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Christie, James, 1829-1892.
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Publication/Creation

[Glasgow], [1879]

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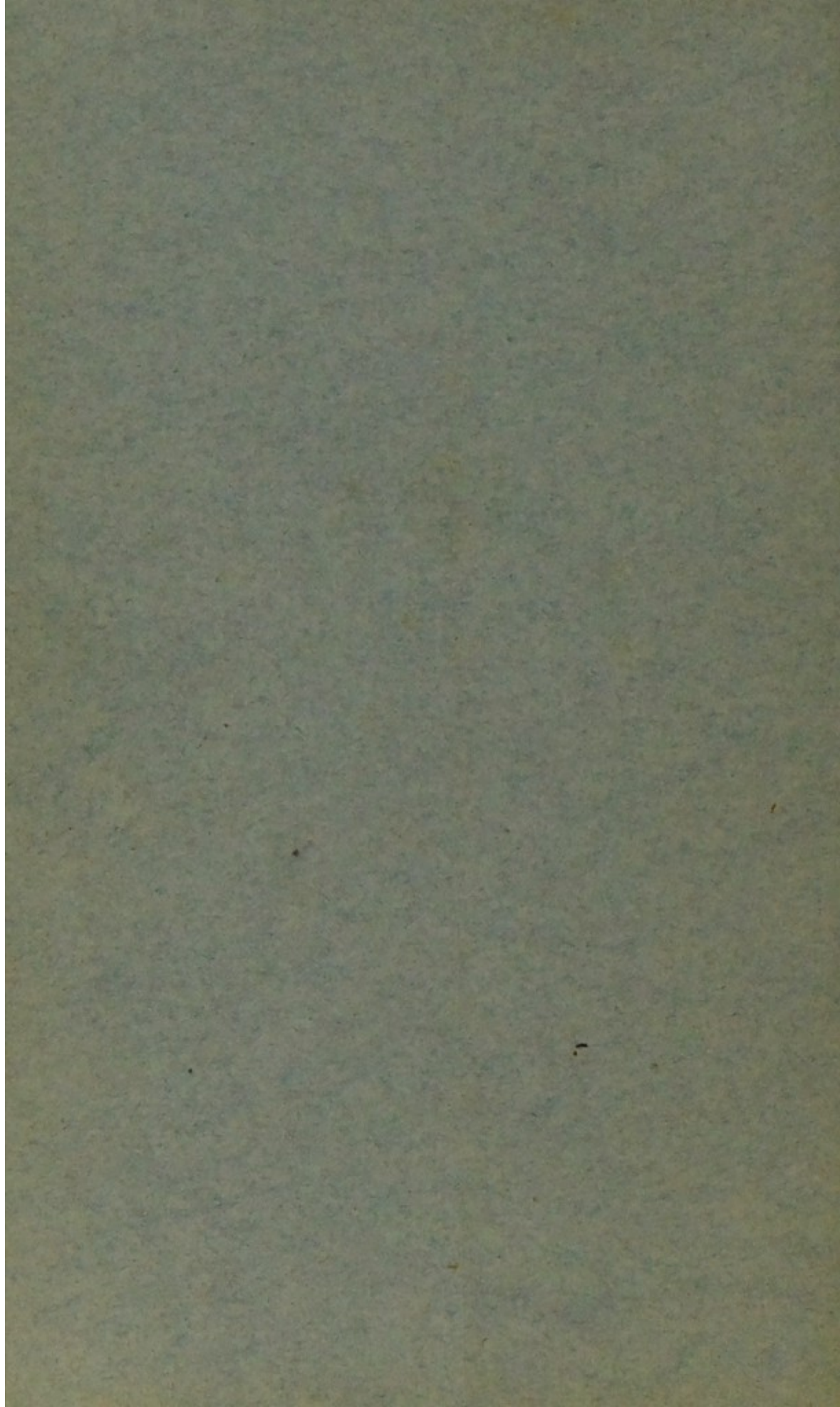
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*History of Sanitary Science - by
Dr James Christy*

Reprinted from

THE GLASGOW MEDICAL JOURNAL,

1879.



AN HISTORICAL SKETCH OF SANITARY SCIENCE.*

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SANITARY Science, sometimes ^{incorrectly?} called Preventive Medicine, State Medicine, Hygiène, and Public Health, has been variously defined by different authors. Dr. Mapother, in his *Lectures on Public Health*, describes this science as "an application of the laws of physiology and general pathology to the maintenance of the health and life of communities, by means of those agencies which are in common and constant use." Perhaps it might be more comprehensively defined as follows:—"An application of the laws of physiology and general pathology to the maintenance of the health of the human species, and to its development in the greatest perfection."

