NOTES ON EPIDEMICAL DISEASES.

By WILLIAM ADDISON, M.D., F.R.S.

NO. III.

INFLUENZA, CHOLERA, CONTINUED FEVER, TYPHUS, AGUE,
 REMITTENT FEVER, DIARRHŒA, DYSENTERY, SMALL-POX,
 SCARLET FEVER, MEASLES, HOOPING-COUGH.

III. SOCIAL HABITS.

THE air of the country is liable to be infected with miasms, prejudicial to the health of those persons who inhale them, producing fevers, agues, and dysenteries; and the atmosphere of towns and cities receives additional taint from effluvia necessarily accumulated by a mass of living beings congregated within a small area, though they may be in perfect health. The power of exhalations from the human body in health, much more in sickness, to corrupt the air, has never been sufficiently attended to, although it has been shown by direct observation that the vapour which condenses on walls and windows of crowded apartments is highly charged with poisonous and offensive animal matter; and that the effect of respiring over and over again air holding in solution such poisonous animal effluvia, is commonly experienced to be languor, headache, and nausea.

Attention was first directed to these sources of sickness and mortality by the announcement contained in the first report of the Registrar-General, that in England concentration of the population in cities and towns doubles the mortality from epidemic diseases; and calculations have been made since, which place in a very striking light the great extent to which human life and health have been sacrificed, by overlooking or neglecting precautions which lie within easy reach of individuals and communities.

The calculations have been made with great care; they are based upon the mortuary returns for seven years, 1838-44, and the census taken in 1841. Equal numbers of the population living in town districts and in the country, have been made subjects of comparison; and to give a few only of the important results, it appears that in the year 1841, there were 23,523 children under five years of age in the county of Surrey, and the deaths of children of that age in seven years were 7,364. In Manchester, in the same year (1841), there were 21,152 children under five years of age, and the deaths in seven years of children of that age were 20,726! Now, taking the numbers in Surrey to express the naturally greater susceptibility of childhood to disease and mortality, we have in the excess in Manchester a measure of the fatal influence of town miasms. In seven years, 13,362 children in that city alone fell a sacrifice to known causes, which it is believed may be removed to a great extent. The victims in Liverpool were not less numerous; and most other towns in England are similarly afflicted.

Well may the Registrar-General, upon first contemplating these stern results, have exclaimed, "How pitiful is the condition of many thousand children born in this world! Here, in the most advanced nation of Europe—in one of the largest towns of England—in the midst of a population unmatched for its energy, industry, and skill—in Manchester, the centre of a victorious agitation for commercial freedom, where Percival wrote and Dalton lived—13,362 children perished in seven years, over and above the mortality natural to mankind." At the present time (1853), the annual deaths in the town districts of Manchester are 37 to 1,000 living; whereas, in the extra-urban parts of Surrey, the deaths are only 19 to 1,000 living—one-half less. Of men of the age of 35 and under 45, the annual mortality in Surrey is 11; in Manchester it is 21 to 1,000 living. Together with these deeply interesting statistical facts, the Registrar-General furnishes a rule by which we may in some degree judge of the unhealthiness of a town or a season. In unhealthy districts, and in sickly seasons, it has been found that the deaths from diseases of the epidemic class increase more rapidly than deaths from all other causes; and this, he says, gives the classification adopted in the mortuary returns "a peculiar property". Whenever

the absolute mortality is low, the number of deaths in the epidemic class is less than the number in the pulmonary class (including consumption); and, on the contrary, whenever the deaths in the epidemic class exceed or equal those in the pulmonary class, it may be affirmed that the mortality is high.

One example will suffice to illustrate this "property". In the quarter (three months) ending September, 1845, the mortality in London from epidemic or zymotic diseases was 2,409, and the deaths in the same period from pulmonary disease were 2,669. But in the quarter ending September, 1847, the mortality in London from epidemic diseases was 4,061, and in the same period the deaths from pulmonary diseases were 2,652.

