MARGATE

AS

A HEALTH RESORT

BY

H. EVELYN CROOK

M.D., B.S. Lond., F.R.C.S. Eng.

Sir Andrew Clark, Bt.
with the Authors' Compliments

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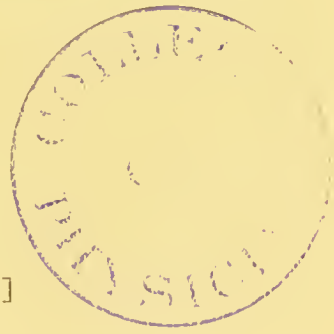

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INTRODUCTION.

THE practical physician, when desirous of giving a patient an opportunity of breathing pure sea air, and, at the same time, of securing for him those little comforts and attentions so essential to one in weak health, not infrequently finds himself in this dilemma:—shall he send his patient on a sea voyage, or shall he recommend a more or less prolonged sojourn in some locality on the coast?

The former plan has of late years been much recommended, and, at first sight, it would seem to be giving the patient every facility for recruiting health and strength. But, viewing the matter closely, many considerations arise which render its adoption of doubtful benefit. Besides the disease, the pecuniary resources of the patient must not be overlooked. It is very important that the patient's mind should be well at ease, and this cannot be the case if, while undertaking a voyage with all its risks, he be unable to provide for himself every comfort and care without incurring expenses beyond his means.

Again, even granting that care and comfort are secured, can we be assured that we are placing the patient under such good hygienic conditions as may be obtained on shore? It should be remembered that at sea bad weather is a contingency that may arise at any time. The confinement to close, ill-ventilated cabins which this entails, the ceaseless and wearying throb of the engines, the noises incidental to the working of the vessel, the monotony of the voyage, and last, but not least, the knowledge of the patient that, should the worst happen, he must die far away from home and friends, all tend to counteract the good effects that the rest, sea air, and change of scene are calculated to bring about.

The alternative plan,—sending the sufferer to the sea-side, has likewise some difficulties which militate against a ready decision. Chief among these is the selection of a locality. It is of prime importance that while the patient is enabled to obtain sea air, he should not, at the same time, be subjected to some baneful influence which may nullify its good effects and render futile the endeavours made to rescue him. It would not be very serviceable to a seeker after health, if, while breathing as much sea air as he pleases, he should run the risk of becoming chronically rheumatic from damp arising from a clay or marshy soil, of constantly catching cold from frequent and sudden changes of the temperature, of being poisoned with typhoid germs from a supply of impure water, of acquiring diphtheria by the inhalation of foul gases arising from a defective drain, or of being nasally offended, if nothing worse, by the emanations from a dust-bin in which lies an accumulation of refuse.

The value of a Health Resort should depend, therefore, on several fundamental conditions, each, and all of which, must be satisfactory to insure the fulfilment of those hygienic laws under which it is essential the patient should be placed. These conditions are the following :— a dry subsoil ; a bright and cheerful climate ; a fairly equable temperature, showing neither a wide daily nor yearly range ; a good and abundant supply of pure water ; perfect sanitary arrangements. Wherever these are found, a low death rate and a freedom from zymotic disease follow as a natural result.

Taking these conditions as the groundwork, I have endeavoured to show by comparison and analogy that Margate has natural advantages as a Health Resort possessed by no other English sea-side town, and that everything has been done by the Local Authorities to aid Nature by the resources of Science. The newly-completed system of drainage has removed the one reproach to which Margate was formerly subject. The delay in its adoption has resulted in good, for the scheme has the advantage of every modern improvement which the experience of its eminent deviser could suggest and which money could provide. Margate now stands pre-eminently suitable for invalids and people of delicate constitution, both as a winter and summer residence.

H. Evelyn Crook,

23, Dalby Square,

December, 1892. Cliftonville, Margate.

GEOGRAPHICAL AND GEOLOGICAL ASPECT OF MARGATE.

MARGATE is situated almost in the north-east corner of Kent; the older portion of the town is built on the acclivities of two hills separated by a small valley (the Dane Valley) running from the south-east to the north-west. The summit of the northern, or more correctly the north-eastern hill, merges into a tableland on which stands the newer and more fashionable quarter of the town (Cliftonville). The cliffs here, overhanging the sea, are from fifty to one hundred feet high, and extend east for about a mile-and-a-half as far as Foreness Point, which is absolutely the north-east angle of Kent; they are thence continued to Broadstairs and Ramsgate with few breaks or openings. The frontage of Margate looks towards the north and north-east, while the southern portion of the town stretches a considerable distance into the country in a more or less scattered manner. On the west, Margate is almost contiguous with Westgate-on-Sea, the two towns being nearly united.

