivered the water in its natural state, thus adding their testimony to the many difficulties there were in softening water on a large scale. In his own house he boiled all the water, put it in the open air to cool, and then filtered it, with the result that as far as the taste was concerned, no

difference could be detected from the water in its original state, in point of fact, however, the process of boiling the water was the means of removing its hardness. Chalk water, he added in conclusion, was an admirable water, and all districts supplied by it were undoubtedly healthy.

Mr. G. J. SYMONS (London), referring to the meteorological observations conducted by the Medical Officer of Health for Brighton, observed that though the rain gauge and the thermometer might not be considered artistic apparatus, he should like to see them occupying better positions on the Old Steine, and not half hidden as they were by trees. He further suggested that, as the temperature of the Old Steine did not truly represent the precise temperature all over Brighton, it would be valuable and interesting for similar instruments to be placed, say, near the Hove sea wall, and near the Madeira Road. Why, the very fact of there being a Madeira Road—a sheltered drive by the sea—was itself evidence that the temperature there was considered higher than at many points elsewhere in Brighton. He was sorry that Mr. Sawyer's table on the mists in Brighton had been published in the *Daily Telegraph*, and not in the proceedings of any Society where it would be accessible.*

Dr. EWART (Brighton) explained that this table had been prepared in compliance with a request from the Corporation, when it was thought that the New Wimbledon would be at Brighton. He, however, suggested that it should be added to Mr. Sawyer's present paper, so as to be preserved in the Transactions of The Sanitary Institute.

As Mr. Sawyer, owing to indisposition was not present, there was no formal reply, nor did Mr. SYMONS, who undertook the introduction of the paper, think that there were any points which required explanation. A cordial vote of thanks was passed to Mr. Sawyer for his communication.

On "Lead Poisoning by Soft Water-supplies," by Professor PERCY F. FRANKLAND, Ph.D., B.Sc. (Lond.), Assoc. Roy. School of Mines, F.C.S., F.I.C.

THE subject of lead-poisoning is one which has, during the past few years, been again very prominently before the public, in consequence of several notable cases of such poisoning having taken place in different parts of the country.

Indeed it is, perhaps, one of the most remarkable features of

* This Table is given on page 256.

this subject that, although the sources of water-supply remain unchanged for long periods of time, still the mischief in question is often lost sight of for a number of years, and then again makes its appearance almost after the fashion of an epidemic. This periodical publicity is no doubt to a certain extent a matter of accident; but it is also unquestionable that one and the same water-supply may have the power of acting upon lead at one time, and become inactive at another.

If we enquire into the cause of this activity, we find that opinion at the present day is even more divided than in the past; according to some authorities it is due to the presence of acidity in the water, according to others the cause is to be sought in an insufficiency of dissolved silica, whilst others again see, in the absence of a certain proportion of dissolved carbonic acid, the secret of the lead-dissolving power.

Time does not permit me here to enter into the evidence upon which these theories are severally based, but their mere enumeration must be sufficient to show that our knowledge of the cause or causes of this lead-dissolving power of some waters is in a very unsatisfactory state, and that at present at any rate the mischief and its remedy must be treated from a purely empirical point of view.

It is not necessary, indeed, to predicate this lead-dissolving power of every water until the reverse has been actually demonstrated by experiment; on the contrary, the experienced chemist, from a mere inspection of the results of an ordinary analysis, is able to predict, with almost unerring certainty, the innocence of the great majority of inactive waters in this respect; whilst, on the other hand, he will have far greater difficulty in foretelling with precision the activity of water towards lead from analytical data alone. He should, however, relegate all very soft waters to a doubtful class, the individual members of which must be subjected to careful experiment before being cleared of the suspicion of possessing activity towards lead.

Methods of Examination.

There can be no doubt that in general water-analysts devote too little attention to the question of the lead-dissolving power of the waters submitted to them for opinion; for this, however, they are not wholly, nor indeed chiefly, to blame, as the adequate investigation of this subject entails a larger expenditure of time and the use of a much larger quantity of water than are generally available for such analyses. It is, however, in my opinion, incumbent upon the water-analyst to indicate to his

client, whenever there is any chance of a water proving troublesome in this respect, that a special investigation of this point is desirable.

Especially noteworthy and regrettable is the absence of any adequate treatment of this important subject in the very comprehensive labours of the Royal Commission of 1868. As a result of this neglect we find that soft waters generally, when free from any suspicion of sewage contamination, have been recommended without caution for the purposes of town supply, and have been left to demonstrate their lead-dissolving power by the cases of lead-poisoning to which they have at times given rise.

The examination of water for activity towards lead, if it is to be satisfactory, must be conducted with much circumspection and care. It is not sufficient to place a strip of metallic lead in contact with a certain quantity of the water, and then watch the result, but the water should be placed in a piece of lead service pipe closed at both ends, and after remaining there for a definite length of time (say twenty-four hours) the amount of lead in suspension and solution should be carefully determined. It must be further borne in mind that some waters act more upon new lead than upon old, whilst others act upon the old or corroded metal more than upon the bright untarnished surface; and on this account it is very desirable that the above test should be made with a piece of new service pipe as well as with a piece of an old one. And again, the tests should be continued over as long a period of time as possible in order to watch the progress of the action.

Thus in some cases it will be found that the water acts more upon the new pipe than the old, and *vice versa;* sometimes that the water acts more and more upon the pipe from day to day, and *vice versa;* so that experiments made only with a new, or only with an old pipe, as well as experiments not continued over a sufficient period of time, would lead to most erroneous inferences being made. As regards the use of old pipes, these should of course have been in use with the water under examination, otherwise no satisfactory deductions can be made, and hence if it is a question of a new water-supply, the important matter is to observe whether, with a new pipe, the amount of lead in suspension and solution increases or diminishes from day to day.

If the quantity of lead taken up by the water diminishes from day to day, and soon falls to an insignificant amount, it may be safely assumed that the water will exert no permanent action on lead. On the other hand, if the proportion of lead taken up is considerable and remains practically constant, or actually increases from day to day, the obvious inference is that the

activity will be permanent, and inasmuch as by corrosion the surface of the pipe is enormously increased, larger and larger quantities of lead will in all probability be taken up by the water.

A very curious feature, which is worthy of notice in connection with such tests as the above, is that a pipe of small diameter, although offering a larger surface to the water it contains than a wider pipe, still yields less lead to a given volume of an active water placed in it, than a pipe of greater diameter. The explanation of this is probably to be found in the fact that the corrosion of the pipe takes place from definite centres on the surface of the lead in consequence of some irregularity, mechanical, physical, or chemical, of the surface, and a larger tube with its larger surface naturally possesses a greater number of such centres from which corrosion can take place.

Classification of Waters.

As regards the waters which should be submitted to examination in the manner indicated above, it may be stated that hard waters, especially those containing so-called "temporary" hardness, may be generally considered above suspicion, although cases are by no means unknown of hard waters, generally from polluted shallow wells, which have a powerful action upon lead.

On the other hand all soft waters, and even hard waters which contain little or no "temporary" hardness, must be provisionally viewed with suspicion until a searching enquiry has been made into their behaviour towards lead. The suspicion of activity in the case of such soft waters becomes the greater if they are highly impregnated with vegetable matter, as they often are when derived from moorland districts. Such vegetable matter often imparts a measurable acidity to the water, although in my opinion it is quite possible for such moorland waters to be possessed of high lead-dissolving power without any acidity, and indeed after an appreciable quantity of alkali, in the shape of bicarbonate of lime, has been added to them. It must also be borne in mind that acidity cannot be indispensable to activity inasmuch as distilled water is possessed of strong lead-dissolving power.

