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ADDRESS ON HEALTH;

DELIVERED BY

ROBERT RAWLINSON, C.B., F.G.S., C.E.,

CHIEF INSPECTOR LOCAL GOVERNMENT ACT, 1858;

MEMBER OF ARMY SANITARY COMMITTEE,

ETC, ETC.,

AT THE

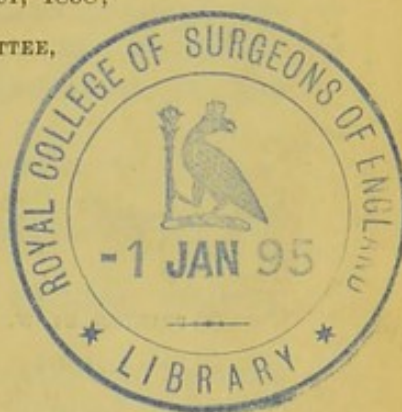
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LONDON, 1870.



ADDRESS OF HEATH

ROBERT H. WILSON, CL. V. S. C.

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ADDRESS ON HEALTH.

THE programme states that this Department considers the various questions relating to the Public Health, and collects statistical evidence of the relative healthiness of different localities, of different industrial occupations, and generally, of the influences of external circumstances in the production of health or disease.

The special questions named for discussion are:—

- “What is the best method of disposing of sewage and excreta?”
- “What modifications are desirable in existing sanitary laws and administration?”
- “What legislative measures ought to be taken to prevent the adulteration of food, drink, and drugs?”

It will not be possible to discuss details connected with public health questions in a popular address, as there is not the time necessary to perform such a task. The collection of statistical evidence is of the first importance and, fortunately for Great Britain and for the world, this is under the charge of men who are able, industrious, and competent workers. Registration of marriages, births, disease, and death, enables the student in sanitary science to compare the state of the Public Health, week by week, quarter by quarter, and year by year. But very much more information is required than any printed returns can show, before the simplest practical sanitary problem can be reasonably solved. The Registrar-General's Returns are made up for “Registration Areas,” which are not, in all cases, the best for the purpose; as some of these areas include towns, villages, and rural districts, living under conditions which

* * This Address reads disjointed, and it is so, being only part of a longer paper: It is, however, considered necessary to print it as delivered, rather than to re-write and fill out the several subjects touched upon. This may ultimately be done.—R. R.

produce results, favourable in some cases, and unfavourable in others. A small town has, for instance, been sewered, drained, and supplied with good water, cesspools and common privies may have been abolished, and such diseases as typhoid fever and diphtheria may have ceased; but in the registration area bearing the name of such town, unimproved detached residences and villages are included, and diseases incident to defective conditions prevail in these houses and villages, and are classed in the return as having occurred in the town which has been improved; there may be also county hospitals, asylums, workhouses, and gaols, the deaths in which are registered as occurring in the town, though really due to the districts whence they came. This is a double injury; it injures the town, and also misleads the outside public. The subject has, however, previously been noticed, and will, probably, soon be amended. The returns given for large towns are also imperfectly instructive. It is very desirable to know how one great centre of population compares with another, as London with Paris, Berlin with Vienna, Manchester with Leeds, Liverpool with Glasgow, and Edinburgh with Dublin; but the figures, 22.50 per 1000 for country districts, and 25.75 per 1000 for town districts—25 for London and 35 for Vienna, do not tell much of the sanitary story; as, in each area, there are divisions and subdivisions innumerable, and variations which, if fully stated, would simply be frightful. In that vast aggregation of humanity which we call London, and which we also complacently consider the healthiest city in the world, in place of reading, "25 per 1000" as the "average" return, we should learn from the details that there are districts in which the mortality ranges from 50 up to 100 (and more) per 1000—human dens of wretchedness, crime, and pauperism; the owners of property in such districts having no regard for sanitary improvement, but to avoid or to retard it.

The term "preventable" has been applied by sanitarians to all deaths occurring from zymotic diseases, and above the standard of 17 per 1000, the returns for the healthiest districts in England. There are "preventable deaths" and "preventable cases of sickness" also, the latter being 30 or 35 times the greatest; that is, to produce one preventable death, there will have occurred 30 or more cases of preventable sickness of longer or shorter duration, and to this "preventable sickness" may very fairly be attributable probably one-half of the existing and excessive poor's rate.