The surface soil is mostly composed of "drift," which, in some places, as along the cliffs leading to Broadstairs, is only a few inches in depth; nowhere does it extend more than a few feet below the surface. Beneath this stratum is the chalk, which is the prevailing formation of the Isle of Thanet. It has been shown by Mr. W. Whittaker, F.R.S., of Her Majesty's Geological Survey, that the comparatively non-flinty chalk of Margate rests on the flinty chalk of Broadstairs and Ramsgate;—"A tabular layer of flint marks the boundary between the higher bed of Margate, and the

lower of Ramsgate. This same flint bed enables us to determine that the chalk of Thanet is dome-shaped, the higher bed rising at the north and sinking at the south; a section in this direction would represent a dome, the flint chalk of Ramsgate appearing underneath the higher or Margate bed, like the pulp of an orange beneath the peel."

It is obvious from the above how excellently well the subsoil of Margate is adapted for natural drainage. The elevated position above the surrounding country, and the permeable chalk acting as a natural filter, both tend to absorb the surface waters as quickly as they collect. It is praticularly noticeable, and a matter of considerable surprise to strangers, that the roads and streets dry up so rapidly even after the heaviest rain. The groundwater is thus always kept at a permanently low level, this being, as is well known, one of the chief factors which render a locality healthy.

In consequence of this rapid absorption of all damp, the atmosphere of Margate is at all times free from those raw, penetrating land fogs which are so prevalent in many places. The nearest approach to fog in this district are occasional sea mists, which sometimes envelop a portion of the town for an hour or two and then disappear, leaving a clear sky and bright sunshine. "In November, when London is foggy, and the country damp, Margate rejoices in a clear, bright and dry atmosphere." The cold of the winter is dry and bracing, and is thus a desirable contrast to that damp cold which is characteristic of low-lying inland towns.

Owing too, to its geographical position, Margate has a great advantage over most other seaside towns; for, as is

pointed out by Dr. Burney Yeo in *Climate and Health Resorts*, "during the prevalenee of the north-easterly winds of spring, it is one of the very few conveniently aeeessible seaside resorts where, during that season, pure *sea* air can be obtained. For the prevailing north-east winds blow directly over the North Sea and the northern portion of the British Channel on to Margate, and the line of the coast of which it forms a part; whereas, during the same season, the prevailing winds at the resorts on the southern coast are *land* winds, and blow off the land out to sea, driving off, as it were, the sea air,—hence the great value whieh Margate air is known to possess in scrofulous affections."

THE CLIMATE OF MARGATE.

"*From Meteorological observations, I find that Margate has a "larger number of hours of Sunshine, a less Rainfall, and a more even "Temperature than any other Sea-side Town in the Three Kingdoms.*" —The late Prof. Airey, Astronomer Royal.

IN describing the Climate of Margate, the subject may be divided into the following sections:—(1) Temperature; (2) Relative Humidity; (3) Amount of Cloud; (4) Sunshine; (5) Rainfall; (6) Prevailing Winds.

Wherever possible, comparison has been made with other sea-side and inland places, in the selection of which preference has naturally been given to those more or less widely known as Health Resorts, without, however, excluding others. Many that might have proved useful have been omitted, as no reliable or trustworthy statistics are obtainable with respect to them.

The data, on which these calculations are based, have been obtained from the records of the Royal Meteorological Society, and from the admirable paper on English Climatology, read before the Society by Mr. F. C. Bayard, F.R. Met. Soc., on June 15th, 1892. Much is also due to Mr. John Stokes, F.R. Met. Soc., Honorary Meteorologist to the Borough of Margate, to whose careful and elaborate observations, extending over many years, Margate owes the honour of being included in the twenty-three British stations, the monthly statistics of which are published in the records of the Society.

In the following tables are given the results of calculations derived from analysis of statistics of trained observers, who conform to the strict and particular regulations of the Meteorological Society. These regulations require that the observations be taken at regular

intervals, with similar instruments, and under conditions varying as little as possible. Inspectors are sent out by the Society for the purpose of examining and checking instruments, and all results are carefully analysed and tabulated by appointed officials.

I.—Temperature.

There is a popular but erroneous belief that sea-side places are colder in winter than those situated inland. That this is not the case has been proved by observers over and over again, and the fallacy is once more entirely dissipated by the results given in Mr. Bayard's paper, referred to above. In summing up the conclusions that may be drawn from his researches, Mr. Bayard draws particular attention to this in the following words:—"With respect to temperature, the sea-coast stations are *warm in winter* and cool in summer, while the inland stations are *cold in winter* and hot in summer." The scientific explanation of this is, briefly, as follows:—The specific heat of water is far greater than that of the earth. Hence water absorbs heat more slowly, and parts with it less readily, than land. During winter the sea, acting as a storehouse for the heat absorbed during the summer, slowly parts with it to warm the atmosphere; in summer the sea, being less rapidly heated than the earth, cools the air and prevents it becoming hot and close. It has thus a tendency to warm in winter and cool in summer the land to which it is adjacent. This fact is one that cannot be too strongly brought to the notice of those who still cling to the contrary belief, as there is no doubt that this false idea is too often seriously considered by some people when selecting a school for their children or a winter residence for themselves.

