form of two letters, addressed to the Right Honorable Sir James Graham, Bart., her Majesty's Secretary of State for the Home Department, and this meeting recommends those letters to the careful perusal of every medical man in the kingdom. Also, that a copy of this resolution be sent to Sir James Clark."

As we were about to go to press, we learned, with much satisfaction, that a memorial similar to that presented from the medical practitioners of Surrey had been forwarded to Sir James Graham, signed by fifty-two members of the Southern Branch of the Provincial Medical and Surgical Association. The memorial was laid before Sir James Graham by Mr. Escott, M.P. for Winchester, and expressed anxiety, on the part of the profession, that no legislative measures, on the subject of medical reform generally, or affecting the Colleges of Physicians and Surgeons partially, should be adopted, until a full and impartial inquiry be made into the real condition of the profession.

LECTURE
ON THE
LAWS WHICH GOVERN THE MODE AND
RATE OF DECAY
IN THE
HUMAN FRAME,
DELIVERED AT ST. THOMAS'S HOSPITAL, MARCH 22, 1843.
By GEORGE GREGORY, M.D.,
Physician to the Small-pox Hospital.

If this were a pulpit instead of a rostrum, if, in place of being a physician addressing a mixed assemblage of professional and unprofessional persons, I were a bishop or curate addressing a congregation, I should have no difficulty in fixing upon an appropriate text. The third chapter of Genesis, verse 19, would supply me with a most apt one, where we read, that not very long after man's creation, the decree went forth, that whereas "from out of the dust he arose, so unto the dust he should return." When this fiat, so pregnant with consequences to the whole human race, was issued, certain laws were at the same time established which should govern the *mode* of decay of the human frame, and regulate the *rate* at which such decay should take place.

To determine those laws has been a continual object of pursuit with the professors of medical science from the earliest periods. The physiologist, availing himself of the knowledge which his researches into *life* afford, has traced the sources of decay, and explained the direct causes of death. The physician, carrying this knowledge into the streets and highways of life, has labored assiduously (the lancet in one hand and quinine in the other, to arrest decay when hurrying forward with a too fatal precipitancy; dragging from their secret recesses in the vegetable and mineral world the powerful aid of mercury, of steel, and of iodine; he has also striven (with a skill which deserved success even when he could not command it) to control and check that slower process which, by a

different route, lands us at last at the Kensall-green terminus!

"Sedem properamus ad unam!"

Where neither the one nor the other of these offices has been open to him, his care has been to smooth the downward path of life, and, with poppy, mandragora, and other drowsy syrups, to lessen that bodily suffering, the ghastly spasm and the racking torture, which, under certain circumstances, presently to be noticed, decay bears in its train.

The decay of the human frame, which has thus practically been the object of the physician's solicitude from the days of Hippocrates downwards, has been studied, however, more in parts than as a whole. Few have attempted to give a general view of the subject,—to connect all the varieties in the modes of human decay, and supplying that link which binds them together, to show that here, too, Nature operates by fixed laws. To remedy this deficiency (if, indeed, the deficiency exists), to arrange and generalise the opinions concerning the decay of the human frame, which separately are so familiar to us all, and to bring to the aid of our judgment in this matter the faithful and impartial results of statistical inquiry,—these are the objects of the present lecture.

A little reflection on the several modes by which mankind are removed from the world, will suffice to show that they admit of being arranged into four classes, namely,—1, natural decay; 2, premature decay, of a slow or chronic kind; 3, rapid decay, by acute disease and unseen violence; 4, rapid decay (or destruction of the body) by open violence. The first three of these topics will furnish us with abundant food for reflection. I begin with natural decay.