The conditions which affect public health are various, complicated, and difficult to understand. Climate, seasons, excesses of heat, of moisture, and of cold; modes of shelter,

of clothing, of feeding, and of occupation, immigration and emigration, all influence the local public health.

Statistical evidence being obtainable—its proper use is the difficulty. Various writers—ancient and modern (recently Dr. Guy)—have recorded the rise, course, and terrible effects of plague, pestilence, typhus fever, and cholera; and we have a tolerably full library of books detailing the past ravages of black-death, sweating-sickness, and other diseases, as also of typhus, diphtheria, small-pox, scarlatina, and cholera.

A series of Reports preceded the passing of the "Public Health Act, 1848," elaborately detailing the sanitary conditions of the population of England, the Report of 1842 being at the head of this class of literature for completeness. This (1842) Report embodies the labours of many observers and workers, and may be said to have dissected modern society in England. Towns, we learned, were not sewered; houses, we also learned, were not drained; or works of this character were so rude and imperfect as to be causes of nuisance rather than promoters of health, the first principles of sanitary engineering not having then been worked out; villages and single houses were also found to be in bad plights. The great "Report on the Sanitary Condition of the Labouring Population of Great Britain, with Appendices (1842)," and the "Supplementary Report on the Practice of Interment in Towns," by our colleague, Edwin Chadwick, Esq., Barrister-at-Law (1843), set forth, in an understandable form, the sanitary evils of our period, and in the Session of 1848 the Public Health Act became law. The Irish famine-fever of 1846-47, the outbreak of cholera in 1849-50, and in subsequent years, gave an impetus to remedial sanitary works which has steadily progressed. The Russian war of 1854, and subsequent years, but especially the severe mortality in the British army in the Crimea during the autumn, winter, and spring of 1854-55 (through the thoughtful and wise intervention of Lord Shaftesbury), induced the Government of the day to send a Sanitary Commission to work at the great hospitals on the Bosphorus, and at the camps in the field. A Commission was also sent out at the same time to inquire into commissariat defects. The records of the work done and of the results accomplished are embodied in the Reports. Since this period Army Sanitary Commissions have been generally established in the various armies throughout the world.

The great mortality in the Crimea during December, January, and February, 1854-55, which amounted in some regiments at the front to 70 per cent. of the men encamped, alarmed the Government. Climate, exposure, and trench

duty were cited as the causes; the men, however, it was found had no suitable clothing or rations; even commissioned officers wore their clothes until they swarmed with vermin; there was no fuel to make fires for cooking, and the rations served out consisted of raw coffee berries, hard biscuit, salt pork, and rum. The road from Balaclava to the front, in a limestone district, with thousands of tons of this rock washed from the mountain's sides ready and handy for use (during the first winter) was never touched, and the road was a quagmire. The small but commodious harbour of Balaclava was allowed to become, from one end to the other, a mass of floating animal and vegetable garbage, and the village and the camp were tainted with human and animal filth. The hospitals on the Bosphorus were frightfully overcrowded; they were also unventilated, and both within and without were as bad as dirt and neglect could make them. Miss Nightingale, in "Notes on Matters affecting the Health, Efficiency, and Hospital Administration of the British Army, founded chiefly on the experience of the late War, presented by request to the Secretary of State for War, 1858," furnishes all the details. The world has heard that Miss Nightingale went out with her lady companions to nurse the sick and wounded, but it is not so widely known that this self-imposed duty, important as the results have been, only constitutes a fractional portion of the labours of this lady. In my opinion, the labours of all other workers in the cause sink into insignificance when compared with the work she has accomplished down to this time. The effect of this labour has been the appointment of Sanitary Commissions, which have inquired into the condition of barracks and hospitals in Great Britain, at the Mediterranean stations, in India, and, in fact, wherever a British soldier is stationed on duty throughout the world. The results, so far, are greatly reduced rates of mortality in the army, both at home and abroad.