TABLE I.—*Showing the average temperatures (in degrees Fahrenheit) for ten years* (1881-1890), *at Margate, compared with those of other places during the same period.*

Stations.	Winter. — October to March.	Summer. — April to Sept'mb'r	Spring. — March, April, May.	Autumn. — Sept'mb'r October, Novemb'r	Annual Mean.	Daily Range.
Ventnor -	44·8	56·8	47·9	53·0	50·8	10·6
Teignmouth	44·4	56·6	48·0	51·9	50·5	11·8
Weymouth	44·2	55·9	46·9	52·0	50·1	10·3
Torquay -	44·2	55·1	46·8	51·9	49·6	10·9
Llandudno -	43·6	54·6	46·1	50·7	49·1	10·2
Sidmouth -	43·5	54·9	46·4	50·9	49·2	11·4
Brighton -	43·4	56·6	47·0	51·9	50·0	11·5
Portsmouth	42·9	57·1	47·4	51·6	50·0	14·0
Southbourne *Nr. Bo'rnem'th)*	42·9	55·6	46·5	50·8	49·3	12·4
Worthing -	42·6	56·0	46·7	51·2	49·3	11·6
Ramsgate -	42·4	56·2	46·8	51·1	49·3	12·0
Margate -	**42·4**	**56·0**	**46·5**	**51·1**	**49·2**	**10·9**
Regent's Pk	41·7	56·7	47·1	50·1	49·2	13·7
Norwood -	41·7	56·6	47·0	50·0	49·2	14·1
So'th'mpton	41·7	55·7	46·6	49·8	48·7	15·7
Lowestoft -	41·5	54·6	44·9	50·2	48·1	11·7
Croydon -	41·4	55·9	46·6	49·7	48·7	13·9
Scarborough	41·3	53·6	44·6	52·3	47·5	10·1
Cheltenham	40·8	54·8	45·7	48·6	47·8	15·0
Bath - - -	40·7	52·9	44·6	47·8	46·8	12·4
Buxton - -	37·9	51·4	42·3	45·6	44·7	13·9
Mean for above Stations.	42·4	55·4	46·3	50·6	48·9	12·3

Average Monthly Temperatures at Margate during the ten years, 1881-1890.

Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
38·9	39·6	41·4	45·7	52·4	57·5	61·3	61·0	58·0	50·1	45·1	39·4

On studying the analysed temperatures of Margate and other places in the foregoing table, the following results are obtained :—

Winter.—During the six winter months, October to March, Margate has an average temperature of 42·4; this is 2·4 below that of Ventnor with the highest winter temperature, and 4·5 above that of Buxton with the lowest, while it is the same as the mean winter temperature of the above stations.

Summer.—During the six summer months, April to September, Margate, with an average temperature of 56·0, is 1·1 below the highest (Portsmouth), 4·6 above Buxton, which is again the lowest, and about half a degree above the summer mean of all the places.

Spring and Autumn.—During spring and autumn in Margate, as in all places, the latter is warmer than the former; in March, April and May the average temperature is 46·5, the spring mean of all the stations being 46·3; in September, October and November it is 51·1; the autumn mean being 50·6.

Annual Mean.—Taking now the average temperature throughout the year, Margate stands at 49·2, this being 1·6 below the highest (Ventnor), 4·5 above the lowest (Buxton), and 0·3 above the mean of all the stations.

Daily Range.—With regard to the daily range, Margate is seen to have a range of 10·9, being excelled in this respect by only four other places, viz:—Scarborough (10·1), Llandudno (10·2), Weymouth (10·3), and Ventnor (10·6); the mean daily range of the whole is 12·3, Southampton being the highest with a range of 15·7.

Coldest Months.—The coldest month in Margate is January, with an average temperature of 38·9. In common with all other places, the *three* coldest months in Margate are December, January and February, with an

average temperature of 39·3 ; this is only 2·6 below the average temperature during the three coldest months in Ventnor, while it is exactly the mean, during the same months, for all the stations.

Frosty Nights.—The average number of nights for the ten years, 1882-91, on which the temperature has fallen to the freezing point is 70 per annum. When it is remembered that there are 222 nights in the year when frosts may be expected, it will be seen that frosty nights occur in less than *one in three* during that period.

To sum up the above results :

1.—**The Winter Temperature** of Margate is warmer than that of inland and many other seaside stations, and is, at the most, only two and a half degrees below that met with in the warmest of those seaside places which have a higher winter temperature.

2.—**The Summer Temperature** of Margate is cooler than that of inland stations, while it is about the same as in other seaside places.

3.—About the temperature in *Spring and Autumn* there is little to be said, except that Margate, in this respect, stands extremely well compared with other places, there being only one degree and a half difference in temperature between the warmest station and Margate in the spring, and about the same with regard to the autumn months.

4.—**The Daily Range** of temperature in Margate is small. This, without doubt, is a matter of very great importance to invalids, and to people of delicate constitution, who are susceptible to cold ; sudden and rapid changes of temperature during the day being very trying to those who have come to the seaside for the express

purpose of enjoying, and being out in, the air as much as possible.