If a strict and impartial inquiry of this kind prove that the mortality of towns is double that of the country, so a like comparison of the different streets of a town shows a similar result; the sickness and mortality in the poorer streets being greatly in excess of those inhabited by the higher classes. "To ascertain and compare the healthy with the unhealthy parts of my district," says Mr. Worrall, "I have placed against each street the whole number of deaths from all causes during the last five years. I have taken the number of deaths from a population of 5,000 resident in what I consider the best streets; and I have also taken the number of deaths from a population of 5,000 resident in streets which I consider unhealthy! The 5,000 occupants of the best houses consist of merchants, professional gentlemen, and the richer class of tradesmen; they inhabit 728 houses, containing about 7,800 good rooms; the streets are wide, well drained, and have a plentiful supply of water. The 5,000 occupying the unhealthy streets, are composed of the lower class of tradesmen, journeymen mechanics, and labourers; these inhabit 434 houses, containing 2,800 rooms, the best of which are little better than the worst of the 7,800 before mentioned; the streets are mostly confined, the drains in a bad state, and in many places the accumulation of filth renders the atmosphere foul, whilst the supply of water is not good. The number of deaths which I find in the healthy streets during five years, amongst a population of 5,000, amounts to 325; and during the same period amongst 5,000 occupying the unhealthy streets, the number is 613." "In the parish of St. Margaret, Leicester, which has a population of 22,000, where the average age of death of the whole parish was, during the year 1840, 18 years, I succeeded," says Mr. Chadwick, "in obtaining the ages of death in the different streets, when it appeared that the average was made up as follows:—Average age of deaths in the streets that were drained, 23½ years; in the streets that were partially drained, 17½ years; in the streets that were entirely undrained, 13½ years. That, however, was a year of heavy mortality, and the average age of death in that and another district during the years 1840, 1841, and 1842, was, in the streets drained, 25½ years; in those partially drained, 21 years; and those not drained, 17 years."

Accurate statistical inquiries were instituted at Ham-burgh when the cholera visited that city, in 1832. The general result is that, with regard to the same class of the population, there were among those residing in the dirty and close parts of the town five times as many attacks, and nearly four times as many deaths, as among those residing in the clean and airy parts of it; that is, irrespective of the condition of poverty, the difference in the sanitary condition of those two parts of the town rendered the same class of inhabitants in the one district five times more susceptible to the disease than those residing in the other, and increasing the actual mortality of the most susceptible four-fold.

If we carry the investigation closer into the causes of sickness and mortality, we have them developed in such evidence as that of Mr. E. Joseph, registrar of the Rectory District, Marylebone: "Calmell Buildings," he says, "is a narrow court, twenty-two feet in breadth; the houses are twenty-six in number, and three stories high, surrounded and overtopped by the adjacent buildings; the drainage is

carried on by a common sewer running down the centre of the court, into which the slops from all the houses are indiscriminately thrown. The following is a statement of the comparative mortality in different parts of the houses as it occurred during the past year (1839):—In the kitchens, 1 in 13; parlours, 1 in 37; first floor, 1 in 30; second floor, 1 in 33; attics, 1 in 12. The floors were let out to different tenants, and there were in some of the houses as many as seventy occupants."

Dr. Griscom, Sanitary Inspector of New York, states with respect to that city—"That 33,000 of the population live in cellars, courts, and alleys; of which number, 6,618 are dwellers in cellars. As to the influence of these localities upon the health and lives of the inmates, there is and can be no dispute; but few are aware of the dreadful extent of disease and suffering in them; fevers, contagious and inflammatory diseases, affections of the lungs, skin, and eyes, and numerous others, are rife and combat the skill of the physician."

Neglect of personal cleanliness, and breathing the unwholesome damp atmosphere produced by washing dirty linen in crowded apartments, may be particularly mentioned, as causes of disease. Neither of them, perhaps, occasion actual sickness in the normal or usual state of the atmosphere, but they both tend greatly to it in an epidemical season.