As already mentioned, some authorities attribute the continuous activity of waters to the absence of an adequate proportion of dissolved silica in them, and although the evidence in favour of this supposition is by no means conclusive, and is indeed in direct opposition to the experience of others, there can be no doubt that whilst this matter is still *sub judice*, such waters should be remanded for further enquiries.

It is, further, of the greatest importance to remember that

the activity of water, especially surface water, from the same source is extremely variable at different times and seasons, and that consequently a favourable opinion passed upon a water of a suspicious type must by no means be supposed to clear its reputation for all time. It is very necessary that Medical Officers of Health of towns supplied with such waters should be continually on the alert, that they should frequently have the water drawn from the service-pipes submitted to examination, for in all probability there must be an immense amount of lead poisoning of an inconspicuous character which is never brought to public notice at all, especially when it is remembered what powerful motives there are for concealing any dangers attaching to a public water-supply.

Public Protective Measures.

Assuming that the activity of a water towards lead has been demonstrated either by experiment or by actual experience on the large scale, the question arises as to what means are available for its prevention. Various preventive measures have from time to time been suggested with more or less success.

In the belief that the activity is in general caused by the acidity of the water, it has frequently been recommended to pass the latter through filters constructed of chalk or limestone. This comparatively simple measure has been found to be fairly successful in certain cases; but the effect is of only short duration, as the chalk or limestone soon becomes coated with a furry deposit, which prevents its further solution by the water.

On the assumption that the presence of silica is essential to secure the inactivity of the water, filters constructed of sand, flint, and limestone have been recommended, and found to be efficacious, at any rate for a certain length of time. I have myself experimented with filters thus constructed, and have found that the activity of the water was very materially diminished by such filtration, although the proportion of silica was not materially increased. Adequate data are, however, wanting as to the length of time during which such filters remain efficacious.

Of all the methods of preventive treatment with which I have experimented, by far the most efficacious consists in the addition of a certain proportion of carbonate of soda to the water. I was first led to employ this method in the case of an extremely active water, which was found otherwise very difficult to deal with, and in which an immediate remedy was requisite. The method proved perfectly successful in the case of this highly refractory water, and has been since imitated with

success in other places. In addition to its efficiency, the method possesses the advantage of avoiding the expensive erection of filter-beds, with the necessary frequent renewal of the filtering material; again, the dose of carbonate of soda can be varied according to the necessities of the case, and even with the same water it may advantageously be varied from time to time, inasmuch as the activity, in the case of surface-water, generally varies much with the season.

I have found this method of treatment with carbonate of soda far more effective than the addition of any other chemicals that I have experimented with, thus it is much more effective than caustic lime, and much more easy to handle; it is also much more effective than phosphate of soda, which has sometimes been supposed to act powerfully as a protective towards lead, but which I have found to be of absolutely no use unless employed in prohibitively large proportions.

As regards the quantity of carbonate of soda it is necessary to add, this must be ascertained by actual experiment in every particular instance; but in an extreme case I found it necessary to use five parts of soda to 100,000 parts of water by weight, which, with carbonate of soda at £5 a ton, represents a cost of 3d. per 1,000 gallons. In most cases, probably, a very much smaller amount only is necessary, and if the quality of a water-supply be watched from time to time, the amount could be frequently varied, and at certain seasons probably the treatment might even be suspended with safety.

But although I am of opinion that treatment with suitable proportions of carbonate of soda is the safest and most expeditious method of counteracting the lead-dissolving power of a soft water, I do not wish to discountenance the treatment of such waters by filtration. On the contrary I think it is very desirable that upland surface waters should be subjected to filtration quite irrespectively of their activity towards lead, although the fact that this activity is often very greatly diminished by filtration through suitable materials, forms an additional and strong argument for submitting all such waters to this salutary process.

Private Preventive Measures.

In conclusion, I would point out that it is the duty of the medical officer of health, or of any other local sanitary authority, to see that in all towns supplied with water which is known at times to possess activity towards lead, the consumers are duly informed of the best means of protecting themselves individually, from the dangers of lead-poisoning. This would probably be best effected by the periodical house to house distribution of a suitable leaflet pointing out:—

(1.) That no water should be collected for drinking purposes, until after the tap has been allowed to run for such a length of time as will presumably clear the service pipe, and that the drinking or cooking water, may, therefore, be advantageously collected immediately after a considerable quantity of water has been drawn for other domestic purposes.

(2.) That the filtration of the water through any form of animal charcoal filter practically guarantees its absolute freedom from lead.

(3.) That hot water acts more powerfully on lead than cold, and that, therefore, metal tea-pots and other soldered vessels for holding hot water should be avoided as much as possible.

"*A case of Well-pollution undetected by Chemical Analyses*," by A. W. Scatliff, D.P.H., Medical Officer of Health for Margate.

A somewhat interesting series of six cases of enteric fever, probably communicated by water from a contaminated well, and exemplifying Dr. R. Cory's investigations, recorded in the Medical Officers' Supplement to the Local Government Board's 11th Annual Report, occurred in my district last summer. These six cases, except the first, all originated in two houses situated next door to one another on the outskirts of the town, and drawing their supply of drinking water from a well used in common by the inmates. The following table gives at a glance a few particulars of the order of the appearance, &c., of the malady in each one of the affected persons:—

House No. 1.			House No. 2.		
No. of Case.	Name.	Date.	No. of Case.	Name.	Date.
1st	Mr. C.	Early in July.	4th	Mrs. F.	Oct. 1st.
2nd	Mr. M.	Aug. 5th.	5th	Mr. F.	Oct. 25th.
3rd	Mr. P.	Aug. 5th.	6th	Miss F.	Nov. 2nd.

The first case, that of Mr. C., was clearly imported, the symptoms showing themselves in a locality previously free from the disease, a few days after his arrival. The interest of the succeeding batch centred in the fact that the Public Analyst reported that the well water, although of doubtful purity, was not, in his opinion, a safe case to "carry into court," and yet five other cases subsequently were probably caused by persons drinking of this identical water. Careful investigation of the circumstances seemed to show that this well had become contaminated (although previously safely used for years), by the specific enteric poison derived from the stools of the first patient. It appeared that there was no water-closet in House No. 1., and that Mr. C.'s evacuations were placed in a dry closet some 40 feet from the house. The trouble which ensued was, however, probably produced in the following manner:—The pail from which the stools had been emptied was usually dipped into a rain-water tub to rinse it clean, and the washings were subsequently thrown on the ground in close proximity to the well, and thus, in all likelihood, polluted it.

Another point of importance duly noted was that, on my advice, the inmates of House No. 2 did not partake of the affected water from August 5th until about September 23rd; at the latter date, the landlord of the house, who had been pressed to amend the water supply and close the well, stated that he should not do so, as he had had the water analysed, and it was reported good, and on the strength of his statement, Mr. F.'s family used the water again, with the result that Mrs. F. was attacked by typhoid fever on October 1st. This was sufficient to convince the landlord, as well as Mr. F., of the serious mistake they had made, and the water was at once laid on without further delay. Notwithstanding this, however, the husband and one of his daughters, who rarely drank water until boiled (in contradistinction to the mother, who frequently drank it fresh from the well) contracted the same disease on October 25th and November 2nd, respectively. After the latter date no other persons were attacked, although others resided in the affected houses. Of the six persons, only *one*, viz., Mrs. F., died, but her daughter, who was the last to suffer, was very dangerously ill for six or seven weeks. These cases, I think, emphasize Dr. Cory's conclusions, that it is unsafe to trust to chemical examination of water, unless we have persuaded ourselves that the source of it is free from pollution.