The first question which will occur to any one engaging in the inquiry is, How is natural decay effected? What is the process by which nature provides for the gradual extinction of life within us, when a constitution naturally sound, which eighty returning suns have found and left in the enjoyment of health, at length approaches its natural close? The answer is, that Nature effects her object by a process of hardening of the structures. The disposition in the tissues of the human body to harden is displayed in a variety of ways. The earliest ever witnessed is the tendency to deposit sand and gravel in the kidney, which, by successive depositions, advance in time to the dignity of stone. This, which is so very common in old age, is occasionally witnessed in the child. The same tendency is displayed in other persons by the formation of biliary calculi, or gall-stones. Very soon after puberty we see in some constitutions a disposition to deposit bony matter about the roots of the lungs. These deposits, called bronchial calculi, are sometimes expectorated, but they may, *per se*, become the direct cause of death. In November last, the quartermaster of her Majesty's 8th regiment of Foot, stationed in Dublin, died of bronchial calculus. It had formed in the triangular space below and between the bifurcation of the bronchi. An abscess followed, having fistulous communication with the bronchi and with the œsophagus. One morning the calculus slipped into one of the fistulous openings into the bronchi, and life was suddenly extinguished. With reference to the decay of the frame, the most important hardening is that of the apparatus for the circulation of the blood,

for pliancy is essential to the functions of the arteries. Other parts may stiffen and become rigid, and no other result follow than local inconvenience, but arteries must be adapted to the varying momentum of the blood, to those changes in the circulation which are the necessary consequences of exercise, of mental emotion, of the indulgence of our appetites. The first inroads on the normal condition of the arteries are made by the deposition of atheromatous points, at first scattered over the surface of the arterial system, but soon congregating in patches of cartilaginous hardness in those vessels which have most work to do—viz., in the large artery issuing from the heart (the aorta) and its three earliest branches. To these atheromata succeed spicula of bone, which shoot up here and there like crystals, and at length unite into masses. As life advances this ossific process creeps into the most distant branches of the arterial system. The arteries of the brain are those which in a perfectly normal state, with no disturbing forces whatever (no hereditary predisposition, no exposure to cold, no weakness left as the legacy of a departed ailment), first yield; for they are the *finest* and the most exquisitely organised, and therefore the most carefully packed of all the vessels of the body. Some artery of the brain gives way, and blood is effused upon its delicate structure. Apoplexy, therefore, is the most perfectly natural—it is the very *beau idéal*—of all the modes of vital decay. How splendid a picture does this present of the unbounded love and tenderness of the Creator towards his creatures! The body must perish, but in the true normal mode of decay death is effected by a process which, in one instant, destroys all sensation and all consciousness.

Allow me to read to you a sketch of the decay of the human frame under the very circumstances now supposed, drawn by a female hand, but by no unskilful one.

A lady at Bath (a relation of my own), one of a family remarkable for longevity, had reached the age of eighty-nine, weak in body, but in perfect possession of all her faculties. On Monday, February 6, 1843, just six weeks ago, she was sitting on a sofa, talking to an old nurse, who had called to visit her, in the enjoyment of her usual health, when suddenly she bent forward without groan or sigh. From that moment consciousness and sensation ceased. She was bled and leeches, and all the appliances of human skill were ably directed, but she never revived. "The body," writes my fair correspondent, "remains motionless. No food is taken. The sound of breathing alone gives sign of life; the lungs act; the pulse beats; and the body, Mr. Stockwell tells us, is living on itself. For seven long days has this lasted. We feel that our relative has been dead for a week! We have her body, it is true, but it is only her body that remains with us—warm, instead of cold!"

Such is the perfectly normal or natural mode of decay of the human frame. In all such cases the lamp of life is not extinguished. It burns down to the socket, and in the most wonderful manner extinguishes itself. The spectacle is full of interest to all; for it proves that the decay of the frame and the ultimate extinction of life, are regulated by the same consummate skill which presides at the birth, and which moulds into symmetry the growth of the body.