With regard to cleanliness, the reports of medical practitioners and health inspectors, appearing in October 1853, which make known the habits of those families where cholera has appeared, have reiterated reference to neglect of cleanliness. "Children very dirty"—"rooms close and dirty"—"bedding never exposed to the air"—"parents and children all dirty, and sleeping in a close room," etc., are the recurring weekly details attached to the registers of death from cholera in the metropolis. Then, as regards washing, it has already been stated (notes No. 2), that a moist warm atmosphere is favourable to the outbreak of epidemical sickness; that volatile matter readily combines with the vapour of water; and that excretions or exhalations from the human body, even in health, are poisonous.

There cannot, then, be a more favourable combination for destroying the purity of the breathing atmosphere, than washing dirty linen in hot water in a small sitting room. In fact, there is formed by this practice a species of endemic atmosphere, saturated with moisture and noxious effluvia, in the centre of the abode of the family—in the midst, perhaps, of a number of innocent and helpless young children; for the steam not only causes dampness in the air, which irritates the eyes and lungs of young children, but ascends to the sleeping apartments, and, condensing on the walls, ceiling, and furniture, is a constant source of scrofula-producing, unwholesome exhalations.

The atmosphere of a city or town is subject to the same general laws of evaporation by day, and cooling by night, as that of the country, though the cooling process may be retarded by gas-lights, warm buildings, and heated chimneys. Effluvia of sundry kinds from crowded houses, dirty streets, drains, etc., pass into the air, and are readily detected by the smell towards evening in warm weather; and, at night, the inside of windows is dewed, and vapour charged with noxious matter condenses upon surrounding walls where persons are crowded within a small compass. Whatever, therefore, may be concluded with respect to the influences of heat and evaporation, cold and condensation, upon terrestrial effluvia in the open country, may be concluded also of the effluvia of populous towns. And it would appear generally, with respect to aerial poisons, whatever may be their origin, that noxious properties are eliminated by condensation of vapour, especially by that species which appears at night within limited areas, in places favourable to radiation. The widely extended influence which occasions influenza or cholera shows a decided predilection for low situations, the banks of rivers, and the night season; so that that is included under the law of radiation.

Aerial poisons being distinct in kind and origin, it follows:—That the inhabitants of the country may be exposed to attacks of sickness from the malaria of the district in which they reside; and also, at longer or more uncertain intervals, to disorders occasioned by a more general miasm, perhaps of cosmical origin; and that inhabitants of a town are liable to sickness arising from one or both these sources, and also from effluvia special to the sphere of the town, or the part of the town in which they reside. And it may happen that noxious effluvia from three sources concur; the consequence of which would be, as we find it, that epidemical diseases differ greatly in form and severity, amongst the same classes of persons, at different periods. Compound miasms, formed by the mingling of effluvia from different sources, would be subject to the meteorological laws which are operative upon each element singly; and thus the same kind of season, and the same conditions of weather, heat, and moisture, may be connected with very different maladies. Hence, too, the precautionary or sanitary measures which experience urges against one form of sickness, may be urged against others; and thus warmth, cleanliness, and ventilation, become of general application in opposing the progress of epidemical diseases.

It accords with the prominence assigned in these conclusions to the terrestrial radiation of caloric, and the consequent elimination of effluvia or miasms, that we find fires in the open air at night sanctioned by the experience of several high authorities; and, to travellers or sentries obliged to pass this period in a dangerous locality, the precaution is one well worthy of attention.

Upon the same principle, fires in the bed-rooms of houses along the banks of a river may be suggested: not for warmth—for experience has decided that noxious effluvia can scarcely exist at or below 32° Fahr.—but to prevent the temperature of the air of the room from falling to the dew-point, which, in particular states of the atmosphere, is as likely to happen with the thermometer at 50° as at 32° F. Cold frosty weather would require this precaution less than that which is termed close and muggy—that in which Mr. Wagstaff has stated, "he could always foretell an increase of malarian disease of some sort" (Notes No. 2)—Weather which in this climate follows a frost, or comes on with melting snow, when furniture of all kinds condenses vapour, and becomes damp.