Sanitary science is naturally divided into private and public—private when it relates to the individual, commonly called hygiène; public, when it deals with masses of men, commonly called Public Health or Sanitary Science.

Regarding Sanitary Science, Dr. Guy says, in his *Lectures on "Public Health,"*—"It has to do with persons of every rank, of both sexes, of every age. It takes cognisance of the places and houses in which they live; of their occupation and modes of life; of the food they eat, the water they drink, and the air they breathe. It follows the child to the school; the labourer and artizan into the field, the mine, the factory, the workshop; the sick man into the hospital; the pauper into the workhouse; the lunatic into the asylum; the thief to the prison. It is with the sailor in his ship, the soldier in his barrack, and it accompanies the emigrant to his home beyond the seas. To all these it makes application of a knowledge remarkable for its amount, and the great variety of sources whence it is derived. To physiology and medicine it is indebted for what it knows of health and disease; it levies

* An Introductory Lecture delivered at Anderson's College, Glasgow, 19th May, 1879.

large contributions on chemistry, geology, and meteorology; it co-operates with the architect and engineer; its work commends itself to the moralist and divine." *including doctors' habits*

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This department of medical science has been cultivated from the most remote times; and the fact of its having had a prominent position in the Mosaic code of laws, the ancient medical literature of the Hindoos, the Chinese, and the Egyptians, shows that sanitary science must have been regarded as a most important means for the independent existence of communities, even in the early dawn of civilisation.

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The first systematic treatises on medicine appear to have been compiled in China and India, and the earliest Hindoo works were probably compiled and arranged before the corruption of the primitive mythology, about 900 B. C. It is probable that medical science extended from India to Upper Egypt, and from thence to Lower Egypt; for the natives of India had, from time immemorial, commercial relations with the Gulf of Aden and the Red Sea ports. The Egyptians, according to Herodotus, successfully cultivated the art of Medicine; and, in practice, they divided it into distinct branches. The writings of Moses show that the Jews paid considerable attention to Medical Science, more especially to the higher branch of it—viz., the preservation of health, and the prevention of infectious diseases by isolation and cleanliness. The Chinese, Hindoos, Egyptians, and Jews, paid great attention to hygiene, and the Mosaic code of sanitary laws is much superior, in some respects, to any that have since been compiled. According to Herodotus, the Greeks possessed more medical skill than the Egyptians in the time of Darius the son of Hystaspes. Pythagoras, who lived 600 B. C., was the first to bring the principles of philosophy to bear upon the study of medicine, and to raise it to the dignity of a science. His pupils, Democritus and Heraclitus, paid special attention to comparative anatomy; and, probably, first dissected the human subject. Their contemporary, Herodicus, first introduced the practice of gymnastic exercises as a part of hygienic and medical treatment.

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In ancient Greece, streams were sufficiently numerous to supply the larger towns with water, and they were frequently converted into public fountains by the formation of a head for their waters, and the erection of an ornamental superstructure. The inhabitants of Rome were not, however, so favourably circumstanced, and they had, doubtless, for a long time to depend upon the water of the Tiber, and wells sunk in the city, for their water supply; but the water obtained from these sources was, in course of time, found to be unwholesome and

deficient in quantity. The aqueduct is mentioned by Strabo as amongst the structures neglected by the Greeks, and first brought into use by the Romans in order to bring pure water from the hills which surround the Campagna, the first—viz., the *Aqua Appia*, having been commenced by the censor Appius Claudius Cæcus, in B.C. 313. In the fourth century of the Christian era, the aqueducts of Rome amounted to fourteen, the length of the longest being nearly 59 miles, and some of its arches 109 feet high. Rome was also intersected with numerous sewers, some of which, especially the *Cloaca Maxima*, the construction of which is ascribed to Tarquinius Priscus, were of gigantic size. It was formed by three tiers of arches, one within the other, the innermost being 14 feet in diameter. The expense of cleansing the common sewers at Rome was defrayed partly by the treasury, and partly by an impost called *cloacarium*. The sewers were constantly flushed by the superfluous waters of the aqueducts. There was a distinct administration of the sewers, which was entrusted, under the republic, to the censors, and, under the empire, to particular officers appointed for that purpose, called *cloacarum curatores*, or *curators of the sewers*, who employed condemned criminals in cleansing and repairing them. Under the empire, state physicians were appointed, the first who held the title of *archiater* being Andromachus, physician to Nero. In later times the order appears to have been divided into two classes, the *archiatri* of the palace and those of the people. The mode of election of the *archiatri populares* is described in the Theodosian and Justinian codes. In the largest towns there were ten *archiatri*, one to each district or subdivision; seven in towns of the second order, and five in the smaller ones. In some respects, the duties of these physicians seem to have been identical with those of our medical officers of health, affording another illustration of history repeating itself.