II.—Relative Humidity.

Table II.—*Showing the average Relative Humidity for ten years* (1881-1890) *at Margate, compared with that of other places during the same period.*

(Complete saturation of air = 100.)

Stations.	Whole Year	Winter. — October to March.	Summer. — April to September.	Spring. — March, April, May.	Autumn. — September, October, November.
Llandudno -	79·2	82·5	75·9	78·0	80·0
Norwood -	80·0	87·0	73·0	75·0	85·0
Brighton -	80·2	85·1	75·3	75·7	82·0
Croydon- -	80·3	87·1	73·5	75·7	82·0
Weymouth -	80·5	84·0	77.0	79·0	81·0
Regent's Pk	81·0	86·7	75·3	76·7	85·3
Southampt'n	81·2	87·9	74·5	76·0	86·0
Ventnor- -	81·2	84·3	78·1	79·0	82·0
Margate -	82·0	86·8	77·2	80·0	84·0
Southbourne	82·0	87·5	76·5	78·0	85 0
Teignmouth	82·0	87·0	77·0	78·0	85·0
Ramsgate -	82·1	87·5	76·8	76·9	84·7
Worthing -	83·0	88·0	78·0	80·0	86·0
Scarborough	83·1	87·7	78·5	81·7	86·0
Portsmouth	83·2	88·4	78·0	79·0	86·0
Cheltenham	83·2	88·0	78·4	78·3	87·3
Lowestoft -	83·4	88·3	78·5	82·0	85·0
Sidmouth -	85·0	88·5	81·5	81·0	88·0
Buxton - -	85·0	91·0	79·0	83·0	88·0
Mean for above Stations.	82·0	86·0	77·0	78·6	84·6

The foregoing table shows the Relative Humidity of the atmosphere in Margate and eighteen other stations during the different seasons of the year.

By the term *Relative Humidity* is meant "the amount of moisture present in the air, expressed as a percentage of the amount just necessary to cause saturation." It has been found that the most agreeable amount of moisture in the air is when the relative humidity is 75 to 85 per cent. It is not an advantage to have the air too dry; in fact, this becomes an absolute disadvantage when the relative humidity is below 70, the evaporation from the bronchial tubes, produced by a warm dry air, appearing to irritate them. It will be seen from the foregoing table that Margate stands well within the limits except during the winter months, when the relative humidity is 86·8; but, at the same time, if the stations were placed in the order of the dryness of their winter temperature, Margate would stand sixth on the list, it being rare in England to find a climate in which the relative humidity is not higher than 85 per cent. in winter.

III.—Amount of Cloud.

Table III.—*Showing the average amount of Cloud visible at Margate, at 9 a.m., for the ten years,* 1881-1890, *compared with that at other places during the same period.*

(10 = that the sky is entirely overcast with cloud).

Stations.	Whole Year	Winter. — October to March.	Summer. — April to September.	Spring. — March, April, May.	Autumn. — September, October, November.
Worthing -	5·9	6·2	5·6	5·7	5·8
Portsmouth	6·0	6·5	5·5	5·8	6·0
Southbourne	6·1	6·5	5·7	5·9	6·1
Ventnor -	6·1	6·5	5·7	5·7	6·2
Scarborough	6·5	6·7	6·3	6·4	6·5
Ramsgate -	6·7	7·2	6·2	6·3	6·8
Lowestoft -	6·8	7·0	6·6	6·6	6·5
Southampt'n	6·8	7·0	6·6	6·6	6·7
Teignmouth	6·8	7·1	6·5	6·6	6·7
Margate -	**6·9**	**7·2**	**6·6**	**6·4**	**6·9**
Norwood -	6·9	7·3	6·5	6·6	6·8
Cheltenham	7·0	7·2	6·8	6·8	7·1
Llaududno -	7·0	7·3	6·7	6·5	7·2
Sidmouth -	7·2	7·6	6·8	7·0	7·2
Buxton - -	7·3	7·6	7·0	7·1	7·5
Croydon -	7·4	7·6	7·2	7·2	7·4
Mean for above Stations.	6·7	7·0	6·3	6·4	6·7

This table shows the average amount of cloud, during the various seasons of the year at sixteen stations, 10 being taken as indicating the sky to be entirely overcast; thus at Cheltenham seven-tenths of the sky are, on an average, obscured by cloud during the year. It will be

noticed that there is a great uniformity in the figures, Margate only differing from Worthing by 1·0, and from Croydon by 0·5. The spring months are the least cloudy in Margate, May having less than any other month in the year. December and January are, on the other hand, the most cloudy, each being accredited with an average of 7·6 of cloud.

IV.—Sunshine.

Statistics as to the hours of sunshine at Margate have only been kept since January 1st, 1892, and, on referring to the Records of the Royal Meteorological Society, it will be found that few places have their sunshine noticed; consequently the Sunshine Records of Margate and other places can only be compared for this short period.