Other modes of death there are, all, like apoplexy, referable to the hardening process. Among these I may mention as the most frequent, palsy, aneurysm, angina pectoris, and dropsy. Palsy is only a minor degree of apoplexy. In angina pectoris the process of decay is slow and accompanied with severe suffering. The heart itself is slowly converting into bone. As if to make amends, Nature has ordained that the extinction of life should here be instantaneous and painless. A few cases of aneurysm arise from accidental causes, rupturing the vessel, and this disease, therefore, may show itself in early life, but, for the most part, aneurysm is the consequence of the ossific process, and a form of natural decay. The blood insinuates itself by the side of some minute spicula of bone, and gradually distends the coats of the artery. The deposit of osseous matter in the *interior of the heart*, especially about the valves of the aorta, is an exceedingly common mode of natural decay. The immediate effect of it is to prevent that free and equable distribution of the blood which is essential to health and life, and ultimately to bring on dropsy. Dropsy, therefore, is another of the modes of natural decay. Another provision of Nature for the extinction of life at advanced ages, differing equally from the impairment of the brain and of the heart, is to be found in *interruption to the respiration*. Air is as necessary to man's life as the blood, or the nervous influence. Now, in many cases of purely natural decay, the air-passages are made the medium of extinguishing life. Fluid effusion takes place from them by an action which originates within the body, and though of an inflammatory kind is wholly independent of cold. Bronchitis, then, is a third mode of natural decay, and it is that which Nature most generally sets up, when either extreme debility, or the gradual disorganisation of other structures, has at length reached that point which is incompatible with life. Signor Ferrari, formerly well known and esteemed as a director and musical composer to the Italian Opera in London, had reached the age of eighty-one. Life for him had lost its charms; the sight of both his eyes was gone; his body was greatly enfeebled and emaciated; rheumatic pain racked his limbs; his appetite began to fail; he had learned but too forcibly

"That life protracted is protracted woe."

The few friends who survived could perceive that his end was approaching, but how that was to be effected was a mystery, for his pulse was good and his intellect clear. Early in November, 1842, he began to complain of cough; this increased upon him. On the 24th of November I first saw him. He was then expectorating an abundant puriform mucus; his debility augmented daily. From that date he never left his bed. Early in the morning of the 30th of November, incipient delirium betokened the circulation of venous blood through the brain. At six, p.m., of that day he calmly expired.

This destructive process, spontaneous bronchial inflammation, commonly called bronchitis senilis, is often, I have said, set up in the advanced stages of the disorganisations (or *degenerations*, as they are called) of the animal tissues. To the consideration of these I next proceed. In this mode of decay the several structures of the body do not simply harden; their nutrient vessels take on certain diseased actions;

healthy structure gives place to morbid structure, which in process of time becomes incompatible with life. There are an immense variety of these chronic degenerations. Foremost in the scale stands the cancerous degeneration, where a malignant mode of action is set up, accompanied generally with excessive pain. It commences in one tissue and gradually extends to a second and a third,

"Till pitying Nature signs the last release,
And bids afflicted worth retire to peace."

The deaths by cancer throughout England and Wales average 2700 per annum; and it appears that about eighteen die annually by this disease for every 100,000 of the population. Closely associated with the cancerous degeneration are those called fungus hæmatodes, medullary sarcoma, and melanoid tumor. Another series of disorganisations are the tubercular, the most perfect specimen of which is the large white tubercle of the liver. A lady, unmarried, the sister of one now standing before me, about forty-five years of age, had passed blood on several occasions, but soon recovered. In the spring of 1839 this symptom returned with more than its wonted severity, followed by indigestion, flatulence, and a sallow aspect of countenance. To these symptoms succeeded great bodily weakness and emaciation; then followed, by slow degrees, excessive viscosity of the saliva, total sleeplessness, frequent syncope, aphthæ, and at length deep jaundice. I mention this case because it gives me an opportunity of explaining to you what happens when Nature, generally so indulgent, fails to set up that bronchial inflammation just adverted to. Death must then be effected by the mode of "*exhaustion*," the senses remaining entire and the breathing unimpaired, until the last drop of blood in the body has been *used up*. So long as wine and brandy could be forced down, so long did the flickering taper of life in this estimable lady continue to burn. But the time at length arrived when, in consequence of the aphthous state of the mouth, the act of swallowing gave such exquisite pain that all support was necessarily abandoned.

Death by exhaustion is truly terrific. For many days the lady prayed fervently to be released from the wretched feeling of a heart acting till there was no blood left for it to act upon.

With what force and truth does Milton describe this mode of decay:—

"For over them triumphant Death his dart
Shook, but delay'd to strike, tho' oft invoked
With vows, as their chief good and final hope!
Sight so deform what heart of rock could long
Dry eyed behold?"