Recent reports from India detail the local causes of excessive disease in that climate. These causes are, filthy native huts, and filthy palaces; filthy villages, filthy towns, and filthy cities; as also filthy British soldiers' barracks, filthy hospitals, filthy prisons, filthy cantonments, and even filthy sanitary hill stations. The low class natives of the plains of India are described as being habitually dirty, idle, and apathetic. The water sources are frightful abominations, the water in rivers, tanks, and wells, being contaminated by human and animal excreta, and even by putrefying carcasses of man and beast; drowning in tanks and wells being common, the bodies, in some cases, wasting as the water is drawn for use. On

cleaning some of these tanks and wells deposits of human bones have been found and removed, which bones indicate the fact that all other portions of the carcasses had been dissolved in the water. Contamination of tanks and wells by washing, bathing, and infiltration of excreta and decaying animal and vegetable refuse is common over the whole of India, so far as we know it.

The sanitary condition of populations is to be studied primarily in their dwellings. If human beings have no means of observing the decencies required by civilisation, it may reasonably be expected that the doctrines which inculcate purity of life, of thought, and of speech, will be a dead letter. This question of human habitations is, therefore, the greatest problem sanitarians and statesmen have to solve. Sewering, draining, water supply, and scavenging, are works of secondary importance.

So far as history illustrates or explains anything connected with the past condition of the masses of mankind, the story is one of utter State neglect in securing decent home accommodation. In ancient times the masses were slaves or in some respects worse than slaves, as ownership imposed responsibility, but the free peasant has been for the most part utterly neglected, and left to house himself as he could. This has been true of the past, and is also true of the present, over the entire surface of the inhabited portion of the world. It is true of country districts, it is also true of towns and of cities, however magnificent they may be in their outward appearances. To describe the mud and bog cabins of Ireland, the bothy of Scotland, and the cottage of England, would be to depict nests of foul air, of scrofula, of physical debility, and of moral impurity. The sanitary defects which exist in the lower class dwellings of Great Britain, exist in the lower class dwellings of every nation and people on the face of the earth. There are reports in abundance on English, Scotch, and Irish villages and towns, setting forth the facts in all their hideous details. Single rooms occupied by all the members of a large family; father, mother, brothers, sisters, and male and female lodgers (sometimes pigs and dogs), mixed in one nest of impurity. Poverty is not always the cause, and, if it were so, should this continue to be a satisfactory excuse? Will sanitary reports, describing the wretched abodes of the teeming populations, or sanitary rules and recommendations, left to chance enforcement avail in enabling the country peasant, or the town artisan, to follow the advice given? If the work of the State stops with reporting and recommending, may not its action be termed "a delusion and a snare?"

Poverty is recognised by the Poor Law, and property is made to bear the pecuniary burden; sickness is recognised by private charity, hence the various forms of endowments, as also the building and support of public hospitals, and charity is made fashionable. Crime is provided for in the erection of gaols, the maintenance of legal tribunals, and punishment, becomes the work and cost of the State. These arrangements are, at this moment, the national measure of civilisation in England. Sanitary legislation, it is true, commenced in 1848, and Act upon Act has since been piled up, one to mend the other, until confusion is the result. Men "learned in the law," cannot even understand, and of course cannot interpret, these Acts.

A Royal Commission, under the chairmanship of Sir Charles B. Adderley, M.P., has been taking evidence relative to sanitary laws, and is expected to make a report, with recommendations, in time for the Legislature, in 1871. Whether Parliament will provide any practical remedy for improving human dwellings generally remains to be seen. Poverty of the occupant is a plea which may be put forth by the peasant in the country, and also by the labourer in the town, and which cannot be gainsaid. The unaided poor cannot provide their places of residence, but must exist in such as they find; the poverty of the individual is, therefore, an effectual bar to improvement by him—he must take his health and his morals as provided for him by others. If born with an unsound constitution, Poor Law taxation will, however, keep him. If example inculcates crime, he will oscillate in and out of gaol. The worst of the males learn crime and live by it. The most tempted of the female portion of such families may drift into prostitution. The wealth of the State is not saved by this mal-arrangement, a fact which has been explained and proved over and over again.