Table IV.—*Showing the total number of hours of Sunshine and of days without Sunshine at Margate and other places, during the first nine months of* 1892.

Stations.	Hours of Sunshine.	Sunless Days.	Stations.	Hours of Sunshine.	Sunless Days.
Brighton -	1445	32	Margate -	1319	35
Ventnor -	1425	33	Kew - - -	1172	39
Eastbourne	1421	36	Harrogate -	1079	47
Torquay -	1396	41	Greenwich -	1045	46
Sidmouth -	1334	41	Buxton - -	954	47

Here it is seen that during the nine months Margate has had 1319 hours of sunshine, which is 60 above the mean hours of sunshine for other places; the number of days without any sunshine is found to be 35, this being excelled by only two places, viz., Brighton with 32 and

Ventnor with 33 sunless days. These results show that Margate is well favoured in the matter of sunshine; this, as is well known, is of great importance from a hygienic point of view, there being many people who suffer from a depression of spirits when the sun has been for a time invisible, but who rapidly recover their wonted energy and "tone" when the clouds disperse and sunlight cheers the scene.

V.—Rainfall.

Table V.—*Showing the average annual Rainfall in inches, and the number of rainy days per annum in Margate, and other places, during the ten years*, 1881-1890.

Stations.	Rainfall.	Rainy Days.	Stations.	Rainfall.	Rainy Days.
Margate -	23·31	169	Scarborough	27·50	197
Norwood -	23·83	173	Llandudno -	28·12	176
Lowestoft -	24·16	173	Ventnor -	28·13	164
Ramsgate -	24·23	163	Brighton -	28·75	159
Croydon -	24·80	172	Southampt'n	29·22	187
Regent's Pk	25·17	165	Teignmouth	31·57	169
Portsmouth	26·03	173	Bath - - -	31·71	178
Southbourne	26·33	160	Torquay -	31·72	176
Worthing -	26·54	157	Sidmouth -	32·44	204
Weymouth -	27·01	157	Buxton - -	49·31	196
Cheltenham	27·5	190			

From these figures it is seen that Margate has absolutely the least rainfall of any other place, while the average number of rainy days throughout the year is computed at 169; the driest month is June, which has an average of nine, while the wettest is November with an average of seventeen. A "wet day," when rain falls

more or less continuously, is but rarely experienced in Margate. Owing to the absorbent nature of the soil, as before mentioned, there is, even during the wettest weather, none of that raw, damp, penetrating cold that is so obnoxious.

A very little snow falls during the winter, and this little speedily disappears.

VI.—Prevailing Winds.

The following table gives the average result per annum of eight years' observations of the direction of the wind at Margate:

North.	N.E.	East.	S.E.	South.	S.W.	West.	N.W.	Calms.
31.	26.	50.	23.	45.	85.	48.	20.	37.

These figures show that the south-west, west and south winds outnumber the aggregate of all the others; this doubtless has much to do with giving Margate those favourable conditions of winter climate, which it has been proved to possess, the warm winds from the south-west, west or south being almost continuous during the winter months. On looking at a map of England, it will be noticed that Margate, standing as it does on a promontory at the north-east corner of Kent, has the distinct advantage, over all other seaside places, that, with the exception of one wind, viz.: that which blows direct from the west, *all winds come direct from the sea*; even the south-west wind, blowing up the English Channel, brings with it all the warm and pure air from the Atlantic, uncontaminated by having passed over land.

THE DOMESTIC WATER SUPPLY.

GOOD water being a prime necessity of life, an abundant supply of the best quality is essential to the well-being of a community.

The domestic water supply of Margate is derived from wells and adits constructed in the chalk; from these the water is pumped to a water tower of such a height as to ensure a plentiful supply to every part of the town. The supply is constant, thus avoiding any risk of contamination from storage in house-cisterns.

The average quantity passed into the mains is more than sufficient for the needs of the population, not only in winter, but also in the height of the summer, when the town is full of visitors.

The following is the result of a recent analysis of the water :—

"Analytical Laboratory,
16, Southwark Street, S.E.

Dec. 9th, 1892.

Report on sample of Margate water, received on December 5th, 1892, from Dr. Crook.

The sample, which was contained in a Winchester quart glass-stoppered bottle, was clear and of a pale blue tint when viewed in a 2ft. stratum.

It was free from taste and odour.

The following analytical data are expressed in grains per gallon (parts per 70,000) :—

Total solid matter	38·00
Loss on ignition	4·00
Mineral solids	34·00
Combined Chlorine	8·00
Nitrogen as Nitrates	0·87
Nitrites	None
Free Ammonia	A trace
Albuminoid or organic ammonia ...	0·0035
Oxygen required to oxidize the organic matter	0·014
Lead or copper	None
Hardness in degrees	22·0

(Signed) R. Bodmer, F.I.C., F.C.S.,
Public Analyst for Bermondsey and St. Saviour's, Southwark."