In Oriental countries, in ancient times, the scope of sanitary science was, in many respects, different from that in European countries, in modern stages of development. The peculiarities of climate were such that the people, in great measure, lived and pursued their avocations in the open air, little more being required than protection, in the form of roofs, from sun and rain. Industrial occupations were and are still practised under verandahs open on all sides; and education in all its branches, from the most elementary to the highest in philosophy, medicine, and science, was communicated either under the shade of porticoes, or of trees, or in pleasant groves.

In all those countries, however, where civilisation had made considerable advances, and which were subject to droughts,

artificial means were adopted for the storage of rain and river water, both for dietetic and agricultural purposes, and the remains of many of these gigantic works may still be seen in India and Ceylon. In Rome, however, we have the best example of a large city possessed of an abundant water supply, and well sewered, some of the sewers being of such a superior construction that they serve their original purpose even to the present day.

From the downfall of the Roman Empire until very recent times, sanitary science made no advances in Europe; but remained a dead letter. The Roman armies had over-run Europe, and had unintentionally roused the dormant energies of nations capable of developing the highest forms of civilisation. Captives, brought from every part of Europe, saw the greatness of the imperial city; and the dominant armies of Rome impressed the subjected nations with a sense of their own inferiority, and roused a determination to reach a higher level so as to enable them to cope with their superiors. When the Roman Empire was over-run by the Goths, pillage and destruction were the order of the day. The aqueducts and the sewers were destroyed, or allowed to remain in a state of disrepair. People who have but recently emerged from a state of savagery cannot be expected to display much interest in sanitary science, or in the higher refinements of life.

For many succeeding centuries, the various European states were almost exclusively employed in wars of offence and defence; and the only honourable occupation was that of arms. Cities were built with a view to defence alone: the streets and alleys were narrow and crooked: the houses were of the most vicious construction, and many had damp underground apartments: no provision was made for potable water, except by the digging of deep wells to supply the population during a time of siege: most of the principal towns were surrounded with walls and moats: there were no public arrangements for the removal of filth from courts, alleys, and streets, and personal cleanliness was unknown. The residents of European cities necessarily spent much of their time within doors, and, in this respect, their condition was very different from that of Orientals and the inhabitants of mild climates, whose whole time, except during sleep, was spent in the open air.

We of the nineteenth century can form but an inadequate idea of the filth and wretchedness of the English habitations, even in the sixteenth century. An eye-witness says:—"The floors of the houses generally are made of nothing but loam, and are strewn with rushes which, being constantly put on fresh without a removal of the old, remain lying there, in some

cases for twenty years, with fish bones, broken victuals, and other filth underneath, and impregnated with the urine of dogs and men." Macaulay, in his celebrated chapter on "The State of England in 1685," observes that at that time, meat, although cheaper than in former times, was still so dear that hundreds of thousands of families scarcely knew the taste of it; that bread such as is now given to the inmates of workhouses was then seldom seen, even on the trencher of a yeoman, or of a shopkeeper; and that the great majority of the natives lived almost entirely on rye, barley, and oats. Soap was rarely used except by the wealthy; linen was so high priced that it was beyond the reach of the lower classes, who, from their extreme indigence, lived in an utterly miserable condition, and in a state of Scythian filth.

The ministers of religion were also opposed to all measures of public and private hygiene, and the people were taught that the highest virtue consisted in mortifying the body, saintliness of character and filthiness of home and person being indissolubly associated. Time and attention occupied regarding the person were supposed to be inconsistent with the interests of the soul; and habits of cleanliness were also supposed to unfit for the hardy occupations of martial life. No wonder, therefore, that sanitary science was utterly disregarded during the early and middle ages, as it was supposed to unfit man both for this world and for that which is to come.

The inevitable consequences of such insanitary modes of living at length appeared, and Europe was visited by a series of destructive plagues in the fourteenth, fifteenth, and sixteenth centuries, such as had probably never before been experienced by the human race. In 1348, the Oriental plague broke out at Avignon, and, in the course of a few years, spread over the whole of Europe, devastating even Iceland and Greenland. It was calculated that Europe lost at least a fourth part of its population, and that 25,000,000 of its inhabitants fell victims to the Black Death within three years.