Mr. Baldwin Latham (London) said that his view of chemical analysis was very conclusive. He never trusted to it. On the other hand, he never supplied a town with water unless he did have a chemical analysis, because, if a chemist said the water was bad no one would use it. With regard to organic chemistry it had not made much advance in this matter, and he pointed out in this connection the anomaly, that whilst a chemist said, if water contained 10 parts of a certain ingredient it was bad, yet, if he put more water to it and reduced the parts of the ingredient to four, the chemist then held that it was good. Further, in order to test the value of a chemist's analysis, the Local Government Board had charged certain water with the excreta of persons suffering from typhoid fever, and other water with the excreta of persons who were perfectly healthy, and significantly enough, whilst the latter was condemned, the water containing most poisonous matter passed muster as good water. In the great fight about the Middlesborough water, Dr. Frankland, the greatest chemist of the present day, said in evidence, that he had charged water of a good quality with a certain quantity of the excreta of persons suffering from cholera, in the proportion of one part per thousand; he had submitted it to analysis, and he had not been able to find any difference in it from pure water. Wells, therefore, which were liable to pollution were, he held, to be looked upon with great suspicion, even though the water in them passed the test of the chemist. Whilst, however, there was this uncertainty in the chemist's test, they had certain minerals in whose power they could absolutely rely. There was for example the lithia test, it being possible for one three-hundred-thousandth part of a grain of lithia to be detected by spectrum analysis. This lithia moved with the water, and by it it was quite possible to trace where the water went, in what particular direction; so, though chemists could supply no accurate test of water by organic chemistry, they had in this way rendered it possible to trace water underground for long distances. As a piece of general advice he would say, "use your common sense in doubtful cases, and always boil your water before drinking it."

Mr. Jago (Brighton) considered it worthy of remembering that no analysis by organic chemistry was of use in tracing germs of typhoid or other diseases. The most the chemist could do in this way was to pass a general condemnation, distinguishing only the difference between water fairly bad and very bad.

Mr. H. H. Collins (London) said that in Paddington they had recently had an inspection of water, and Mr. Latham had certainly told them exactly what the water contained, and they had blindly trusted the opinion he offered them. He could only say, therefore, that he hoped Mr. Latham had spoken of chemists' tests with the due caution that a gentleman making such assertions should do, for his remarks were such as seriously to disturb those who, like himself, had to do with the administration of Acts of Parliament. For himself he was rather

of opinion that Mr. Latham had conveyed a wrong impression of Dr. Frankland's evidence in the Middlesborough case, nor could he believe the analysts were quite so ignorant on the subject as Mr. Latham would have them believe. Mr. Latham's remarks, at any rate, had placed him in this position, that when he returned to London he should feel bound to make very careful and anxious enquiries, whether the analyst's science was a mere delusion or founded on fact, and whether chemistry was a myth or the means of teaching them what they wanted to know.

The PRESIDENT of the Section pointed out that Mr. Scatliff's paper would have been of additional value if it had gone a little more into details of the case. And many would have liked to know, for example, the conditions surrounding the well. It would seem, he added, if the statement were correct, that some people had suffered from the effects of the poisonous water even after it had been boiled; that the boiling of water did not absolutely destroy the germs of disease.

Mr. SYMONS (London) said that he had been engaged in the Middlesborough water fight, and would endeavour to supply the shorthand writer's notes on this point, so that they might be printed in the Transactions.*

Dr. SCATLIFF (Margate) in reply, said that his object was to emphasize the point that well-water, even after it had passed the chemist's test, might still contain some germs of disease. Mr. Latham had called attention to the fact that chemists had great difficulty in detecting specific organic germs in water. They were so minute that it was not safe, even after the analysts' report, for people to drink water the source of which was exposed to unhealthy surroundings. Wells should be regarded with suspicion, especially if they were in the neighbourhood of a town. With reference to the point raised by the President, it was an established fact that the action of boiling water would not destroy all germs of disease, though of course boiled water was safer than well-water in its original state.

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* *Stockton and Middlesborough Water Bill, House of Commons*, 1876. *Extract Evidence of* Dr. E. FRANKLAND, F.R.S. 483. "Can you always, by chemical analysis, detect matters which may be very injurious to the health of the persons drinking the water?" "No, you cannot. I have already proved in the cholera year of 1866 that the evacuations of cholera patients, mixed with a thousand times their volume of water, were undetectable by chemical analysis." 484. "Would that dilution be such as to destroy the probability of the communication of disease?" "No."

On "Sanitation in Bread-making," by W. JAGO, F.C.S., F.I.C.

ABSTRACT.

GOOD bread should possess the following properties—Best possible composition, be made by the best processes, and under conditions ensuring absolute cleanliness.

The composition is governed by that of the wheat, but bran-free flour is far superior to preparations in which bran is present. The bran does not add to the nourishing properties of the flour, and injures its keeping and other properties. The difference between white and dark flour is largely caused by the latter being contaminated with dirt from the wheats. Bread should be free from all adulterants; alum where used at all, is much more likely to be employed with inferior kinds of flour. A recent preparation of the germ or embryo of wheat, mixed with fine flour constitutes a valuable article of diet. "Germ bread," prepared from this mixture is exceedingly rich, both in flesh and bone forming materials.

Among the processes used in the manufacture of bread, that of fermentation is far superior to any other mode of aeration. It induces changes in the gluten which render that substance more digestible, and hence far more nourishing flours are employed in conjunction with fermentation than in other processes. Further, fermentation induces an exceedingly pleasant characteristic flavour, unattainable by any other means. The aeration of bread by yeast is in itself a safeguard against the employment of unsound flours.

It is an essential of sanitary bread-making, that all operations involving severe labour be performed by machinery. The most crying among all the evils of ordinary bread-making is that of the dough being kneaded by hand; for this purpose the public should insist on the adoption of mechanical appliances by the baker. Bread should be baked in ovens, free from ashes and smoke, and then allowed to cool in a special room of moderate temperature.

On "The Ill Effects of Floods on Health; illustrated by Facts from the Basins of the Thames, the Severn, and the Mawddach," by ALFRED HAVILAND.

IF we examine the map of Cancer Distribution (females), 1851–1860, it will be seen that throughout the West coast of Wales the districts are so coloured (red) as to indicate a *low* mortality from this cause among females; one exception, however, is to be seen in the dark-blue district of Machynlleth, to the north of which lies that of Dolgelly, so coloured, however, as to show that the prevalence of this disease, in that district, was only just *below* the average; therefore, sufficiently high to make one suspect the prevalence of floods somewhere within the district, and at a point where the population was so great as to dominate the death-ratio of the whole area.

On the 31st May, this year, I began my reinvestigation in the Dolgelly district, some of the results of which I will lay before the Congress, leaving the more technical details for the future consideration of my medical brethren.

In the first place it must be stated that the district of Dolgelly consists of two sub-districts, both of which have natural boundaries and certain physical characteristics, which I will briefly describe.

1. *Talyllyn* sub-district derives its name from the town "*above the lake;*" and 2, *Barmouth* sub-district from Abermaw, the *estuary* of the Maw or Mawddach.

These sub-districts lie almost parallel to each other, and each has a separate river system. In 1871–80, *Talyllyn* had a mean female population of 3,088, whilst *Barmouth* had one of 4,605.

The local climates, however, of the two sub-districts, as well as their local configuration, although lying side by side, separated only by the Cader Idris chain of mountains, differ *toto cœlo* from each other.