This case is a good paradigma of structural degeneration taking place at its most usual period of life. There are many others of a like kind of much more frequent occurrence. One of the most remarkable is granular kidney—a form of vital decay which has been studied with such care and success by the physician of a neighbouring hospital, that in imitation of the good old custom which dictated such names as the Eustachian tube, the circle of Willis, or the capsule of Glisson, it has been called "*Bright's kidney*." It is often the precursor of dropsy, and the chief cognisable evidence of what the world calls a "*break up of the frame*." To this form of disorganisation and decay I may add scirrhus of the stomach,

scirrhus of the rectum, tumors attached to the peritoneum and uterus, hypertrophy and soft vegetations about the heart. In this latter case the struggle towards the close of life is often fearful, the mode of death being sufficient of itself to characterise the disease. Heart affections are certainly on the increase in this country. The deaths from this cause throughout England and Wales amount now to *four thousand* annually. Disorganisation of the pancreas appears to be the *rarest* form of chronic decay. Not more than twenty-five persons die of it annually in England. The advanced stages of this disorder are attended with great distress, with delirium, convulsions, and other evidences of nervous sympathy. We cannot here say "*facilis descensus averni*."

In all the cases now adverted to decay is traceable to the branches of the aorta, to those vessels which, for the first twenty years of life, are incessantly occupied in that truly wonderful process "*growth*," a phenomenon which, from its extreme familiarity, ceases to be the object of our astonishment, yet which, when duly considered, is nothing less than a daily miracle, pointing out to us the immeasurable distance interposed between divine power and the utmost efforts of human skill. Splendid as the steam-engine is, teeming as it does with the elements of power, a monument of man's ingenuity, yet as it issues from the manufactory so it must for ever remain. The combined genius of a Watt, a Bolton, and a Maudslay, could never make even the most distant approach to that simple phenomenon *growth*, which every child daily displays.

From the twentieth year of life, when growth ceases, the action of these nutrient vessels begins to change. Sometimes it subsides quietly, and the system is left in possession of its completed strength for another period of twenty years; but frequently, too, it happens that from having been so long occupied this, their normal subsidence, does not take place. The capillary vessels refuse to be idle; mischief of some kind must then inevitably follow; either a process of hypertrophy commences, or it may be of degeneration, and thus is the foundation laid for decay of the frame. In persons of weak or scrofulous habit the healthy process of growth, and one or other of these morbid abnormal processes, may chance to proceed simultaneously. At length, even to the strongest, comes the age of forty, when the top step of the ladder is reached, and the "*turn of life*" takes place; then it is that the degenerating actions chiefly prevail, and *they* constitute (from this period to the age of sixty) the chief modes of human decay.

Time, then, the great destroyer of all things, is the main agent employed by nature in working out the decay of the frame, but several other circumstances contribute to the result. Of these by far the most important is "*hereditary predisposition*," which exists not only to such general modes of disease and decay as *gout*, *gravel*, *rheumatism*, and *cancer*, but even to the disorganisation of particular viscera. Scirrhus of the stomach, which, at the age of fifty-two, brought to a close the splendid but chequered career of Napoleon Buonaparte was hereditary in his family. Affections of the heart may often be traced to the same source. Again, intemperance is one of those accessory causes which, lighting up diseased

actions, pave the way to many kinds of disorganisation, especially those of the liver. Occupation, also, has its share of influence. Chimney-sweepers are liable to scrotal cancer, painters to palsy. The proportion which deaths by natural decay bear to the total mortality cannot be made out with strict accuracy, but we shall be near the truth in stating that there die, per 1000, of old age, debility, and the disorders depending simply on age, about 175; by the disorganising or chronic morbid processes *accompanying the advance of life*, 225; total by this mode of decay, 400 per 1000.

I must now withdraw your regards from the several varieties of slow but natural decay, to fix them on the equally important, I was almost tempted to say the still more interesting, subject of slow but *premature* decay. With very different feelings do we view the departure of the veteran who, full of years and honors,

Superfluous lags upon the busy stage
Where newer forms and different views engage,

and the early exit of ripening beauty or aspiring genius. It happens to but a small portion of mankind to be gathered to their fathers, like the patriarchs of old (after completing the full term of human existence), by a slow and "unperceived" decay. The larger proportion of mankind perish either by some acute malady cutting life short, or by the mode of decay now to be described.