From these figures we see that the sample was particularly free from organic contamination of any kind. It contained the usual mineral matters characteristic of good waters drawn from chalky soils near the sea. The combined chlorine is equal to 13·2 grains of common salt per gallon, this amount being quite insignificant when the close proximity of a large body of sea water is taken into consideration.

The amount of nitrates is what may be expected considering the source of the water; it is the opinion of Professor Wanklyn, that chalk springs, which contain little or no organic matter, are often highly charged with nitrates derived from the various geological strata traversed by the water.

The water of Margate is, like all other waters drawn from chalk, hard; hence it will give a curd with soap

and deposit a sediment in boilers; consequently, it is not so suitable for cleansing purposes as rain or a softer water. There are, however, many evidences that a hard water is more conducive to the good sanitary condition of a locality than a soft water; in some towns, *e.g.*, Glasgow and Manchester, the extreme softness of the water requires the addition of lime, it being found that a soft water is very likely to acquire some impurity, such as lead, during its transit through the mains and house-pipes of the town.

To sum up:—For all drinking purposes the water of Margate is of good quality and is remarkably free from organic contamination; the supply is constant, is at an uniform pressure, and, even during the driest weather, amply sufficient.

THE DRAINAGE OF MARGATE.

PRIOR to the year 1888, Margate was drained in two different ways, viz:—the higher part of the town by cesspools dug in the chalk; the lower part, situated for the most part in the Dane Valley before mentioned, by sewers which emptied directly into the sea. In that year, however, the Town Council, having regard to the rapid increase of the town, decided to establish some good modern system of drainage for the whole of the district under their control. The plan, which is here shortly described, was submitted by Mr. Baldwin Latham, M. Inst. C.E., and, having received the approval of Sir Frederick Bramwell and Sir Douglas Galton, was adopted by the Council, the work being placed in the hands of Messrs. Cooke and Co., of Battersea, who at once commenced operations, and finally completed the contract in 1892.

It was found in 1888 that the total area of the Borough of Margate required to be drained was about 760 acres; it was then decided so to complete the work, as to suffice for all possible future contingencies in the matter of increase in size and population of the town; allowance was also made for the outside districts adjacent to the borough, which, from their natural configuration, might have to drain in the direction of Margate.

For the purposes of drainage, the district is divided into two parts,—the *high level* and the *low level*.

In the former, comprising about four-fifths of the whole, the sewage, with the rainfall, flows direct by gravitation to the point of output.

In the smaller division, the low level, the sewage, which is here separated from the rainfall, is raised by pumps so as to discharge itself into the gravitating outfall sewer.

The high level district is subdivided into two parts, the northern and the southern.

The northern subdivision is drained by an intercepting sewer, which, commencing as a pipe 12 inches in diameter, soon enlarges to 15 inches, then to 18 inches, and terminates in the outfall sewer; it receives the lateral sewers from the northern portion of the high level.

The southern intercepting sewer commences as a pipe 18 inches in diameter; it enlarges to 21 inches, then to 24 inches, becoming finally an egg-shaped sewer, 3ft. 9in. by 2ft. 6in., which empties itself into the outfall sewer; it receives the lateral sewers from the southern portions of the high level.

The lateral sewers of the town are all of a small size and have very rapid falls, so that they discharge their contents quickly into the intercepting sewers. These intercepting sewers have such falls in the districts which they traverse, that the daily flow of sewage, in the driest weather, keeps them clear and self-cleansed.

The low level is divided into three subdistricts, in each of which is a duplicate set of hydraulic pumping engines, which lift the sewage from the sewers of the low level to the intercepting sewers of the high level. These engines are so arranged that, should one become overpowered, the second comes automatically into action.

At the normal rate of working, each of these automatic pumps is capable of raising 400 gallons per minute; so that at each of the stations, at the normal speed of working, 800 gallons of sewage per minute can be raised, and that quantity can be increased at any time if required.

Each set of hydraulic machines is contained in a chamber 9ft. in diameter, which is constructed below the level of the street; they are reliable in working, noiseless in action, and free from vibration. The water used for the working of the pumps is afterwards directed into automatic flushing tanks, for the purpose of flushing the sewers.

The Outfall Sewer, which receives the sewage from the intercepting sewers, is egg-shaped at its commencement, being 4ft. high and 2ft. 8in. wide; it is constructed of brick and concrete, the invert being lined with blue brick; afterwards the size is increased to 4ft. 6in. by 3ft. About one third of a mile from the edge of the cliffs it empties into a circular tank sewer. This tank sewer is 590yds. long, 7ft. 6in. internal diameter, and terminates, at the edge of the cliff, in penstock and tidal valve chambers, which are provided with storm overflows and ventilating shafts; being placed at a slightly lower level than the rest of the system, it permits storage of the sewage during certain states of the tide; this arrangement enables the sewage to be discharged at the most favourable periods, when the tide is ebbing directly away from Margate.