Let us recapitulate the chief facts with reference to the precautions which may be taken to escape the influence of aerial miasms.

1. *An epidemic atmosphere* extends over thousands of miles. It usually manifests its presence by disturbances in the physical condition of the air; it disorders the health of the people, and changes the form of common disease before making its peculiar and recognised attack. It prevails upon the ocean as well as upon land; pursues a steady course, irrespective of seas or seasons; and shows a decided preference for low situations and the banks of rivers. Its influence is not confined to the human species, but extends to all kinds of domestic animals and to plants. A miasm thus infecting a wide extent of atmosphere is beyond control; it is hopeless to contend directly with it; and, whether a cosmical origin be or be not assumed, success in combating or avoiding its influence must depend on attention paid to concurring or co-operating conditions. If one blade of the destroying shears be forged by neglect at home, and without it the other cannot do its work, it is at home, that is to say, to sanitary measures, that we must look for the means of escape.

2. *Endemic atmospheres*, on the other hand, are of local origin, derived from terrestrial effluvia of limited diffusion. The diseases which arise are very various; they occur at particular seasons of the year, are more severe and fatal in proportion to the intensity of the sun's rays after rain, and the attack is mostly to be apprehended in low situations, and undrained places after sunset, when dew or mist is beginning to form. Cultivation, drainage, and other labours that alter the character of the surface of the soil, and re-

move moisture, are measures of prevention; but, in extensive and thinly inhabited districts, these measures are beyond the power of individuals or communities. In such circumstances, there is safety only by removal beyond the circle of the miasm, especially at those seasons when it is known chiefly to abound. If this also cannot be accomplished, then the strictest attention to any deviation from health, the avoidance of intemperance and of exposure to night air, and the selection, as sleeping apartments, of the uppermost rooms of the house, are the most approved precautions.

3. In cities and towns the congregation of human beings, and the habits of the people thence arising, are prolific sources of sickness and mortality. These, for the most part, are under control, or within our reach; and here an extensive field is open for individual and united exertion.

Where PUBLIC BATHS AND WASHHOUSES are established, with every requisite convenience, at very moderate fixed charges, there can be no excuse for personal uncleanness. To all persons, especially to those of the labouring classes and their children, a tepid bath once or twice in the week must do good. It may be safely and strongly recommended, not only for the comfort of a clean skin, but in a precautionary and hygienic point of view; and those families whose abodes are confined for space may be assured that the slight additional trouble, entailed by the use of the public washing department, will be amply repaid by the health, vigour, and increased comfort of themselves and their children. Life is so greatly under the dominion of external agencies—air, temperature, light food, and water, that health and strength of constitution may be practically regarded as exponents of the care and attention paid to them. Moreover, sanitary inquiries have most clearly demonstrated that it is in correcting any neglect of these outward agencies, that our control over epidemical diseases is most manifest. Therefore, to the authorities of a town, the prevention and removal of nuisances, cleansing of noisome courts and alleys, supervision of common lodging-houses, sewerage, and the supply of wholesome water, legally appertain; but personal care of health, especially that of children, proper clothing, avoidance of unwholesome food, cleanliness of person, and the thorough ventilation of rooms and houses, must devolve on individuals. Refuse-heaps, dust-bins, pigsties, yards with stagnant pools of water, and all offensive accumulations, seeing how greatly their effluvia are known to contribute to epidemical diseases, ought in common justice to neighbours and the community to have the constant attention of their owners; and if decaying refuse matters of any kind be permitted to accumulate unnecessarily, the Legislature has wisely empowered a properly appointed inspector to step in and enforce the performance of a neglected duty.