Those who are in the least conversant with the structure of the body must know that the heart is a double organ; but all present may *not* know that the two portions of the heart have distinct offices. The left heart is engaged in the great work of growth, and in the repair of injuries, and in those exceedingly useful processes digestion and secretion, without which life would soon come to a stand still; the other, the right heart, placed, for convenience of stowage, in the same bag with the other, has a totally different function, it is the mere workshop of the other, the laboratory, from which the left heart draws its hourly decreasing supplies. Now, with this difference of function is associated a remarkable difference with reference to decay. The vessels of each system are governed in this respect by different laws; those of the right heart take on the process of decay at a date much anterior to that when the aortic system of vessels gives way. With reference to aortic decay, we, therefore, call pulmonary decay *premature*, not that it really is so any more than aortic decay can legitimately be called *protracted*.

I know no reason why the lungs, and the peculiar apparatus of vessels belonging to them, should be liable to an earlier decay than parts supplied by the aorta; it is a *law* of the animal economy—a principle interwoven in the construction of our frame. I believe that no reasoning will ever carry us beyond the simple fact that pulmonary decay precedes systemic decay, doubtless for some wise and necessary purpose.

Pulmonary decay is, of course, what the world call "consumption;" it occurs at all periods of life. Mr. Farr, in his third report, has given a table showing the prevalence of consumption in three of the most populous towns of England at all ages from birth to decrepitude. I will take Liverpool as an example.

There died of consumption at Liverpool in 1839, 1124 persons, of them there were—

Under the age of 3 years	227 (one-fifth of whole)
Between 3 and 15	194
" " 15 and 30	379 (one-third of whole)
" " 30 and 50	258
Upwards of 50 years of age	66

Total . . . 1124

You see that consumption is diffused through all ages of human existence, but not equally; that it is most frequent at that period of life when the growth of the body is completed (that is, between fifteen and thirty), and least common in advanced years. Consumption is an hereditary ailment, but it appears also in families who have shown no such tendency. A single member of a family sometimes dies consumptive. Delicate texture of the lung is the root of the evil, but habits of intemperance may break down a structure of lungs originally the soundest. Consumption is immeasurably at the head of all the fatal diseases of the human body; no single malady approaches even near it. Scarcely less remarkable than its frequency is the steadiness of the mortality which it occasions, bespeaking, as it undoubtedly does, some peculiarity of cause.

There died of consumption throughout England and Wales in 1838, 59,025 persons; in 1839, 59,559 persons; in 1840, 59,923 persons, while the total mortality varied from 342,519 to 359,561.

In the metropolis, during the five years, from 1838 to 1842 inclusive, the deaths by consumption have been as follows:—7687, 7104, 7236, 7326, 7145; while the total mortality varied from 45,272 to 52,698.

No other disease exhibits an uniformity at all approaching to this.

Females are the especial victims of consumption. In the three years, 1838, 1839, and 1840, there died, throughout England and Wales, 80,560 males, 90,711 females; that is, 9 females to 8 males.

Compared to the total mortality, the average deaths by consumption are 170 per 1000. This, you will remember, is very nearly what we calculated the deaths by old age, debility, and its associated disorders to be; in other words, rather more than 1 out of every 6 deaths that occur in England is imputable to consumption, and one to old age and its consequences, one to premature decay, one to natural decay; such is the law of nature.

Among the many remarkable facts which recent statistics have brought to light is the prevalence of consumption in all parts of the world, the hottest as well as the coldest. Year after year has seen consumptive patients expatriating themselves to profit by the supposed immunity which tropical countries enjoy from the ravages of pulmonic decay! Vain delusion! We learn from the statistical reports of the British army that *twice* as many cases of consumption originate in Jamaica as at home, among European soldiers. Out of 51,000 troops, serving in that island in the course of twenty years (1817 to 1836), there were attacked by consumption 661, or 13 per 1000; whereas, out of 44,000 troops quartered in England during the same period, 286 only were attacked, which is 6 per 1000. The same fact was ascertained with regard to the East Indies. Consumption is twice as prevalent at the Mauritius as at the Cape of Good Hope, although

pneumonia and other diseases of the lungs are considerably more abundant in the latter colony.