In the first place *Talyllyn* is almost bisected, lengthways, by a deep, cleanly cut valley, having a direction S.W. to N.E., through which the prevailing winds blow with great force—a fact that must be remembered when dealing with the death-rates from phthisis. In this valley lies the lake, which acts as a water-store, and prevents floods.

In the second place the sub-district of *Barmouth* includes Dolgelly, the most populous parish in the district; its river valley is broad, and characterised, as will be seen by the Geological Survey Map, by extensive alluvial flats, which

stretch far above Dolgelly and Llanelltyd, the two highest parishes in the district. At the mouth of the river is the Bar, and the extensive estuarian sands, which impede the river-flow, hold back freshets, and, combined with tides, contribute materially to the floods which extend even to and above Dolgelly.

The Severn.—Recently I have drawn the attention of my medical brethren to the causes conducing to the increase of cancer among females,* amongst which stand, first and foremost, *floods.* I must only draw your attention to the high mortality districts, which surround the well-known flooded areas through which the Severn passes, to convince you of the coincidence of high mortality from this cause, and the seasonal floodings of such fully-formed rivers as the one on which the high mortality districts of Shrewsbury, Worcester, Upton-upon-Severn, Tewkesbury, and Gloucester are situated.

The Thames.—If now we trace the Thames along its course, we shall find that, wherever the riparian districts are seasonally flooded, and consist of retentive clays, there is to be found the highest mortality from cancer among females; it is noteworthy, however, that both above and below London there are low mortality districts to be found where the *chalk* crops out. This formation, consisting as it does of carbonate of lime, has a powerful neutralising effect upon the acids, the results of vegetable putrefaction, the common sequel of floods, and the source of certain peculiarities in the local climates of flooded areas. These low mortality districts are found at Cookham and Wycombe above, and at Dartford and Orsett below London.

The floods of the Thames are still to be dealt with by the engineer; in fact wherever they exist as permanent sources of disease, it becomes imperative on those having jurisdiction over rivers and water-courses, to take measures for their prevention.

The facts connected with the basins of the Mawddach and the Talyllyn valley may be summed up as follows:—

The district of Dolgelly includes the Mawddach valley and that of Talyllyn; its death-rate from any cause would, therefore, to a certain extent, be the result of composite factors.

On the one hand a local climate influenced, especially inland, by flooded areas; on the other hand a local climate characteristic of the presence of lake-water, and freedom from floods.

Last year I showed† that the local climates of the English Lake District, brought about by the constant movement of its lake waters, its torrential rivers, cascades, &c., and absence of floods, stagnant water, and vegetable decomposition, was co-

* *The Lancet*, 9th August, 1890.
† *The Lancet*, 14th September, 1889.

incident with a remarkably *low death*-rate from cancer among women.

Within the Dolgelly district we have comprehended a *flooded* area and a *lake area*. Taking the district as a whole, we of course take the results of these conditions in their modified forms, as will be seen by the following figures and the coloured maps, which accompany this paper.

On the map of England and Wales, showing the geographical distribution of cancer (females) for 1851—1860, it will be found, as already pointed out, that the district of Dolgelly is coloured light red, indicating a mortality just below the average.

Now, if we take the mean *death*-rate from cancer among females for the thirty years, 1851—1880, to be 5·5 annually to every 10,000 of that sex living, we shall find that the following figures and colours apply to Dolgelly :—

		Males.		Females.
1851—1860.	Death-rate	1·4	..	3·6
1861—1870.	„	3·4	..	5·1
1871—1880.	„	6·1	..	7·8

By which it will be seen that this disease has greatly increased among both males and females.

If we now separate the sub-districts, we shall soon see on which the burthen of this increase has fallen.

1871—1880.

Sub-district.	Mean Population.		Total Deaths.		Death-rate.
Barmouth	3,976 Males....	..	31	..	7·7
„	4,555 Females..	..	47	..	10·3
Talyllyn	3,126 Males....	..	13	..	4·1
„	3,088 Females ..	..	13	..	4·2
Dolgelly	7,102 Males....	..	44	..	6·1
„	7,643 Females ..	..	60	..	7·8

For 1851—1860, the colour for the female death-rate, 3·6, would be *light red*, being between 3·5 and 5·5.

For 1861—1870, the colour would still be light red, as the death-rate, 5·1, remained still below 5·5, although it had risen.

For 1871—1880, the death-rate having increased from 5·1 to 7·8, the appropriate colour would then be the *darker blue shade.*

If we now examine the figures and colours of the two sub-districts separately, the contrast is so obvious that it will not require a second glance to convince us which local climate had the greatest share in this female cancer death-rate of the Dolgelly district, for at least the decennial period 1871—1880. Thus in the (1) *Barmouth sub-district* the death-rate = 10·3, and in (2) *Talyllyn sub-district* the death-rate = 4·2 ; so that the *first* would be coloured the *darkest blue*, and the *second light red*, which is exactly what we should be led to expect from our experience throughout Great Britain.

It is impossible to ignore the connexion between these local floods and the prevalence and increase of cancer among females; and it is because I am convinced that they are the great factors in local climates which favour the development of this fearful cause of death, that I bring this subject before an Institute numbering so many eminent engineers among its members, in the hope that through their skill and influence this great and growing evil may be remedied, and that the diseases which arise from it may cease to prevail locally, or to increase generally.

There can be no doubt that the extensive sands and silts which encumber and disfigure the estuary of the Mawddach, could be made to serve a better purpose than causing floods above, and blinding with their sand-drifts people crossing the viaduct. Other rivers, such as the Tyne, the Clyde, and the Tees, have benefited by the works of the engineer, and it would be well if, throughout the country, his aid were invoked in removing what I cannot help calling a disgrace to the science of the nineteenth century.

The Tees was formerly, like the Mawddach and other rivers, a very irregular and wandering water-course, between Stockton and Middlesborough, and after passing that town it opened out into a wide, sandy estuary, about six miles long and three miles across at its widest part. Training walls and dredging were both used, and with a great amount of success.

The deepening of the channel of the *River Tyne* has produced a very beneficial *lowering of the flood-line* in the river, thereby preserving the adjacent *lands from inundation*—this we learn from Mr. Messent, in his work on "The River Tyne Improvement," 1882.

In the *River Clyde* dredging is constantly practised, and other works have been carried out; since which the tide falls 8 feet lower at Glasgow than it did before any works were begun, which not merely adds to the tidal capacity of the river, but also *prevents* the *fresh-water floods*, which formerly inundated the low-lying portions of Glasgow, whilst the total tonnage entered and cleared has increased from 1,757,000 tons in 1863, to 5,544,000 tons in 1883.

The harbour of Barmouth was once a busy scene with its ships and their imports; the *sands*, however, have taken the place of the ships, and the harbour is deserted—in fact the sands, the floods, and their ill-effects have all increased together, and the sooner this malign progress is arrested the better for the beauty of the locality and the health and wealth of the community.

On "Teneriffe as a Health Resort," by G. W. STRUTTELL.

OROTAVA, Teneriffe, now enjoys considerable reputation as a health resort for European invalids. It undoubtedly possesses a warmer and more equable climate than the Riviera, and a less humid climate than Madeira; yet there are drawbacks and disadvantages which in fairness ought not to be overlooked. My object is to record in brief terms my own experiences of Teneriffe from October, 1888, to May, 1890, so as to enable invalids in search of a health resort to judge whether the Fortunate Islands, as they are termed, are likely to be suitable for them or not.