As an evidence of the utter ignorance of sanitary science which prevailed, the deliverance of the medical faculty of Paris, the most celebrated of the fourteenth century, as to the cause of the Black Death, may be quoted. Having been commissioned to deliver their opinion, they said—"We, the members of the College of Physicians of Paris, have, after mature consideration and consultation on the present mortality, collected the advice of our old masters in the art, and intend to make known the causes of this pestilence, more clearly than could be done according to the rules and principles of astrology and natural science; we, therefore, declare as follows:—

It is known that in India, and the vicinity of the Great Sea, the constellations which combated the rays of the sun, and the warmth of the heavenly fire, exerted their powers especially against that sea, and struggled violently with its waters. (Hence, vapours often originate which envelop the sun, and convert his light into darkness.) These vapours alternately rose and fell for twenty-eight days; but at last, sun and fire acted so powerfully upon the sea, that they attracted a great portion of it to themselves, and the waters of the ocean arose in the form of vapour; thereby the waters were, in some parts, so corrupted that the fish which they contained died. These corrupted waters, however, the heat of the sun could not consume, neither could other wholesome water, hail, or snow, and dew, originate therefrom. On the contrary, this vapour spread itself through the air in many places on the earth, and enveloped them in a fog.

“Such was the case all over Arabia; in a part of India; in Crete; in the plains and valleys of Macedonia; in Hungary, Albania, and Sicily. Should the same thing occur in Sardinia, not a man will be left alive; and the like will continue, so long as the sun remains in the sign of Leo, on all the islands and adjoining countries to which this corrupted sea-wind extends, or has already extended from India. If the inhabitants of those parts do not employ and adhere to the following, or similar means and precepts, we announce to them inevitable death—except the grace of Christ preserve their lives.”

Public opinion, however, was directed to the Jews as the cause of the great mortality, and they were accused of poisoning the public wells. Three of them, one a Jewish physician, were put on the wheel and tortured in the castle of Chillon, on 15th September 1348, and, under the persuasive influence of the rack, confessed to having put poison into the wells and several other places for the purpose of destroying the Christians. Balavignus, the physician, declared under torture that none of his community could exculpate themselves from this accusation, as the plot was communicated to all, and that all were guilty of the above charges. The official document from the Castellan of Chillon says, *inter alia*:—“I must add that all the Jews of Neustadt were burnt according to the just sentence of the law. At Augst, I was present when three Christians were flayed on account of being accessory to the plot of poisoning. Very many Christians were arrested for this crime in various places in this country, who, at last, and in their dying moments, were brought to confess and acknowledge that they had received the poison from the Jews. Of these Christians, some have been quartered, others flayed and afterwards hanged. Certain

commissioners have been appointed by the magistrates to enforce judgment against all the Jews; and I believe that none will escape."

It is worthy of note that the medical faculty of Paris, and the populace of Strasburg, considered that poisoned water and air were the chief agents on which the spread of the Black Death depended. They were, doubtless, right in their conjectures, although wrong as regards the manner in which the water and air had been poisoned. The faculty of Paris took a high scientific flight, concealing their ignorance by authoritative assertions; but the populace endeavoured to account for actual facts by what appeared to them a reasonable cause—viz., religious bigotry. Poisoned wells were quite sufficient to account for sudden and widespread local outbreaks of the *great mortality*, and they concluded that some enemy must have done this. Religious bigotry pointed to the Jews as the authors of the crime. It never seems to have occurred to them that their wells were capable of being poisoned by soakage from the streets, alleys, and courts of their cities, saturated with the filth of centuries; and that every city in Europe, from the total neglect of every sanitary precaution, was a perfect hotbed for any epidemic disease which might appear. The sun remaining in the sign of Leo could not be prevented by the medical faculty; and the burning of Jews and skinning of Christians was more in accordance with self-righteousness than removing filth from houses, courts, and streets. The Black Death, however, spread in localities where there were no Jews to burn, and the intelligence of Europe was directed to the discovery of some more probable cause than religious hatred.

The Great Plague, which swept away twenty-five millions of the inhabitants of Europe within three years, was one of the most important factors in the history of the world in preparing the way for the present position of Europe.

When Europe recovered from the shock of this great calamity, and began to reflect on the events which had just transpired, it became evident to reflecting men that infection had much to do with the spread of the disease, and the possibility of protecting whole cities by isolation became apparent to many. On the 17th January, 1374, Viscount Bernabo issued the first regulation regarding a rigorous barricade. "Every plague-patient was to be taken out of the city into the fields, there to die or to recover. Those who attended upon a plague-patient were to remain apart for ten days before they again associated with anybody. The priests were to examine the diseased, and point out to special commissioners the persons infected; under the punishment of confiscation of their goods, and of being

burned alive. Whoever imported the plague, the state condemned his goods to confiscation. Finally, none except those who were appointed for that purpose, were to attend plague patients, under penalty of death and confiscation." When the plague returned, in 1383, Bernabo forbade the admission of people from infected places into his territories on pain of death.