This fact (the increased prevalence of consumption among Europeans proceeding to hot countries) has lately received a striking illustration. The lower orders of animals, it is well known, are equally, with man, liable to pulmonary decay, more especially those of the monkey and cat tribe. Mr. Miller, the intelligent superintendent of the Zoological Gardens, informs me that, until lately, in that establishment, *one-half* of the deaths in those orders of animals has been from consumption, the disease commencing prior to the animal's attaining its full growth. The great extent of this mortality suggested the idea that it might be owing to some mismanagement, and this he believes to be the high temperature of the air breathed. By reducing this from 60° and upwards to 50°, the health of the animals has, of late, materially improved. Visitors to the gardens may have noticed that some of the finest and healthiest leopards and tigresses have

passed the last winter, without any artificial warmth, in the open garden, and that the temperature of the monkey-house very little exceeds 50°.

From very early periods a tendency to develop consumption has been associated with particular trades. Those of glass-blowing, scythe-making, and leather-dressing, have been denounced as especially injurious to the lungs. Statistics are calculated to clear up this point, because, if true, the proportion of male deaths, by consumption, *in towns where those trades are practised*, ought to exceed the female deaths. Mr. Farr has kindly supplied me with data to test the correctness of this notion. From these tables we learn, first, that the male deaths in the four towns of *Birmingham, Sheffield, Worcester, and Newcastle*, exceed the female deaths in the proportion of 23 to 20; whereas in the three agricultural counties of *Essex, Suffolk, and Norfolk*, the female deaths by consumption are to the male deaths as 67 to 52.

TABLE
Exhibiting the Comparative Prevalence of Consumption in the Sexes in Towns and Country Districts.

Locality.	1841.		Deaths by Consumption.	
	Males Living.	Females Living.	Males.	Females.
Birmingham, Sheffield, Newcastle, and Worcester	157,430	165,755	2357	2049
Essex, Suffolk, and Norfolk	509,496	531,182	5243	6740

Again, by comparing the deaths with the numbers living, you will perceive that the male deaths, by consumption, in the four towns, are to the total male population in those towns as 16 to 1000; while in the three agricultural counties the proportion is as 10 to 1000, the ratio of female deaths to the female population *being the same in town and country*—namely, 13 per 1000. The popular notion, therefore, is thus proved to be well founded.

A survey of all the facts connected with the origin and development of consumption confirms the great principle that this disorder is not (as some would have us believe) a modification of *common* inflammation, but that it is a true decay of the pulmonary apparatus, originating from very recondite, and, perhaps, unappreciable causes. Sir James Clark, one of the latest and most acute writers on consumption, has introduced the term *tuberculous cachexia*, to express, with as much precision as the nature of the subject will at present allow, that condition of the body which tends to pulmonary decay. Changes have taken place in the relative position of all other diseases by which mankind is removed from the world; they, like kingdoms, have their rise and fall; but consumption holds the same place in the catalogue of mortal maladies which it occupied in the infancy of statistical science, and probably in the earliest ages of the world. Decay of the respiratory apparatus, therefore, must be viewed as the great gulph into which all improvements in medical science, and all ameliorations in the physical condition of man tend ultimately to drive the

population. Any measure which, like vaccination, or improved nursing, or the use of flannel, lessens the amount of mortality in early life carries the junior population forward to the epoch when it becomes obnoxious to pulmonary decay. The progress of systemic decay may be checked by art, and thus may the value of human life be improved; but no statistical considerations warrant the conclusion that we possess any such controlling power over the course of pulmonary consumption.