The sewage is finally delivered into the sea across the Longnose Rock by a 30in. iron pipe, sunk in an excavated trench 550 yds. long as measured from the cliffs. The

trench is filled in and concreted, so that the presence of the sewer pipe is not apparent.

The total length of the outfall sewer, from its commencement to the point of discharge into the sea is 11,775 feet.

From the prevailing direction of the tidal currents, the general direction of the winds and the particular outline of the coast at the point of outfall, all conditions are extremely favourable for the discharge of sewage directly out to sea; there being only one particular phase of the tide, viz., the first quarter flood, continuing from an hour and a half to two hours, which is not altogether favourable. During this particular time, the sewage is automatically stored in the tank sewer before referred to; when this storage reservoir is full, the sewage runs through it; there is no check whatever in the flow through the main sewer; and, as soon as the tide falls below the level of the storage reservoir, all the sewage contained therein is discharged, and before low water everything is carried into the depths of the sea. At no period of the tide is there the slightest stagnation in any part of the system; unlike an ordinary tidal system, where the sewage must be dammed back, the sewage is always either flowing into the sea or into the storage reservoir.

The total length of the sewers, exclusive of pipe drains for house connections, is $21\frac{1}{2}$ miles; they are laid in straight lines, and are therefore readily inspected. At the points of lateral deviations manholes are inserted, while at the points of vertical deviations either manholes, ventilators or lampholes are provided. There are 320 manholes and 140 ventilators in the system, all of which

are provided with charcoal screens at the street levels. At the principal heads and intersections of the sewers are automatic flushing tanks; in addition to these, there is a staff of experienced flushers, with all necessary apparatus, who almost daily visit and thoroughly flush all parts of the system. By these means the sewers are kept perfectly sweet and clean.

All house drains terminate in an intercepting trap with a fresh air inlet; by this means direct communication between the houses and sewers is effectually cut off, and perfect isolation of each house is obtained.

The surface and storm waters on the high level flow through specially trapped gulleys into the sewers; on the low level, on the other hand, the rainfall is separately dealt with in the following way:—There is a separate system of sewers which conveys all the storm and surface water from this district directly by gravitation into the sea. When rain occurs during the period of high tide, and the surface water drains can no longer discharge their contents, a system of hydraulic apparatus, similar to that used in dealing with the low level sewage, automatically comes into action and pumps the surface water into the sea, thus preventing the district from being flooded by rain water.

The dry weather volume of sewage is calculated to be 30 gallons per head per day, half flowing off in six hours.

GENERAL SANITARY ARRANGEMENTS OF MARGATE.

THERE are now 16½ miles of roads and streets, kept in thorough repair by constant macadamizing and the use of a steam roller. By far the greater number of footpaths are made with either tar-asphalte or tarred pavement; in a very few of the less frequented thoroughfares they consist of a hard binding gravel.

COLLECTION OF REFUSE.

1.—The town for this purpose is divided into seven districts, in each of which men, under proper supervision, are employed for the purpose of sweeping and clearing the streets of all refuse and garbage.

2.—From fish shops, poulterers, greengrocers, and business premises of a similar kind, all refuse is collected daily.

3.—From private houses a daily collection of dust and household refuse is made, thus preventing an accumulation of filth in private dust-bins.

The refuse, when collected, is taken out of the town before noon; it is then distributed on farm land and dug into the soil.

All the Model Bye-laws, as issued by the Local Government Board, have been adopted by the Town Council, and are now in force in the district under their control.

Among the Parliamentary Acts in force in the Borough may be mentioned "the Infectious Diseases Notification Act," of 1889, and "the Infectious Diseases Prevention Act," of 1890.

The Hospital for infectious cases is situated at Northwood, three miles from Margate, to which suitable cases are promptly removed by the Sanitary Inspector in a special ambulance or carriage.

THE GENERAL HEALTH OF MARGATE.

ON a preceding page it is remarked, that provided certain conditions be complied with, and a good hygienic state of a district thus ensured, the result will be a low general death rate and a freedom from zymotic disease, indubitably demonstrating the value of the locality in regard to the health of its inhabitants.

In the foregoing pages the conditions referred to have been taken one by one. In regard to Margate they have been severally and collectively examined, and the results have, wherever possible, been compared with those of other places. It has been shown that not only is Margate not found wanting, but that it would be difficult, if not impossible, to find another spot similarly favoured in all its details.

It is now necessary to apply the final and crucial test, which is to examine the death rates of Margate, and to compare them with those of other towns.

In preparing the following tables, every care has been taken to ensure accuracy; in many instances the figures have been obtained direct from the Medical Officers of Health in the towns referred to, in other cases from the quarterly returns of the Registrar General. In the selection of the different places, the endeavour has been to include as many of the stations mentioned in the section on "Climate" as possible, but in some instances this was found to be impracticable, owing to their being merged for registration purposes into a larger or adjoining district.