During the fifteenth century, the plague broke out seventeen times in different places in Europe; and in the year 1485, a special council of health, consisting of three nobles, was established at Venice to devise measures for preventing the entrance of the disease to the Italian cities. Quarantine laws were framed, and the first lazarettoes were established upon islands at some distance from the city, where all strangers coming from places where the existence of plague was suspected were detained. When any case of the disease appeared in the city, the sick, and also their families, were despatched to the Old Lazaretto, where they were supplied with provisions and medical attendance. When cured, they were detained for forty days longer in the New Lazaretto, situated on another island. Such stringent measures could only be enforced by very extensive powers; so that, in 1504, the power of life and death over those who violated the regulations was conferred on the council, and from the year 1585 onwards no appeal was allowed from the sentence of the council of health. Hecker says (*Epidemics of the Middle Ages*)—"The appointment of a forty days' detention, whence quarantine derives its name, was not dictated by caprice, but probably had a medical origin, which is derivable in part from the doctrine of critical days; for the fortieth day, according to the most ancient notions, has always been the last of ardent diseases, and the limit of separation between these and those which are chronic. It was the custom to subject lying-in women for forty days to a more exact superintendence. There was a good deal said also in medical works of forty day epochs in the formation of the fœtus, not to mention that the alchymists expected more durable revolutions in forty days, which period they called the philosophical month. This period being generally held to prevail in natural processes, it appeared reasonable to assume, and legally to establish it as that required for the development of latent principles of contagion, since public regulations cannot dispense with decisions of this kind, even though they should not be wholly justified by the nature of the case. Great stress has likewise been laid on theological and legal grounds, which were certainly of greater weight in the fifteenth century than in more modern times; such as the forty days' duration of the flood; the forty

days' sojourn of Moses on Mount Sinai; our Saviour's fast for the same length of time in the wilderness; lastly, what is called the Saxon term, which lasts for forty days."

Such may be cited as an example of the incongruous jumble of medical science, theology, astrology, and alchemy, which pervaded the minds of men, and regulated their actions, as regards sanitation, during the fifteenth century.

Disinfection was not altogether neglected in these days; for we find that Viscount John, in the year 1399, when the Black Death broke out in Italy, for the sixteenth time, ordered that "infected houses were to be ventilated for at least eight or ten days, and purified from noxious vapours by fires and by fumigations with balsamic and aromatic substances. Straw, rags, and the like, were to be burned; and the bedsteads which had been used set out for four days in the rain or sunshine, so that, by means of the one or the other, the morbid vapour might be destroyed. No one was to venture to make use of clothes or beds out of infected dwellings, unless they had been previously washed and dried, either at the fire or in the sun. People, likewise, were to avoid, as long as possible, occupying houses which had been frequented by plague-patients." It was common, in the Middle Ages, for the populace to barricade the doors and windows of houses infected with plague, and to leave the inhabitants to perish without mercy.

The ancients were as well informed as we are regarding the propagation of contagious diseases; but they applied their knowledge only where individual property, not human life, was concerned; and their herds alone enjoyed that protection which they deemed it impracticable to extend to humanity. Physicians advised only purification of the air by means of large fires, and they left it to individual families to seek safety in flight or to seclude themselves in their own dwellings.

The black death, which cost Europe twenty-five millions of victims, was the accumulated penalty of centuries of insanitation. Every centre of population had become a fertile soil for the germination of epidemic disease, the excrement-sodden soil polluting air, water, and food. Several diseases, previously unknown, and which still ravage our modernised cities, defying every effort to root them out, evidently had their origin in the Middle Ages. The quarantine laws of the Venetians were gradually adopted by the other commercial nations of Europe; but epidemic disease, whether of man or cattle, can never be stamped out by quarantine or isolation alone, however stringent these laws may be, and however efficiently they may be carried out; there is something more

essentially necessary. Insanitary conditions must be removed, for such conditions give to epidemics all their potency. For nearly six hundred years after, Europe trusted almost solely to her quarantine laws for the arrestment of contagious disease; but, although these laws have been productive of an immense amount of good, they have signally failed in eradicating epidemics from our midst.