The third mode of decay of the human frame I described as "*rapid decay by acute disease or unseen violence*." The human body is not invaded by such external agents alone as are cognisable to our senses—such as arsenic, sulphuric acid, the bite of a mad dog, or a locomotive engine, but by various agents of a less palpable character, whose effects are not the less remarkable. We distinguish these hidden sources of disease by the term "*miasms or morbid poisons*." They steal insensibly into the system, and there effect ravages, sometimes so frightful as, in a few hours, to deprive the strongest man of all power, and even of *life* itself; others operate by a slower process, but with a result not the less certain or fatal. To the first class of morbid poisons belong cholera Asiatica, Egyptian plague, and the angina maligna, or putrid sore throat. To the second class belong small-pox, measles, hooping-cough, remittent fever, and typhus fever; besides which there are a variety of other morbid poisons which are less destructive in their effects, but which, nevertheless, prove occasionally

the sources of death; of this kind are erysipelas, syphilis, ague, and influenza.

These miasms or poisons are of two kinds, those of animal and those of terrestrial origin. Small-pox, hydrophobia, measles, scarlatina, and cow-pox, are miasms originating from the animal body in a state of disease, and, therefore, called the *morbid animal poisons*. Again, ague and remittent fever, probably, also, dysentery and beriberi, and, perhaps, cholera, are the results of noxious miasms generated on the earth's surface by the decomposition of *vegetable matter*. These are distinguished as the diseases of endemic, paludal, or *malarial* origin. Each miasm, whether springing from an animal or an earthy source, has its peculiar mode of development; some affect the skin, some the bowels, some the blood. Whatever the mode be it is the same, whether the poison invades the European or the negro, the young or the aged, the strong or the weak; they all agree in their mode of imbibition; they correspond in the theory of their action; they are all, in short, pathologically associated, and whether designated as epidemic, endemic, or contagious maladies, they are to be looked upon as *agents interrupting the normal course of man's life in his progress to natural decay*; they chiefly prevail in the periods of infancy and manhood. There are strong reasons to believe that in an earlier period of the world diseases of a miasmatic nature existed, which have since disappeared, while others have supplied their place.

The plague described by Thucydides as having devastated Athens during the Peloponnesian war (429 years before Christ), does not correspond with any known disorder, although it bears a general resemblance to scarlet fever. The same may be said of the plague described by Procopius, as invading Constantinople and the neighbouring countries in the year 544 after Christ. Many pestilences which prevailed during the dark ages, and which are described by the physician-monks of those days, cannot be recognised as the diseases of modern times. There are the strongest grounds for believing that small-pox did not commence its ravages until the year 622. If we may credit Constantine Africanus, measles first showed itself about the year 900 of the Christian era. Syphilis first appeared in 1598. The first accurate accounts which we have of the scarlet fever are in the year 1610, when that disorder invaded Spain. It was unknown in Edinburgh until 1680, for Sir Robert Sibbald, physician to King Charles the Second in Scotland, writing in that year, says of it, "That it was so recently introduced and so little understood, that he would not venture any observations either on its theory or treatment." Scarlet fever did not invade America until 1735. Neither small-pox or measles have yet reached our Australian colonies. "Two years only have elapsed since scarlet fever assailed them. Horace says that, in days long-past,

"Nova febrim
Terror incubuit cohors."

That this should have happened need not surprise us.

We have in our own days seen two new miasms spring into existence. In 1798 Jenner made us acquainted with cow-pox. In 1817 cholera arose, like a black vapor, from out the Sunderbunds of Bengal, and has since carried death and desolation through

every known country of the world, except those highly-favored regions to which England, with a generous humanity, consigns the victims of crime—Australia and Van Dieman's Land. It will, in after times, be noticed as a strange coincidence that thus, within twenty years of each other, cow-pox and cholera, the mildest and the most malignant of human maladies, the alpha and the omega of the morbid poisons, should have originated. Whether this was accident, or whether, among the many inscrutable arrangements of Providence, cholera was ordained to be the scourge of mankind when small-pox declined—as small-pox arose when earlier plagues had been banished—it is not for us to say. Reflecting, however, upon the origin and succession of epidemic maladies, it is impossible, I think, not to trace in them evidences of *design*. We may even venture so far into the regions of conjecture as to predict that nature has not yet exhausted her catalogue of epidemic

"And wide wasting pestilences."