Exaggerated statements have appeared in print with reference to the climate of Teneriffe. It has been termed a "rainless Paradise"; it has been asserted that "firing is unneeded," and that throughout the winter one can bathe at Orotava with as much pleasure as at Brighton in July. These experiences, I should imagine, are absolutely exceptional, and are calculated to mislead the reader. I myself was induced to visit Teneriffe for the benefit of my wife's health, on the strength of Mr. Ernest Hart's pamphlet, "A Winter Trip to the Fortunate Islands." I found that during Mr. Hart's visit the weather was unusually fine, and that the statements he makes, though unquestionably true, do not convey an altogether accurate idea of the general climatic conditions of Teneriffe.

There are various ways of reaching the Canary Islands, of which group Teneriffe is the centre. The sea passage may be shortened by taking the Spanish mail boat from Cadiz, but the Donald Currie steamers, which call at Lisbon are better boats, and do the distance of 750 miles in about 54 hours. Viâ Cadiz, including rail, the cost is £20, as against £22 viâ Lisbon. The Donald Currie steamers, however, only touch at Las Palmas, which entails transhipment. Undoubtedly the best way for those who can bear the sea voyage is to go by steamer from England. There are four excellent lines—the New Zealand Shipping Company, the Shaw, Savill and Albion Company, the British and African, and the Union. These vessels leave London (calling at Plymouth), Southampton, or Liverpool ten or twelve times a month. Invalids, I think, would do well to give the preference to the New Zealand or Shaw, Savill Company's boats, as they are admirably equipped for comfort, and perform the voyage from Plymouth in less than five days. A single first-class ticket by either line costs £14, and a return, available for six months, £25.

There is no difficulty in reaching Teneriffe. The trouble is to get away, as there is uncertainty as to when the return steamers call, and when they do, there may be no accommodation. As visitors begin to leave early in May, a passenger steamer might very well call at Orotava early in that month, and another early in June. Steamships prefer to call at Santa Cruz, which is 25 miles off, owing to the alleged bad anchorage at Orotava, but my experience is that from May to October that roadstead is safe enough.

After landing at Santa Cruz, I suggest Laguna as the first halting-place for the invalid. It is situated on a plateau about 1,800 feet above sea level, and possesses a comfortable hotel. At Santa Cruz itself, at Camachio's hotel, the sanitary and other arrangements are excellent. As, however, Santa Cruz is debilitating early in October, when invalids usually arrive, visitors do well, instead of hurrying on to Orotava, to make a stay at Laguna, which is only an hour and a half's drive. From December to March Santa Cruz has a charming climate, and is well sheltered from the north-east winds. What, however, Santa Cruz needs is hotel accommodation outside the limits of the busy town itself.

Passengers going from Santa Cruz to Laguna will find the roadway exceedingly good, though they must be prepared for much jolting and bumping when passing through the streets of the latter town; but this, I am told, will soon be a thing of the past, as there is a promise that before long the streets will be re-paved on modern principles. A word of caution by the way. The heat of Santa Cruz may be found oppressive on landing, but those who are going on to Laguna—the summer and autumn retreat of Orotava and Santa Cruz—will find it unadvisable to discard their warm clothing hastily.

Many of the English invalids at Orotava derive considerable benefit from a change to Laguna; but my wife derived greater benefit from her stay in Orotava from July till October than in any period of her visit. The great drawback to remaining in Orotava in the autumn is that invalids lose the services of Dr. George Perez, a graduate of London University, and his partner, Dr. Thurstan, an M.D. of Cambridge, the only other qualified English doctor there. Dr. Perez' patients are unanimous in his praise. The professional ability of Dr. Tomas Zerola, the resident medical man at the Villa, is universally acknowledged by his English patients.

From Laguna to Orotava is about four hours' drive, over a roadway highly creditable to Spanish engineering. The mountain scenery *en route* is striking, and the terrace system of

cultivation is seen to great advantage. From Matanza, where one stops for lunch, there is a good view of the Peak, which attains a height of 12,176 feet, rising directly from the sea level. The crater is about eight miles in diameter, and 7,000 feet above the sea, and from its centre rises the Peak itself, a further 5,200 feet.

The town of Orotava, or Puerto de la Cruz, is situated on a low peninsula about 60 feet above the sea. The first plateau, at an elevation of 380 feet, is most salubrious, very desirable for chest patients. Lower down it is enervating; higher up rather too cold. This first plateau offers a favourable position for the construction of small villa residences with pretty gardens, which by most visitors would be preferred to hotels. Such villas, however, should not be erected too near to cultivated areas or large reservoirs. The former are frequently manured with human excreta, and the latter give off unhealthy exhalations in the summer months.

After a further ascent of 720 feet, one reaches the base of the mountain proper, where stands the ancient town of La Villa Oratova. Though this altitude has proved beneficial in some cases, yet it is too frequently enveloped in cloud to render it a very desirable resort.

As to the Puerto itself, its streets are narrow, the houses high, and the free circulation of air is impeded. Nevertheless, typhoid fever is unknown. As to the climate generally, its equability seems to show that the island is not so dry as represented. The visitor must not be disappointed to find during the early part of his stay in the north of the island that there is a fair quantity of rain; but, the ground being porous, the atmosphere is not rendered so humid as the amount of rainfall would suggest. Outdoor recreation is, however, frequently interfered with. Then, as to mean temperature. On that point visitors may be easily deceived. In England 62° would be regarded as sufficiently warm to enable fires to be dispensed with and lighter apparel to be partially assumed. In a warm climate, however, 62° is sufficiently cold to justify the invalid wearing a sealskin out of doors, and keeping a fire going indoors. This seems to me to show that without some knowledge of the locality, one may be working in the dark, even in the presence of meteorological records.

But, though Teneriffe has its faults, I think that on the whole it may be pronounced a most desirable health resort. I myself intend taking my wife back there in October, 1890, in preference to any other place; so that, though I do not hesitate to speak frankly about its drawbacks, I have a high opinion of Teneriffe as a sanatorium. Its charm is that, owing to its

mountainous character and geographical position, there is a great variety of climate.

Clearly, therefore, there is a probability of the invalid obtaining relief, though the first place he visits may not suit him. I have known Santa Cruz to confer benefit where other places had failed; Laguna to suit complaints which were not favourably affected at lower elevations; and Orotava and Icod to benefit those who went there as a last resource. In the near future, it is possible that a still larger variety of climate will be accessible to invalids, for Villaflor and Guimar, on the south side of the island, are spoken of; the former as the "first mountain station in the universe," and the latter as possessing an exceptionally dry and sunny climate.

I think that the physical advantages of Teneriffe are unique. Within the comparatively small area of 900 square miles, it has altitudes ranging from a few feet to 8,000 feet above the sea level. It has a northern and a southern aspect, rendered distinct by the great Cordillera running east and west. The north aspect is favoured by the north-east trade winds, the south by warm trans-African winds, cooled in their progress across the narrow strip of sea.

To give some meteorological details taken at Orotava, the mean variation of temperature between morning and night, *i.e.*, 9 a.m. and 9 p.m., is not more than 2°·8. The average temperature in spring, summer, autumn, and winter is respectively 64°, 71°, 69°, 60°; while the lowest temperature for the same seasons in the shade is 54°·9, 51°·8, 50°, and 49°·1. The mean minimum is 59°·3, 55°·4, 53°·0, 52°·7. The extreme difference between winter and summer is not more than 14°, whereas at Nice it is 30°, and in Algiers 24°. The total annual rainfall is 15·35 inches, falling on eighty-five days, and the average monthly sunshine—136 hours—distributed as follows: November to January, 110 hours; February to April, 140 hours; May to July, 132 hours; and August to October, 160 hours. Storms of thunder and lightning are rare.