Defective house accommodation produces disease, immorality, pauperism, and crime from generation to generation, until vice has become a second nature, and morality, virtue, truth, and honesty are, to human beings so debased, mere names. The money expended in relieving pauperism, in detecting and in punishing crime, and in supporting the sick, if properly expended, would provide sufficient funds to furnish improved house accommodation. Taking floor areas and cubic space into account, and the money expended within such spaces, it will be found that wretched dens of misery and vice are more costly to the community than any equal area and cubic space in a palace. There are tenements by hundreds of thousands, which generate sickness, pauperism, and crime, the cost of

which is paid for out of rates, and yet such property is not worth more than from three to five years' purchase, but the round of degradation is allowed to go on. Zymotic diseases cut down the head of a family. Typhus removes a father in the prime of life, and the family is then left to the care of the parish. "Once a pauper always a pauper," has become a proverb. Statesmen have, therefore, this lesson to learn—namely, that that which is necessary to the well-being of society, and which individuals cannot provide, but which States can provide, must be the bounden duty of the State to furnish. No excuse can be valid.

It does not follow, as an inference from these arguments, that States must build and own cottage tenements, but it may be inferred that States ought to frame laws, and provide means and machinery for enforcing such laws and regulations as are necessary to bring about the required improvements. State aid has been and is afforded in many forms, but upon no defined or settled principles applicable to the requirements of the empire. There are Exchequer Loan Commissioners, who however are only State hybrids—they are not a Government department, neither are they independent, but being in connection with the Chancellor of the Exchequer, they can advance State money on loan for various purposes. Parliament also by fits and starts votes money for public purposes outside "strict Government requirements"—as to relieve the Irish Famine, 1846-47; to drain agricultural land; to promote special occupations, as fisheries; to construct roads, canals, harbours, and river improvements; and to provide for the execution of sanitary works, as in Lancashire during the cotton famine. Corporations and local boards can also borrow money from Government for main sewerage, for water-works and for general improvements; but not on any simple, easy, and equitable principle, as the rates of interest charged vary from 3 per cent. to 5 per cent.; Exchequer loans are also as a rule discouraged.

The question may be asked—Should the State halt on the threshold of so wise an arrangement as lending money to aid sanitary improvements? The money (1,750,000*l.*) lent to the distressed cotton district (1863-69) (under the supervision of the Right Honourable C. P. Villers, M.P., then President of the Poor Law Board) has been expended on works of a permanent and sanitary character; such as main-sewers, house-drains, forming streets and roads, constructing water-works, and other works of local improvement, thereby securing to the inhabitants means to enjoy health, comfort, and greater facilities for locomotion and trade. The advance

of this money relieved local distress, at no cost to the State,* because the local rates are mortgaged as security, and both the principal and interest (at $3\frac{1}{2}$ per cent.) will be repaid to the uttermost farthing, "within a period not exceeding thirty years." If Government would lend money, at this rate of interest, to enable Parish Authorities, Town Councils, Local Boards, Improvement Commissioners, and other similar Public Bodies, to improve dwelling-houses, to sewer, drain, construct water-works, markets, &c., and to effect street, road, and other town improvements, the progress of the whole country in sanitary improvements would be rapid, and the Registrar-General would soon be enabled to record the beneficial results in his returns; pauperism would cease its alarming growth, and crime would be lessened.