In the epidemics of plague, during the sixteenth and seventeenth centuries, tolerably accurate statistics as to the mortality can be obtained; for London had then its weekly bills of mortality which, although imperfect, are still of considerable value. In London, according to Sir William Petty, the plague usually killed one-fifth of the inhabitants. The figures for the five great plague years are as follows: 1593, 11,503; 1603, 36,269; 1625, 35,417; 1636, 10,400; 1665, 68,596, the latter year being that of the Great Plague in London. In August and September, the disease reached its maximum, and the death-rate was three, four, and five thousand weekly, and in one week, in the middle of September, the death-roll was 8,000. The aspect of the streets at the height of the plague is described by various writers as something terrible. Infected houses were shut up and marked with a red cross (X) inscribed with "The Lord have mercy upon us." "Some of the infected ran about staggering like drunken men, and fell down dead in the streets, or they lay there comatose and half dead; some lay vomiting as if they had drunk poison; and others fell dead in the market in the act of buying provisions." There were not sextons enough to bury the dead, and the bodies, collected in carts perambulating the city, were thrown into common pits. So late as 1720, the plague broke out in Marseilles, and we have a faithful narrative of the events according to their daily occurrence. The author of the *Journal of the Plague at Marseilles*, writes as follows regarding the condition of a portion of that city during the plague, and it is almost inconceivable that such scenes should have occurred in an European city only 150 years ago. "There lie extended about a thousand dead bodies close to each other, the freshest of which have lain there about three weeks; so that had they not been infected, the lying so long in a place so exposed to the hot sun all the day might have sufficed to render them contagious. All one's senses are affected at approaching a place where one smells afar off the contagious vapours which exhale from it. Nature shrinks, and the firmest eyes cannot bear to behold so hideous a sight; those bodies have no longer any human form; they are monsters that give horror, and one would think that all their

limbs stir, the worms are in such motion about them. Nothing, however, is of more urgent necessity than to remove these bodies from that place; every moment they are let lie there furnishes exhalations that must poison the air; but how shall they be taken up and carried to the pits without the town, which are at a very great distance? Bodies so putrified will not hold in the carts; the entrails, the limbs which are loosened at the joints by worms, would run out or drop off, which would scatter the plague and venom throughout the city."

The same author says:—"As soon as one person in a house is seized with the distemper, that person becomes an object of horror and affright to the nearest relations; nature instantly forgets all ordinary duties; and the bonds of flesh and blood being less strong than the fear of certain death, dissolve in an instant. As the distemper which has seized that person threatens to attack them; as the contagion communicates itself with extreme quickness; as the danger is almost equal to him that suffers, and to those who approach him; and as those who tend and help him have no other prospect than that of following him in a few days, they take at first the barbarous resolution either to drive him out of the house, or to fly and desert it themselves, and leave him alone without assistance or relief, abandoned to hunger, to thirst, and to all that can render death the more tormenting. Thus wives treat their husbands and husbands their wives, children their parents and parents their children; vain precaution, inspired by love of life and horror of death! By the time they take their resolution, they have already caught the subtle effluvia of the fatal poison they would secure themselves from; they are soon sensible of its malignity, and a speedy death is the punishment of their cruelty and baseness: others have the same hardness of heart towards them; they are forced into the open street in their turn, or are left alone to perish in their houses without help."

Oriental plague has not been seen in England for two centuries; but it has appeared in the present century in the Black Sea, and in 1828-29 it devastated the Russian army in Bulgaria. In 1844, plague became apparently extinct, but it re-appeared in Western Arabia in 1853; in the province of Bengazi, Tripoli, in 1858-59; in the extreme north-west of Persia, in 1863; among the Arabs on the right bank of the lower Euphrates, in 1867; in Persian Kurdistad, in 1871; and among the Affij Arabs on the lower Euphrates, in 1873-74. Since the latter date, plague has prevailed epidemically in the regions adjoining the lower Euphrates, till the close of 1877. In January, 1877, several cases of plague occurred at Baku, on

the Caspian shore of Transcaucasia, within Russian territory; and, in the month of March, the disease appeared at Resht, near the north-west corner of the Caspian Sea, and continued till January 1878. From Baku the line of the epidemic was most probably to Wetlianka, in the province of Astrachan, on the mouth of the River Volga.

Given a tropical summer, an unhealthy badly managed port, and a number of plague stricken patients, the plague may yet be re-introduced into Europe, and the events of the Middle Ages reproduced. It is impossible, however, that the disease could attain the same dimensions as formerly in this country, as the insanitary conditions necessary for its existence and spread have been long since removed.