The drawbacks with regard to life in Teneriffe are principally in reference to accommodation and food. The majority of the houses are of the Moorish type, built without fireplaces, and solely with a view to coolness. Stoves are absolutely necessary, and so are curtains and other appliances for keeping out draughts. As regards servants, warning is not required on either side, therefore it is advisable to study the idiosyncracies of your domestics, or they may leave you in the lurch. A knowledge of the language is very desirable, but even with this aid you cannot expect to reform a Spanish servant, who has remarkably conservative instincts. As a rule they are very

honest; but they are desperate love-makers, and one sometimes gets tired of hearing the wretched twanging of the troubadour beneath the bedroom window at night.

As to society in Teneriffe, after an experience of twenty-five years spent in various parts of the world, I have never known a happier community than that of Orotava. The relations between the English and Spanish gentry are most cordial, though the latter believe that every new arrival from Europe adds to their difficulties by helping to raise the price of food.

Let me add a word on the subject of social amusements. They are arranged, no doubt, with a commendable desire to render Orotava attractive, but some invalids have been drawn into merriment which they could not resist, and have returned all the worse for a sojourn in what should have been a place of perfect rest and quiet. If balls and bazaars must go on, they should be held somewhere else than in the hotels.

Orotava greatly needs a public market and improved food supplies. The butchers are generally ignorant of their business and often present meat of doubtful quality in a most repulsive condition.

The English residents should club together and purchase, and stall-feed, sheep for their own consumption—an alternative resorted to in different parts of India where the same inconvenience sometimes occurs. Milk, bread, butter, fowls, ducks and turkeys, are cheap and plentiful. There is a difficulty, however, in obtaining groceries, meat essences, and invalids' food. This is due to the fact that visitors are in the habit of getting supplies from the Stores in England, with the result that shopkeepers in Teneriffe are not encouraged to keep large and varied stocks on hand. For my part, I believe little is saved by these direct importations, while much general inconvenience results.

A word or two as to water supply. At the Port of Orotava it is of very good quality, and enteric fever has never been known. That of La Villa Orotava is less excellent, and should in every case be filtered. There is no doubt that the absence of a proper system of sanitation throughout the island would be a much more serious matter but for the absorbent nature of the soil, the sparsity of the population—towns and villages not being overcrowded—and the open nature of the country.

There is one subject directly bearing on the comfort of invalid visitors, and that is the absence of professional nurses at Orotava. There is a scheme now on foot for supplying the deficiency, but it is felt that, to ensure stability for a fixed period, a sum of not less than £500 must be raised, though the institution, it is hoped, will eventually be self-supporting.

The proposal is to secure the services of two lady Sisters of Charity of the English Branch of St. Vincent de Paul. There are, however, various difficulties to be surmounted. The provision of nurses is exceedingly desirable for those invalids who are unable to travel with a private nurse, or, indeed, to pay for the services of a nurse when nursing aid may be much needed. Contributions to this fund may be paid into the London and County Bank, to the credit of the treasurer, the Rev. T. Gifford Nash, Orotava Nursing Fund.

With respect to wearing apparel, it is advisable to take to Orotava just the same outfit as if going on a twelve months' visit to any part of England. Sanitary woollen underclothing, sheets, and pillows are desirable. A sealskin coat or an overcoat will be found a comfort at one time; at another, summer garments will be essential. There are very good tailors and dressmakers in the island, and good boots are procurable at ridiculously low prices.

Before concluding this brief paper, let me add that it is impossible, as Sir Morell Mackenzie well points out, to say with certainty whether this or that particular climate will suit a particular case, and that to phthisical patients the benefit of a change of climate will be greatest if it renders an out-of-door life possible. With an island possessing such climatic conditions as Teneriffe, varying, as they will be found to do, according as the visitor may select his place of residence, it is clear that discrimination is needed if the invalid desires to return home benefited by the change. I have endeavoured to point out that Teneriffe does not altogether merit the roseate colours in which it sometimes has been painted; but I have also endeavoured to do justice to its admirable situation, its exceptional climate, and its possibilities as a health resort.

Mr. Baldwin Latham (London) considered that papers of this kind were very valuable, for they enabled the Institute to keep a record of the climatic conditions of celebrated health resorts.

Mr. Symons (London) quite agreed in this view.

Mr. White (London) was quite aware that dancing was one of the most healthy amusements, if it were properly carried out, and The Sanitary Institute ought, he thought, to do its best for its promotion.

Mr. Struttell (Brighton) said that with regard to dancing in Teneriffe, the difficulty was that the hotels were too small for this amusement, and when dances were given invalids could not get to sleep. Besides, there were many invalids who, if dances were given, would enter into them despite the fact that they would be much better if they were taking rest.

TABLE REFERRED TO IN PAPER ON THE CLIMATE OF BRIGHTON (p. 228).

Number of Days on which Mist, Fog, or Haze were observed at Brighton.

	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888 *	Total 1868—1887
January	4	4	2	2	3	6	6	3	3	3	3	2	3	3	5	1	3	2	3	5	9	66
February	6	3	2	5	—	7	2	4	4	2	7	2	2	3	3	3	1	6	—	2	1	64
March	6	5	3	4	4	3	4	4	1	1	—	2	5	2	5	1	3	4	4	1	2	62
April	4	6	1	1	3	2	2	—	6	2	4	1	2	5	1	—	—	1	—	—	2	41
May	2	3	1	—	1	2	3	2	1	—	2	1	—	2	—	—	—	1	2	1	2	24
June	—	4	1	—	—	5	—	2	4	1	—	2	—	1	—	2	—	1	1	—	1	24
July	—	2	—	2	—	3	1	1	7	1	1	2	—	—	—	—	—	—	—	2	1	22
August	6	—	1	3	1	1	1	1	—	—	—	1	—	—	—	—	—	—	—	—	4	15
September	—	2	—	—	—	1	3	1	—	—	1	—	1	—	2	1	—	—	1	—	—	13
October	2	4	1	6	3	4	—	—	1	4	1	2	—	2	3	4	1	1	4	2	—	45
November	3	3	4	7	7	2	3	2	1	1	2	2	3	3	—	2	1	7	4	1	—	58
December	5	4	1	4	—	6	2	2	2	—	—	2	2	5	8	8	—	5	4	2	—	62
TOTAL	38	40	17	34	22	42	27	22	30	15	21	19	18	26	27	22	9	28	23	16	...	496

* Up to end of September.

CONFERENCE OF MEDICAL OFFICERS OF HEALTH.

THE fourth Conference of Medical Officers of Health, arranged by the Institute, was held in connection with the Brighton Congress.

There was a good attendance of Medical Officers from the principal provincial centres.

The chair was taken by Dr. A. Newsholme, Medical Officer of Health for Brighton, President of the Conference.

Papers on the following subjects were read and discussed:—

"The Study of Hygiene, in the Elementary Schools," by A. Newsholme, M.D."

"The Etiology of Diphtheria," by W. N. Thursfield, M.D.

"Uniformity of the Reports of the Medical Officers of Health," by A. Wynter Blyth, M.R.C.S.

A full report of the subjects discussed is given in "Public Health" for September, 1890, page 134, and October, 1890, page 163; and, as much of the matter was of technical interest, it was thought unnecessary to reprint it in the Transactions of The Sanitary Institute.

CONFERENCE OF INSPECTORS OF NUISANCES.

ADDRESS BY DR. A. CARPENTER.

PRESIDENT OE THE CONFERENCE.

ABSTRACT.