The State, under outside pressure, has recently done something in the way of facilitating the improvement of workmen's dwellings—as, by passing an Act to enable the Exchequer Loan Commissioners to advance money on loan (at $3\frac{1}{2}$ per cent.) to assist limited liability companies, formed for the erection of industrial workmen's dwellings—such loans to be in aid, or extension, of capital subscribed and paid up. Alderman Waterlow's Company, in London, has obtained money so provided, for the purpose of erecting improved dwellings, as contemplated. Mr. McCullagh Torrens, M.P. for Finsbury, has also obtained an Act to enable local authorities (on the certificate of a sanitary officer) to compel, summarily, the improvement or removal of house and other property certified to be unfit for human habitation. There are several independent associations of benevolent men in London, in Leeds, in Hastings, and in other towns who undertake the purchasing of house property notoriously bad (as Wild's Court, London), for the purpose of improving the same, and great moral and sanitary improvements have thus been and are being accomplished. Lord Shaftesbury, by the Common Lodging-houses Registration and Inspection Act, has effected much good. The benefits conferred by this Act are so much appreciated that tramps assist to enforce the rules as to cubic space, clean bedding and ventilation. In Liverpool the Corporation has obtained power to purchase overcrowded cottage property, and to remove so much of the same as may be considered necessary to secure an improved state of public health. This work is going on. Sunderland has obtained similar Parliamentary powers, and is proceeding, or is about to proceed, to pull down

* The administration of this sum of 1,750,000*l.* has not cost Government more than 3*s.* 6*d.* per cent. in clerks and office expenses.

the most defective house property in that borough. The late Mr. Peabody's large bequest of 500,000*l.* for the improvement and erection of industrial dwellings, by a judicious investment of the growing net revenue of the fund ought, in the next fifty years, to go far towards providing industrial dwellings (of the best character) for artisans and others requiring house accommodation in London. There are in all parts of the kingdom charity funds, to a very large amount, left by former benefactors for many purposes which have become obsolete, or even mischievous, which funds the Charity Commission might be empowered to reappropriate to more useful purposes, especially in the direction of providing improved cottage dwellings.

We now want a report or treatise, of an exact and statistical character, setting forth with clearness and precision the financial, sanitary, and moral results of the more important industrial dwelling undertakings in this country of the last fifteen years. Financial, in order to bring to a practical test of profit and loss, expenditure, undertaken in different parts of the country, under ordinary or peculiar conditions. Sanitary, in order to show that improved house accommodation means less sickness, less mortality, healthier children, and higher wage-earning power. Moral, in order to show that Better Dwellings mean sober habits, accumulated savings, and an almost total absence of offences against the law.

The first steps in sanitary progress are, as previously indicated, special examinations and faithful reports; and then remedial measures ought to follow. The inspections and reports in England have (to some extent) been followed by works, and, at the present time, "the Local Government Act (1858)" has been adopted in some 700 places, and the number is being added to. A sum of about 8,000,000*l.* sterling (exclusive of the metropolis) has been expended on the various works provided for by the powers of the Act, such as sewerage, draining, water supply, road and street improvements, &c.* To put the whole of England in a similar sanitary state will cost about 50,000,000*l.* in addition. In round numbers, from 2*l.* to 5*l.* sterling per head of the populations under the Act may have been expended. Large as these figures appear, when thus stated, the expenditure has been (and will be) a relief and not a burden. House property has been (and will be) increased in value, and,

* This 8,000,000*l.* represents the PUBLIC DEBT; but, as private improvements are paid for by owners and occupiers, and, as a rule, the private expenses of drains, closets, cisterns, pipes, and apparatus, cost about as much as the public works, the expenditure on sanitary works and apparatus has not been less than 16,000,000*l.*

in so far as causes producing zymotic diseases are removed, the ratepayers enjoy better health, earn fuller wages, and are, consequently, better enabled to pay the rents demanded. There are many persons, however, who do not appear to value health, if providing the means to obtain it touch their pockets. These persons in towns and villages are, small shopkeepers (in business or retired), small speculative builders, and owners of cottage property, generally owners of cottages of the worst class, which, on account of their badness, are relieved from paying rates, but in which fever and pauperism are manufactured with singular regularity, the parish relieving-officer indirectly, but nevertheless regularly, paying the rents.