Several other epidemics, obviously depending upon insanitary conditions, ravaged Europe during the Middle Ages. In August, 1485, after the fate of England had been decided by the battle of Bosworth, the sweating sickness made its appearance, and followed in the rear of Henry's victorious army to the metropolis of the Empire. "Richmond's army was composed of wandering freebooters—'*vile Landsknechte*'—as they were called in Germany, who assembled under his banner at Havre—sharpshooters formed under Louis XI, who recklessly pillaged Normandy, and whom Charles VIII gladly made over to Henry, in order to free his own peaceful territories from so great a scourge. This army may not have been worse than others of the same period, but cooped up as they were for a whole week in dirty ships, they doubtlessly carried about with them all the material for germinating the seeds of a pestilential disorder, which broke out soon after on the banks of the Severn, and in the camp at Litchfield," (Hecker.) The sweating sickness re-appeared in 1506, 1517, 1528, and the last epidemic appeared at Shrewsbury, in April 1551, and made its way through Coventry and Ludlow to London. Kaye or Caius, a celebrated physician of that time, ascribes it chiefly to a poisonous condition of the atmosphere. Noxious exhalations from dungpits, stagnant waters, swamps, impure canals, and the odour of foul rushes which were in general use in the dwellings of England, together with all kinds of offensive rubbish, seemed not a little to contribute to it; and it was remarked universally that wherever such offensive odours prevailed, the sweating sickness appeared more malignant. Caius says of those whom it attacked, that "it fearfully invaded them, furiously handled them, speedily oppressed them, unmercifully choked them, and that in no small numbers, many of them being persons of rank and mark. It immediately killed some in opening of their windows, some in

playing with children at street doors, some in one hour, many in two, and, at the longest, to them that merrily dined it gave a sorrowful supper. As it found them, so it took them; some sleeping, some waking, some in mirth, some in care, some fasting, some full, some busy, some idle; and in one house, three, five, seven, eight or more, or all; so that if the half in any town escaped, it was thought great favour." The mortality throughout the kingdom was so great that one historian calls it a depopulation. The disease spread over the continent with great rapidity, large numbers of people being attacked simultaneously. In populous places trade was completely paralysed, and the sole occupation of the living consisted in burying the dead. The disease was a fever of short duration, with pains in the back, limbs, and head, delirium and sleeplessness, terminating with profusely offensive sweats, one or more relapses being common.

In 1482, after two years of famine, France was the scene of a devastating plague, the symptoms of which were inflammatory fever with delirium, accompanied by such intense pain in the head that many dashed out their brains against the wall, or rushed into the water; while others, after incessantly running to and fro, died in a state of the greatest agony. In 1505, petechial fever broke out in Italy for the first time, and was supposed to have been brought by Venetian mercenaries from Cyprus, where they had fought against the Turks; and in 1528, the French army, composed of 30,000 veteran warriors, was decimated before Naples within the space of three weeks. In the intrenchments, in the tents, and wherever death had overtaken his victims, there unburied corpses lay, and the dead that were interred spread a poisonous stench far and wide over the camp. Out of the whole host a mere handful remained, consisting of a few thousand cadaverous figures, who were almost incapable of bearing arms or of following the commands of their sick leaders. The French general, Lautrec, by turning off the aqueduct of the Poggio reale, in order to compel the besieged to a more speedy surrender, converted the plain on which his own camp was situated into an immense swamp, and this probably gave increased intensity to the fever.

Notwithstanding the plagues and murderous epidemics of past times, no important additions were made to sanitary science in Europe, beyond the quarantine laws of the fourteenth century, until very recent years. In the early periods of English history the only protection from injury to health by neglect or nuisance was obtained by common law; but it is worthy of notice at the present time that the first Sanitary

enactment, in this country, was a "Rivers' Pollution" Act. In the year 1388 an Act was passed imposing a penalty of £20 upon persons who cast animal filth and refuse into rivers and ditches; and in 1489, an Act was passed prohibiting the slaughter of cattle within cities and boroughs. Both these Acts continued to be law until the year 1856, when they were, with other obsolete laws, repealed. In the older records there is but little evidence to show to what extent the courts of law and equity exercised their powers in such matters; but the Court Rolls of Stratford-on-Avon show that, in 1552, Shakespeare's father was fined for depositing filth in the public street, in violation of the byelaws of the manor; and, again, in 1558, for not keeping his gutter clean.

In the reigns of Henry VI and Henry VII, Acts were passed regarding the draining off or controlling the action of waters within defined limits; and, in the reign of Henry VIII, the Statute of Sewers authorised the issue of Commissions of Sewers, at the discretion of the Lord Chancellor, the Lord Treasurer, and Chief Justices, and enacted a general definition of the duties of the Commissioners appointed by them—such as—the overlooking of sea-banks and sea-walls, and the cleansing of rivers, public streams, and ditches.

In the reign of George II, and from that date till the present day, numerous special Acts have been passed conferring on the more populous and wealthy towns powers of local government, more especially as regards paving, lighting, cleansing, and improving the districts embraced in them; but, until lately, no general measure applicable to the whole kingdom provided for the health and comfort of the people. The action of the legislature was directed only from time to time against extraordinary attacks of pestilent and contagious disease; as in the case of the stringent enactments introduced by James I against the plague; and the Vaccination Acts against small-pox.