Dr. CARPENTER said that he was glad that they were following in the footsteps of the Medical Officers of Health, who had met in Conference on the previous day. The founding of the Institute was the thought of men who had been instrumental in bringing to the notice of the State the wants of sanitary law, the result of which was the passing of the Act of 1848. It was his privilege to reside in a town that was in the first list of those that took advantage of that Act. The Local Board made bye-laws. After a short time they discovered that these bye-laws were dead letters, and then a Sanitary Committee was appointed, of which he had the honour to be Chairman. They made a report, and the local authority determined, in accordance with the recommendations contained in that report, to appoint inspectors to see that the bye-laws were carried out. Then came the battle. They had to face the opposition of those who objected to the appointment of Sanitary Inspectors. Owners of small houses and others felt that Sanitary Inspectors would be prying into their private affairs, and causing them much trouble; but after a time the unpopularity became dormant, and the inspectors were appointed. Then there was the disadvantage of the appointment of incompetent persons as inspectors.

He then explained that such methods of administration in various localities led to the establishment of the Sanitary Institute, through which properly qualified men were able to obtain certificates, showing that they were capable of doing the work which they undertook. The work done by the Institute in this way was of great value to local authorities when they were about to appoint Sanitary Inspectors, and the Institute had in consequence of that and similar actions commended itself to the public generally. Public opinion had now materially advanced in favour of sanitation, and the position of Sanitary Inspectors had greatly improved. Some people were inclined to think that the office of Sanitary Inspector or of Inspector of Nuisances was a new office, but it was no such thing. It was one of the offices in connection with hygiene that had been formed in very early times. They had only to go back to the pages of Holy Writ to prove it. Let them read Leviticus, and study the laws laid down by Moses, and they would see

that the Sanitary Inspector he appointed was one of the most important men in the state. When the sewage of a house had produced disease, the occupier was to go to the priest, who explained things, and he became the Inspector of Nuisances within the camp, or, as it was afterwards, within the cities of Israel. Therefore, they had to go to the highest authority for the foundation of their office, and the importance of their social position in connection with this office was very manifest from what was in the mind of Moses. The formation of infectious hospitals was really inaugurated by him. They would find that he appointed that infectious diseases which were there classed together under the head of leprosy should be treated by isolation without the camp. That would not be without shelter, and they might assume that hospitals were erected for their protection.

Passing on, he said that at the present time there was not a town in the kingdom where the sanitary authority was doing its duty which had not a hospital in which it could isolate cases of infectious disease as soon as they were brought to its notice.

Touching upon the manner in which the work of Sanitary Inspectors should be done, he said that there were two classes of officers. Some went with the threat of legal proceedings in their mouth, and did not attempt to explain why certain work had to be done, and if they acted in this way they set up the backs of the people, and did not get the work carried out to the satisfaction of the Authority. It was far better that people should be taught by the Sanitary Inspectors the reasons why different work had to be done, and be persuaded to carry out the principles necessary for the removal of nuisances, and so diminish the chances which lead to the spread of infectious disease. It was far better for the people to do the work willingly, and look upon the Sanitary Inspector as their friend, than as a prying, intolerant autocrat, who would force down their throats the principles of sanitation whether they liked it or not.

Referring to the pay of Sanitary Officers, he agreed that every labourer was worthy of his hire. A paper was sent to him when he was away from home with regard to compensation and mutual assurance, he hoped that the gentleman would accept his apology for omitting to cause it to be placed on the agenda. If there was time when the other papers had been disposed of it would be read. He congratulated those present on being invited by the Institute, and the Institute on inviting the Inspectors to meet in conference in the important and healthy Borough of Brighton, which he said was almost the healthiest town in the kingdom. The invite extended by the town to the

Institute reflected great credit on the town itself, the Institute and Inspectors being thought worthy of the presence of the Mayor at their meetings reflected credit upon them. Brighton was healthy, but he claimed that if they took a decade of ten years, his town, viz., Croydon, had beaten it.

Passing on, he said that he had thought it necessary in the town of Brighton to draw attention to the waste of material in regard to sewage. It was the only serious sanitary fault he found. They had magnificent waterworks and constant water supply, and the fact that the streets and poorer classes of houses were well looked after by the authorities was proved by the healthy condition of those classes, and the absence of mischievous disease from their midst. He hoped that the time was not far distant when the Legislature would prevent the washing away into the sea of that which was absolutely necessary from a national point of view for the feeding of the people. If that material were placed on the Downs at the north of Brighton the crops would be ten times more abundant than at the present time, and the chances of destroying the sea-shore of Brighton as a bathing place altogether removed. In connection with the milk-supply this was most important. He looked upon it as a part of the duties of local authorities not only to provide for the grown-up, but to see that the younger children were provided with material which would help to sustain them in a healthy state of existence. Where a district did not provide a sufficient amount of milk for the people who inhabited it, and it had to be obtained at prices which were prohibitive to the poorer classes, there was something wrong. If the sewage was put on the Downs, as he had said, the milk-supply from this particular land could be ten or twenty times as much as it was at the present. The expenditure of capital upon sanitary works was never lost, and though it might not obtain an absolute reduction of the rates it reduced the death rate, and the utilization of sewage in the way he had stated would bring food down to a fair and average rate. He again thanked the Corporation of Brighton for inviting them to that beautiful town, and said that all would, when they returned, be able to say that the Congress at Brighton had been a great success.

The Mayor of Brighton considered that Dr. Carpenter had sketched to the Inspectors much that was beyond what was necessary for their position: he had shadowed forth a list of first principles. Now they had nothing to do with first principles, they were engaged to carry out the work after the first principles had been sketched out; for it was not possible for men of ordinary calibre to grapple with the great questions of sanitation. As to the disposal of sewage, they all knew that it should be returned to the land; but when they were surrounded by the ratepayers they had to do the best thing for the smallest amount of money, and he considered that the Brighton Corporation had done the best under the circumstances. Addressing himself to the duties of the Inspectors, he said he thought discretion was very necessary, and that they should carry out their duties as nicely and kindly as possible. They must not only be discreet and civil, but it was necessary that a man should have a fairly good education before he took office. He thought an Inspector should have an elementary knowledge of diseases, and a knowledge of building construction was essential as well as a little knowledge of chemistry. He contended that it should be the occupier of every house who should be worried and terrified into keeping the drains in good order, and not the owner, and that liberty should be given to an owner, if he saw that an alteration could be done in a certain way, and that if it would be half the cost, to carry it out in that way. In conclusion, he proposed a vote of thanks to Dr. Carpenter for his address, and expressed the hope that the Chairman might long be spared to do his work as he had done hitherto.

Dr. A. Newsholme seconded. He was glad to find that the examinations of the Sanitary Institute had been so highly spoken of, although he could not help thinking that the examinations should be supplemented by a little building construction. He also thought that the passing of the examination in hygiene at South Kensington was a very great thing.

Dr. Carpenter acknowledged the compliment paid him. He knew that the fifty years of work in which he had been engaged could not continue much longer. Still, he was glad to do what he could in promulgating sanitary science.

"*The Education, Examination of, and Legislation for, Sanitary Inspectors.*" By A. E. Adams, Sanitary Inspector, Wood Green.

ABSTRACT.

The author considered that it was largely through the Sanitary Institute that Sanitary Inspectors were better educated than they were twenty-five years ago.

He agreed with the Association of Public Sanitary Inspectors that Inspectors should have a knowledge of building construction, but considered that to qualify to pass the 1st Class, *advanced*, of the Science and Art Department, would occupy too much time, and was not necessary.