Since the Crimean war, and the effective work of this the first Army Sanitary Commission, there have been commissions, inquiries, and reports, as to barracks and hospitals on home stations, and works of sewerage, drainage, water-supply, and of ventilation have been carried out, the results being a great reduction in the sick rate, and a reduced annual army death rate of about 8 in each 1000. The Mediterranean stations have been examined, the water supply of Malta has been improved, plans and estimates for main-sewering and draining are ready, waiting to be adopted and carried out. Gibraltar has been sewered, drained, and furnished with an improved supply of water. India is now the seat of a vast sanitary movement, reports having been ordered, and sent in. To extract only fragmental portions of these reports would occupy more space to write and time to read than are allowable in an address. Calcutta being the capital of British India, is, however, thus described :—

“It is beyond contradiction that the present condition of Calcutta is highly unsatisfactory, and is a reasonable cause of alarm to the sanitarian. I write advisedly when I assert that, for flagrant nuisances, stagnation of filth, vast accumulations of excremental matter, vegetable and animal decay and putridity, foul effluvia from open drains, sickening odours generally, sewage contamination of air, water, and soil, impurity of drinking water, horrible defilements of every sort, inefficient scavenging, want of proper drainage, and general sanitary mal-administration, Calcutta will compete with any other city at home or abroad.”*

India is described in the Sanitary Reports recently sent to England as one vast field of general uncleanness, and consequently the ravages of disease and death are excessive. The delta of the Ganges, in all its seats of human habitation, is a

* David B. Smith, M.D., Sanitary Commissioner for Bengal.

vast area of filth of every type to be found where sanitary regulations have been (from the remotest periods) utterly neglected. The sacred river, in the monsoon periods, brings down the tropical rains and inundates large areas, drowning out disease for the time. The waters subside, the fierce sun dries up the swamps, putrescence begins, and cholera again reigns, ripening the germs to be matured as seasons favour the process. Cholera need not be any longer considered a mystery, as the disease obeys well-ascertained laws. Its birth is in the midst of indescribable human filth, which is removable; its spread is along lines of human communication where filth abounds, irrespective of all other terrestrial or meteorological considerations; there must, however, be human populations to generate cholera. The course of rivers, stratifications, and even elevation, have apparently little influence; but, given a population grovelling amidst filth, and there may be cholera from the tropics to the poles.* New countries were said to be free from old world diseases; but, alas! this has been only for a time. Zymotic diseases, at first unknown, are now rife in the Australian towns since population has increased, like causes producing like results.

The sanitary condition of a State is visible to the eye of a stranger and student, in the bodies, features, and rags of its population. The dirty, half-naked, stunted, squalid, diseased, and crippled mendicants, of any country, as well as the ragged, able-bodied and bold beggars, declare the result of defective legislative provisions and sanitary regulations. The street-arabs and tramps of London, the English paupers, the ragged and turbulent peasants of Ireland, the barefooted women and children of Scotland, all show that vast masses of the populations of Great Britain and Ireland are uncared-for. Degeneracy is most painfully visible. The human face and form present hideous squalor and distortion—and, as is the body so is the mind. Such populations are an incumbrance, a money loss, and a civil terror.

Sanitary works may be simple in country districts, but in towns they become compound and, therefore, complex. Municipal, parochial, and personal care and labour are, however, required under all conditions, and this fact has not, as yet, been generally appreciated and acted upon; hence arises, from

* Cholera has been said to prevail, in excess, on certain geological strata, and to avoid regions of granite—to follow the course of rivers—to be most deadly on low sites. Where populations are massed for purposes of commerce, and live in neglect of sanitary laws, there cholera may prevail, in excess, on any strata or on any site.

personal, municipal, and parochial neglect, much of the nuisance wrongly imputed to sanitary appliances.

The physician and the sanitary engineer must also, as a first lesson, learn the simple laws of nature, that they may know their weakness; as, also, in what may consist their power. The grand phenomena of nature cannot be controlled.

The atmosphere is the breath of life, but a contaminated atmosphere produces sickness and death. Temperature, dryness, and moisture, affect health; and it will be wisdom to understand how far these conditions are beyond the control of man; as, also, to what extent he may modify them.