It may appear to some readers trite and commonplace to dwell as we have done on precautionary measures, on the one hand, to be commended; or on their opposites, impure air, crowded apartments, inebriation, unwholesome food, and dirty habits, to be avoided; but let it be remembered that cholera has already been visiting its wonted haunts, singling out its victims from the predisposed class; and, judging of the future progress of its present visitation by the past, we may expect in the coming year (1854), to witness a severe, and in the worst parts of towns, perhaps, a decimating attack.

An impressive lesson in *hygiène*, on more than one occasion, has been inculcated by an extensive fire, which, effectually dispersing the inmates of crowded dwellings, and sweeping away a mass of close courts, lanes, and alleys, has stayed the raging of an epidemic, and greatly improved the sanitary state of the town. During the summer of 1831, cholera visited with great severity the middle of Russia; in June and July, it reached Constantinople; but after the famous fire at Pera, in August, it entirely disappeared from that city. The fire of London, in 1666, immediately succeeded the great plague, a pestilence which carried off 100,000 persons. The city became much more healthy after the fire, care having been taken in rebuilding

to make the streets wider and more regular than before. "The plague," says Hume, "which used to break out twice or thrice every century, and indeed was always lurking in some corner or other of the city, has not appeared since the great fire of 1666."

In 1842, nearly one-third of the central part of Hamburg was destroyed by fire, and this part of the city has been re-constructed on a plan avowedly in conformity with sanitary principles. The result was, as respects the epidemic cholera of 1849, that, comparing the poor residing in the rebuilt part of the town with those residing in the old portion, not more than one of the former was attacked for ten of the latter.

Great calamities are seldom without an attendant good; and the facts we have narrated prove that great fires in large cities have been the means of saving a thousand-fold more lives than they have destroyed. The lesson which they teach upon the sanitary influence of dispersion and ventilation, ought not merely to make a passing impression, but to be practically enforced in all cases where new streets are added to a town.

The substitution of wide open streets for narrow damp thoroughfares, cleansing and whitewashing the abodes of the poor, dispersion of the inmates of crowded tenements, or enlargement of the space in which the people breathe and sleep, together with wholesome food and good water, have in all places been followed by a marked check to the progress of epidemical disease; and whatever may be the source of the miasm, it cannot be doubted that that mode of conduct and living which is a safeguard against it, is equally a safeguard against the inroads of sickness and mortality in infant life.

Lastly, let it be remembered that in every town of England, amongst those who neglect the rules and precautions which have been mentioned, *one-half of the children born die before they complete the fifth year of their age.*

Maidstone, January, 1854.

[To be continued.]

DEGENERATIONS OF THE MUCOUS MEMBRANE OF THE STOMACH.

By C. HANDFIELD JONES, M.B., F.R.S., Assistant Physician to St. Mary's Hospital.

NO. II.

IN a communication to the ASSOCIATION JOURNAL of Oct. 7, 1853, I drew attention to the not unfrequent occurrence of degenerative changes in the mucous membrane of the stomach, instancing simple and fatty atrophy, the formation of nuclear deposits, and intertubular fibroid development. At present, I purpose to enter a little more into detail respecting these and associated morbid changes.

Nuclear masses, as I term large circumscribed formations of nuclear corpuscles, are very frequently met with in various situations. Sometimes they lie in the subtubular tissue, that thin expansion of fibrous tissue which passes off from the corium to envelope the deep blind ends of the tubes. Sometimes they are embedded in the substance of the mucous membrane, in the midst of the tubes; and in this case they may be situated in its most superficial part. Often they are well defined, and the tissue in their immediate vicinity is tolerably healthy; but still more commonly they spread out on all sides, and infiltrate their substance between the adjacent tubes. When circumscribed they get easily detached from the surface of a vertical section during manipulation; and a cavity is then left, in which the tubes are manifestly wanting. In their primary state they consist of very perfect, well formed, distinct, nuclear corpuscles, just like those which fill up the cavities of the thymus: these lie heaped closely together, and there is scarce any trace of granulous matter imbedding them to be seen; in later stages, however, of their existence, oil-molecules, in varying quantity, sometimes considerable, are mingled with, or replace them. Frequent as is the occurrence of these