The recent sanitary legislation in this country has been connected with, and depended upon, events which have occurred within the experience of the present generation—viz., the three outbreaks of cholera. The alarm caused by the ravages of Asiatic cholera, in the year 1831, led to the first move in sanitary reform, and thoroughly awakened the public conscience. Lamentable as were the results of this and succeeding epidemics of cholera, in this country, it must be admitted that no calamity which ever visited a nation has been productive of such an amount of good in directing the public mind to the prevention and repression of disease, and the improvement of the public health. Debates immediately took place in Parliament, and the provisions of a section of the Quarantine Act of 1825 were

greatly extended by a temporary Act in 1832. Official investigation into the sanitary condition of the labouring class of the population revealed a condition of things of which the general public had no conception, and attention was directed to the fact that the seats of endemic disease were generally where the air or water were polluted. Crowded parts of towns, and the courses of rivers fouled by refuse, were observed to be the chief resorts of the epidemic; while high, open, and dry situations were not attacked. The correlation of filth and disease was clearly established and universally acknowledged; and the consequence has been the movement towards the reconstruction of the cities of Europe.

A new Poor Law Act was passed in 1834, and it soon became evident that legislation regarding sanitary matters was imperatively called for. In 1836 a comprehensive Registration Act was passed which afforded the first means of deriving sanitary information by bringing the registers throughout the kingdom into collocation in the hands of a Registrar-General, who submits an annual abstract of them to Parliament. In 1839, the first Report of the Registrar-General exhibited in a general survey the increasing amount and the causes of excessive mortality in towns; and, in 1840, a Select Committee on the Health of Towns, appointed by the House of Commons, recommended that Acts should be passed for a better regulation of buildings and construction of sewers, and for the appointment of Local Boards of Health, and inspectors. The report drew attention to the evils of interments in populous cities; the importance of water supply; the want of open spaces in crowded cities; the necessity of some superintendence over common lodging houses; and the advantages which would result from the establishment of public baths. In 1842, a *Report on the Sanitary Condition of the Labouring Population of Great Britain* was drawn up by Mr. Chadwick for the Poor Law Board, which so elaborately described the unsatisfactory sanitary condition of the labouring population, and so ably exposed the feebleness of the law on the subject, that the question was brought under the serious attention of the Cabinet. In 1843, a Royal Commission, of which the Duke of Buccleuch was chairman, was issued to inquire into the state of large towns and populous districts, and, specially as regarded the causes of prevalent diseases, the best means of improving the public health by existing laws giving powers for drainage, water supply, and building regulations, and possible amendments of those laws. The Commissioners made two valuable reports in 1844 and 1845, and recommended that the Crown should inspect and supervise the sanitary improvement of

towns and populous districts; that Local Authorities should have more power, and that their districts should be enlarged and made co-extensive with drainage areas; that the necessary arrangements for drainage, paving, cleansing, regulating buildings, and water supply should be under one administrative body; and that there should be compulsory rating for water supply as well as for sewerage, the Local Authority contracting with any companies which might have already undertaken the supply. In 1847 and 1848 the "Metropolitan Sanitary Commissioners" issued reports, which formed the starting point of sanitary legislation; and, in 1848, was passed the first great and comprehensive measure, The Public Health Act, which may be called the ground work of all Sanitary legislation in this country.

In 1849, the second visitation of cholera came, and the medical officers of health, appointed under the Act of 1848, traced the most fatal ravages of the epidemic to the crowded alleys of large, old towns, impure air and water, and foul streams. An additional impulse was given to sanitary legislation, and the Common Lodging Houses' Acts and the Metropolitan Water Act were passed. In 1854, the third epidemic of Asiatic cholera appeared, and the necessity for more stringent sanitary precautions became obvious; so that, in 1855, a comprehensive Nuisance Removal Act was passed; and exceptional powers, relating to formidable contagious or epidemic diseases, were brought into a separate statute of the same year—the Diseases Prevention Act of 1855. Since that date various Public Health Acts have been passed, the most important of which is the English Act of 1875, which repeals and embodies the Public Health Act, the Local Government Act, the Nuisance Removal Acts, the Sewage Utilization Acts, and the Diseases Prevention Act, either entirely or partially. The Act does not extend to Scotland or Ireland, nor to the Metropolis, except when expressly stated. In Scotland, we are protected only by the tentative, and, in great part, permissive Act of 1865, and by the Rivers' Pollution Act of 1878.

The first great impulse to Sanitary Science, in this country, was due to the labours of men of the present generation, some of whom are still with us. Prominent among them were and are Edwin Chadwick, Southwood Smith, Lyon Playfair, William Farr, and Dr. E. A. Parkes, who may be said to have laid the foundations of the science of modern sanitation.