Table showing the average annual rate per thousand of deaths from all causes, and the average annual rate per thousand of deaths from zymotic disease, in Margate and other places during the eight years, 1884 *to* 1891 *inclusive.*

	Average Annual Rate per 1000 of Deaths from all causes.	Average Annual Rate per 1000 of Deaths from Zymotic Disease.		Average Annual Rate per 1000 of Deaths from all causes.	Average Annual Rate per 1000 of Deaths from Zymotic Disease.
Margate -	13·9	1·46	Brighton -	17·7	1·76
Hastings -	14·2	1·14	Southampt'n	17·7	1·61
Folkestone -	14·3	1·57	Teignmouth	17·8	1·29
Sidmouth -	14·4	0·5	Cheltenham	18·1	1·55
Ramsgate -	*14·5	*1·02	Scarborough	18·3	1·51
Eastbourne-	14·8	1·68	Portsmouth	18·8	2·45
Torquay -	14·8	0·63	Bath - - -	19·8	0·62
Croydon -	15·0	1·9			
Lowestoft -	15·8	1·46	England &		
Weymouth -	16·7	1·51	Wales	19·2	2·16

* For the four years: 1888 to 1891.

Table showing the rate per thousand of deaths from all causes, and the rate per thousand of deaths from zymotic disease, in Margate, for each of the eight years, 1884 *to* 1891 *inclusive.*

Year.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.
Death Rate -	15·1	15·2	15·6	13·4	13·1	14·5	12·8	11·4
Zymotic Rate-	2.7	2·2	2·4	1·0	0·7	1·2	1·0	0·5

Table showing the average annual death rate per thousand in Margate, for each zymotic disease, during the eight years, 1884 *to* 1891 *inclusive.*

	Average Annual Death rate per 1000.
Small Pox - - - - -	None
Measles - - - - -	0·117
Scarlet Fever - - - -	0·037
Diphtheria - - - -	0·154
Whooping Cough - - -	0·337
Fever (Typhus, Enteric, Simple or "ill-defined") - -	0·118
Diarrhœa - - - -	0·702
Cholera - - - - -	None
Total average annual zymotic rate	1·46

In the first table Margate stands at the head of all the places mentioned with an average general death rate of 13·9 per thousand. That this is an exceptionally low rate may be seen from the fact that the general death rate for the whole of England and Wales is 19·2.

In the second table are given the general death rate and the zymotic death rate of Margate in each year. From this it is apparent that the health of the district shows a steady increase year by year, the general death rate and the zymotic death rate in 1891 being the very low ones of 11·4 and 0·5 respectively.

On examining the rate of deaths from zymotic disease, Margate is seen to be seventh on the list, with an average zymotic rate of 1·46 per thousand. This result is the more remarkable when it is remembered that Margate probably contains, during the thirty-nine weeks

of the year when the various schools are assembled, more children, in proportion to adults, than any other town in England. The number of children who flock to Margate from all parts at the commencement of each school term has been estimated at about three thousand, the great majority being at an age when they are most likely to contract zymotic diseases and ailments of all kinds. It will doubtless be granted, that with our present state of knowledge, it is impossible, especially when the many possibilities are considered of fresh infection being imported into the town by the reassembling of the schools, to entirely prevent cases of such diseases as measles, scarlet fever or whooping cough occurring from time to time; but that the physical health of the children should, by good hygienic surroundings, be so improved, that they may be rendered less subject to disease and the better able to resist its influence when acquired. This, undoubtedly, has much to do with the low death rates in Margate.

THE CLIMATE OF MARGATE IN RELATION TO DISEASE.

IT is not here intended to enter into a long dissertation as to the various diseases for which a residence in Margate is particularly suitable. Enough has been said to show that Margate possesses advantages —peculiarly its own—specially suited for debilitated constitutions generally, and more particularly for every form of tubercular disease, including consumption,—in the early stages of which a sojourn in Margate is invaluable; enlarged glands; diseases of the spine and joints; and the many scrofulous affections of the skin and mucous membranes.

Among other diseases, for the cure or palliation of which Margate is beneficial, may be mentioned chronic bronchitis, chronic pleurisy and empyema, diseases of the heart, and the various forms of paralysis.

For convalescents, it may be said, without fear of contradiction, that with very few exceptions, all classes are benefited by a visit to Margate. For rachitic or delicate children the fine open sands form a happy play ground, and the invigorating character of the climate is there shown in some of its best effects.

The sea-bathing at Margate is both safe and good. When bathing in the sea itself is not advisable, fresh sea water is delivered at every part of the town at a trifling cost; or there are excellent swimming baths in which the water is kept at an uniform temperature.

To conclude in a few words:—by a residence at Margate a patient may be placed under a climatic influence which is probably more nearly allied to that of a sea voyage than can be said of any other watering

place in England; while the inconveniences, before mentioned, incidental to a voyage, are avoided. The establishment in Margate of a large number of Convalescent Homes by the directors of Metropolitan and Suburban philanthropic institutions, incontestably shows that the value of Margate as a health resort is fully recognised by the highest authorities.