The sun is the source of heat, and this heat is dispersed through space, year by year, and age by age. It is suspected that some annual variation can be observed in the volume and effects of the heat of the sun in the earth's atmosphere.* The salt ocean is the source of vapour, and the annual volume of aqueous vapour, raised into the atmosphere, will necessarily be in proportion to the heating power of the rays from the sun, and, as the moisture will be in proportion to the heat and water evaporated, so also will be the precipitation of moisture in the form of snow, hail, dew, and rain. Temperature and moisture affect the public health seriously in several ways; vegetation is affected, through vegetation animal life, through animal life man. A series of exceptionally dry seasons produce famine; a series of wet seasons produce blight in vegetation, murrain in cattle, and then wide-spread epidemics in man. History furnishes the details, though historians do not, in all cases, recognise their importance. Science is young, but vast advances have been made in the study of meteorology, and the aids now afforded will enable students to discard ancient fallacies and establish new truths; local tables of weather predictions, in detail, will become obsolete; forecasts, for continents, and islands, will become common. The electric telegraph will be the warner and teacher of the meteorologist; as, by its aid, he will have note of the tornado at its birth; and, by experience, indicate its probable course; then, "to be forewarned, will be to be forearmed." Commerce, under free trade, can save from famine, and sanitary science can mitigate the severity of vegetable epidemics. Man cannot, however, regulate cosmical changes, nor will any work of man more than fractionally modify cosmical

* In meteorology, seasons vary, in the fall of rain, about as 1 to 2, that is, if a dry season gives 20 inches of rain in the year, a wet season will give 40 inches; and an average of years will give 30 inches. Does the heat of the sun vary so as to produce this meteorological variation in the fall of rain?

effects ; continents and islands—parts of continents and parts of islands will continue to have seasons of scorching drought or of deluging rain, irrespective of the destruction or growth of forests, the drainage of land or its cultivation.* A few facts will illustrate this. In the year 1864 the continent of Europe suffered drought ; Australia was flooded by successive falls of rain. In 1866 Australia experienced a fatal drought ; Europe suffered from excess of rain. This year (1870) great drought again prevails in portions of the northern hemisphere, and Australia is again deluged with rain, that is, there is more than the average of drought and of rain alternating. There are not, however, entire seasons over the surface of the world, either of drought or of rain ; there is only equality in an average. At what point heat and moisture are friends or foes the physician must study ; a few degrees more of heat in summer, or of cold in winter, affect the Registrar-General's returns, both of sickness and of death.

Meteorology also affects water-supply. The heat of the sun causes evaporation from the ocean, and the vapour is condensed into pure water (soft water). There is no other source of pure, soft, and fresh water but the salt ocean. All fresh water found in springs, rivulets, streams, rivers, and lakes, or in the substrata of the earth's crust, has therefore been evaporated from the salt ocean, and after permeating the subsoil, or flowing over the surface, wends back to the great ocean-reservoir of the world, again to be salted, purified, and re-evaporated, and floated once more in the air to the virgin springs and streams of the earth.

Public water-supply has been greatly extended within the last quarter of a century, both at home and abroad. The metropolis obtains its 100,000,000 million gallons per day, partly from the river Thames, and partly from the river Lea, which, however, is a tributary of the Thames. Both these sources are polluted by washings from manured lands, from roads, and also from villages and towns, such washings containing human excreta. Boating and bathing are common to both rivers. Liverpool, Manchester, Bradford, and many other lesser towns, have obtained soft and comparatively pure water, and works are in progress for Leeds, Huddersfield, and some other places. Glasgow has Loch Katrine

* Forests affect meteorology only over their own local areas, to the extent of several degrees of temperature. Land draining and cultivation also affect local temperature only, and that during ordinary periods, but these neither lessen nor increase the excesses of nature in her storms or in her calms,

water in abundance, Dublin that from the Vartry, both sources producing water soft and pure. A few instances may be named of waterworks in different parts of the world; as in America, New York has the Croton and Brooklyn waters, and Chicago takes water by a tunnel driven under the shore-bed of Lake Michigan. In India Calcutta is completing a scheme for taking water from the river Hooghly, Bombay has the Vehar reservoir; and in China, Hong-Kong is having an impounding reservoir constructed at Pokefoolum to supply that station with water from the surface of the granite.

Sanitary science, before it can be of practical use, must be learned by statesmen. The strength of a nation is in its health, and where there is the healthiest community, there bodily purity and morality will have the greatest development. Empires, Monarchies, and Republics have this lesson to learn. In the cities of the Republican States of North America, the worst sanitary defects of the worst cities of Europe are being repeated.