He considered the Sanitary Institute right in not having *Competitive* examinations; and Sanitary Inspectors should feel

that they owed a debt of gratitude to the Sanitary Institute for the way in which they had grappled with the question of the examinations. In nearly all advertisements for Sanitary Inspectors the Candidates were required to hold the Certificate of the Sanitary Institute. He believed the feeling amongst Sanitary Inspectors was that the examinations were not sufficiently practical; but he considered that the standard at present required was quite high enough if the questions at the *viva voce* examination were more searching, and models added to thoroughly test the knowledge of the Candidates.

He suggested that the Council of the Sanitary Institute should invite a dozen or two Sanitary Inspectors to meet them to discuss the question of the examinations, but he was strongly opposed to any Sanitary Inspector being put on the Board of Examiners.

He thought that Sanitary Inspectors should combine to obtain the appointment of a Minister of Sanitation, but he did not advocate Trade Unionism, but an amalgamation to obtain recognition as Public Servants, and that the Laws of Public Health might be made more stringent and complete.

"*The Position that Inspectors should take with regard to the General Public.*" By JOSEPH CORBEN, Chief Sanitary Inspector, Southampton.

ABSTRACT.

The author observed that it was matter for congratulation that the Sanitary Institute had inaugurated this General Conference of Sanitary Inspectors.

Speaking on the subject of his paper, he said that by the general public should be understood the ratepayers, some of whom were the owners of small tenements not in a first-class sanitary state, and were ready to impress on the Inspector the advisability of making friends of them.

An Inspector, when requiring improvements, should act with prudence, and should endeavour to educate the public, so as rather to persuade, than to appear to compel, an owner of property to make any necessary improvements.

The author suggested that sometimes the Inspector is impeded in his duties by the Medical Officer of Health either being antiquated in his notions or twenty years in advance of the times.

He considered that the yearly appointment of the Inspector tends to make him less independent and more susceptible to be influenced in the performance of his duties than he would be if his appointment were permanent.

MR. W. WILKINSON proposed the following resolutions:—

"That in the opinion of this meeting the administration of Sanitary law would be greatly improved by the following amendments thereof, and the Council of the Sanitary Institute are hereby requested to press upon the Legislature—

"1. That a Government Department of Health be established, and presided over by a Cabinet Minister, having supreme control over all matters connected with the Public Health.

"2. That the officers now variously named Sanitary Inspectors, and Inspectors of Nuisances, be designated Sanitary Inspectors.

"3. That Candidates for the position of Sanitary Inspectors be required to possess a general knowledge of the building trades, and a Certificate in Sanitary Science.

"4. That all Inspectors be elected to a permanent tenure of office, and only dismissable for misconduct or proved incompetence, with right of appeal to the Local Government Board or Department of Health.

"5. That Sanitary Inspectors be required to inspect their districts for the detection of nuisances, and to serve notices for the abatement thereof, all such notices to be as valid, if confirmed by the Local Authority, as if served by the Authority's Order.

"6. That the duties of Sanitary Inspectors be clearly defined.

"7. That in all appointments requiring an officer's whole time, an adequate minimum salary be prescribed.

"8. That steps should be taken to form a fund for granting superannuation to Inspectors."

Mr. ERNEST DAY, F.R.I.B.A. (Worcester), considered that if an Inspector had tact he would succeed with the multifarious duties he was called upon to perform. That an Inspector should possess a practical knowledge of the building trade was, to his mind, of the utmost importance. He was delighted to see that there had been a great improvement in preventing jerry building, and some of these builders had now very great difficulty in evading the bye-laws.

Mr. WASHINGTON LYON held that the appointments of Medical Officers of Health and of Sanitary Inspectors were the most important of any in connection with Local Boards. Regretting the remark made by the Mayor of Brighton to the contrary, he thought it most important that Inspectors of Nuisances should have a thorough knowledge of first principles. If they were in possession of this knowledge, the clever men upon the Sanitary Committee would appreciate it, and these clever men, before whom they had to go, would lead the ignorant ones, so that the Sanitary Officers, if well qualified, would really be the leaders.

Mr. W. WILKINSON, having read his resolutions again, supported his

claim that all Inspectors should be designated "Sanitary Inspectors" by urging that they were asking for nothing new, and that in many cases the same men had to inspect new buildings as well as act as Inspectors of Nuisances. It was so in his own case. He discountenanced the practice of taking a man from the outside and constituting him a Head-Inspector, and urged that every man should first act as an assistant. There could be no objection to theirs being a permanent appointment, and he held that Inspectors should have the power to serve notices at once where nuisances were discovered, inasmuch as the local authorities often only met once a fortnight or once a month, and great harm might be done by delay. The Public Health Act did not explain what their duties were, and it was most necessary that they should know exactly what they were expected to do. Upon the question of salaries, in some places it was the hardest possible work for a man to live and present a decent appearance upon the salary he received. In certain places the authorities did not pay for the work to be done, but sought to satisfy the Legislature at the lowest possible cost. He also claimed pensions for those who had to endanger their lives to save others.

"*The Position that Inspectors should take with regard to the General Public.*" By THOMAS GEORGE DEE, Sanitary Inspector, Westminster.

ABSTRACT.

The author pointed out the importance of cleanliness in the prevention of disease, and he considered that some knowledge of the laws which govern Sanitary Science or preventive medicine was necessary on the part of the Sanitary Inspector.

The Inspector should take the position of the practical adviser of the public upon the details of works of sanitation, and he should possess sufficient legal knowledge to enable him to form a judicial opinion upon all statements and facts.

The conclusion arrived at by the author was that a Sanitary Inspector should be "something of a clergyman, a doctor, and a judge."

"*On the general duties, responsibilities, and status of Sanitary Inspectors; applicable to those Officers appointed by virtue of, and working under, the Public Health Act,* 1875; *and to their position in comparison with other Public Officials.*" By GEORGE STEERS, Sanitary Inspector, Bedford.

ABSTRACT.

The author pointed out that, inasmuch as the Sanitary Inspector is required by law, in a notice to abate a nuisance, to give full particulars of work required to be done, he ought to have a thorough practical knowledge; and he considered that Inspectors should have power to serve a legal notice for the abatement of a nuisance without having first received the sanction of the Local Authority to do so.

Looking at the nature of the duties that a Sanitary Inspector has to perform, he considered that his appointment should be permanent; and, further, that the status and position of a Sanitary Inspector does not compare favourably with that of many other public officers.

"*The Position that Inspectors should take with regard to the General Public.*" By J. HICKS BEEL, Sanitary Inspector, Gosport.

ABSTRACT.

The author considered that in order to obtain duly qualified men as Sanitary Inspectors they should be better remunerated. Thanks to the Sanitary Institute, the importance of the duties of the Sanitary Inspector is becoming recognized.

Every Sanitary Inspector should have had three years' experience as an Assistant Inspector. He should understand the advantages of various sanitary appliances, and to qualify him for the Inspection of builders and plumbers' work, he should hold a Certificate of competency in Building construction, which should be obtained before the Certificate of the Sanitary Institute is granted.

The author's experience was that the poorer residents receive the Sanitary Inspector gladly, but that the owners of property hinder him in the performance of his duties. He was of opinion that the Chief Inspector should have power to give legal notice for the removal of nuisances.

He suggested that a Union of Sanitary Inspectors should be formed under the auspices of the Sanitary Institute, composed of Sanitary Inspectors who have held that office for upwards of three years; the objects of the Union being the discussion of matters affecting their interests, to watch the working of the laws affecting County Councils and Local Boards, and to promote such measures as may from time to time be deemed advisable.

In conclusion, the author suggested that the meeting should adopt resolutions approving of such a Union, with the special object of securing a settlement of the question of superannuation.