The aim and end of statesmanship ought to be to ensure to every individual born into the State means of health and of morality. Each Englishman's home should not only be his castle, but his hospital. Charity will not then degrade but will elevate; and that alone will be true charity which assists the poor to assist themselves, and so to live, independent of almsbegging and almsgiving.

The sanitary engineer and manufacturer of the future will know nothing of waste products, because sewage will be used as the most valuable manure, and the ingredients which now pollute and destroy our rivers will be converted to profitable uses. Smoke may be prevented, and noxious fumes may be condensed.

The statesman of the future will make social questions his study and care, and, whilst providing for defence and taxation, he will see that measures necessary to the prevention of disease and mortality in excess shall also be provided and administered; and if all the foul dwellings in country and town are removed, and wholesome tenements substituted, and all the waste products of manufactures and populations are utilized, which now tend to destroy human life by polluting the streams and rivers, and make healthy life impossible in the country, the money saved and made will go far towards providing a sufficient fund out of which to repay the national debt.

We are now proud of our charities, proud of our public hospitals, which cost 1000*l.* per bed, plus the additional expenses of administration, in which hospital-beds sick men

are treated at a money rate three times greater than the wages they could ever earn when in health. "Our charitable institutions are the glory of our land," but happy will that State be which neither possesses nor needs such extravagantly costly forms of glory.

We repeat at our great musical festival the angelic chant:—"Peace on earth, good will to men," but we read in our daily papers of carnage such as the world never before knew; we cannot explain the terrible phenomena, but stand aghast in dread and wonder. The war epidemic is upon the nations, and will run its course. Sanitary science, under such conditions as are now in existence, appears to have laboured in vain. But it is our duty to work in hope and wait. War and carnage are not the end of Christian teaching; we must strive to look beyond the present, and hope for better times. The poet, using his divine faculty, states—

"For I dipt into the future, far as human eye could see,
Saw the vision of the world, and all the wonder that would be."

And in another verse embodies the hopes of men, who do not despair, in words with which I conclude this address—

"Yet I doubt not thro' the ages one increasing purpose runs,
And the thoughts of men are widened with the process of the suns."

SIR CHARLES ADDERLEY, M.P., the Chairman, at the close of the address, intimated that the Duke of Northumberland, though present, had allowed him, as the accidental chairman of that Meeting, to conclude its proceedings. He had been told that such was the pressure of time in this crowded week, and so great the anxiety of those who had come from a distance, and who were so perfectly competent to deal with the subject in detail which had been so ably illustrated and laid before them on broad principles by Mr. Rawlinson, that it was not desirable that he should call upon any gentleman to move a formal vote of thanks to him, feeling as he did that they all would consider such a proceeding a mere formality, and that he might assume on the part of all present that there was one unanimous wish to express their gratitude to Mr. Rawlinson—to whom the country was already so much indebted for his labours, and for an address which did such full credit to his sagacity, to his humanity, and to his practical experience and wisdom. He for one confessed that he had come amongst the members of the Association, more expressly on the present occasion as Chairman of the Royal Sanitary

Commission, not to make speeches, but in order to hear and to take advantage of that most useful Congress, to learn from those who had studied the subject, and to discuss and to debate and test opinions, one with another, upon the details of that most important subject. For his part, he readily admitted how valuable were the opportunities afforded by the meetings of the Association; for the assembling of people who were full of experience from various parts of the kingdom; for the comparing of notes and opinions, and discussing the topics which had occupied their attention in their several localities. He asked the meeting, by acclamation, to express their acknowledgments to Mr. Rawlinson for his very able address.

The motion was carried by acclamation, and the assembly adjourned to the various departments.

APPENDIX.

THOSE who remember the Model Cottages of the late Prince Consort at the Great Exhibition, in Hyde Park (1851), will know that His Royal Highness, at that time, had studied the question, and had fully recognised the great importance of proper cottage accommodation both for country and for towns.

The example then set has been followed in parts of Europe and also in parts of Great Britain.