There probably are others of "*the painful family of death*" still in the womb of time, to occupy the thoughts of physicians yet unborn, and to assume hereafter their station among

"The miseries which the inabstinence of Eve
Hath brought on man."

The several miasms now adverted to operate on the animal economy by a principle very analogous to that which, in the vegetable world, is called *fermentation*. This is no new doctrine, though as recently revived by the ingenious Liebig, who has invested this hypothesis with a strictly scientific character, it has all the charms of freshness. It is, in fact, one of the oldest doctrines in physis, and very striking is it thus to witness the revolutions of the wheel of science!

Mr. Farr, to whose indefatigable labors every physician pays a willing tribute of praise, has done good service to pathology by substituting the term *zymosis* (derived from the Greek *ζυμων* to ferment) to express the mode by which the several morbid poisons operate on the animal economy. Zymotic diseases, therefore, will include all those which have hitherto been known by the name of *epidemic, endemic, and contagious* maladies. A change of phraseology was called for by the new aspect of science, and the term has been judiciously selected.

The destruction of human life by the zymotic tribe of diseases is very great. Upon an average of years, 350,000 persons die annually in England and Wales, of whom 70,000 are the victims of epidemic and contagious diseases—that is, one-fifth of the whole. The equalisation of epidemic mortality through a succession of years is very remarkable. Every year is distinguished by some prevailing, reigning, or *master epidemic*, during the continuance of which other epidemics decline. Thus, in 1838, small-pox was in the ascendant, and 16,268 persons died of it throughout England and Wales. In 1839, measles predominated, and destroyed nearly 11,100 persons. In 1840 scarlet fever was so general and so fatal throughout England, that it destroyed more lives by one-fifth than small-pox did during its epidemic season. The deaths by scarlet fever in that year were nearly 20,000. The exact numbers were 19,816. Knowing (as we do) the average rate at which scarlet fever proves fatal (six per cent.), we are sure that in the year 1840, there

could not have been less than 360,000 cases of scarlet fever in England and Wales! Measles, whooping-cough, small-pox however declined. Everything teaches us that when one avenue to death is closed,

another opens for "*noctes atque dies patet atri janua Ditis.*" If children are saved from small-pox, therefore, it is only to fall into the power of tyrants, scarcely, if at all, less inexorable.

TABLE

Exhibiting the amount of Exanthematic Mortality in England and Wales, during the years 1838, 1839, 1840

	Year 1838.	Year 1839.	Year 1840.
Small-pox	16,268	9131	10,434
Measles	6514	10,937	9326
Scarlet fever	5802	10,325	19,816
Total Mortality by the Exanthemata	28,584	30,393	39,576
Total Mortality throughout England and Wales	342,529	338,979	359,561

Besides the zymoses, the human body is subject to the assaults of many acute diseases of internal origin, which the old writers (probably with reason) attributed to a faulty condition of the blood and humors. They are naturally associated with the zymoses, not only from a like obscurity of origin, but because they occur at the same periods of life, run the same rapid course, and equally with them serve as interruptions to natural decay. The forms which they principally assume are, rheumatic fever, gout, pneumonia, hydrocephalus, and convulsion. They may be either of an inflammatory or congestive character. The ordinary labors of man are sufficient to excite some; others are brought on by atmospheric vicissitudes. A very large proportion of them, however, are wholly independent of exterior agency. Witness, in children, the variety of such disorders which accompany the process of dentition. Witness, in adults, the first appearances of gout and rheumatism.

The principal disorder of this class which swells Mr. Farr's black book is infantile convulsion; next to it is pneumonia, and near them stands hydrocephalus. Very nearly one-sixth of the total mortality of the country is attributable to these three diseases, naturally grouped together as being the eldest offspring of abnormal dentition.

The total amount of mortality by the diseases of this class, the fevers of internal origin, is 200 per 1000. The sum total, therefore, will give the following

Analysis of the Tables of Mortality of England and Wales.

	Per Thousand.
Deaths by old age, debility, and its associated disorders	175
— chronic disorganisations of the viscera	225
— the zymotic diseases	200
— acute diseases of internal origin	200
— consumption, or pulmonary decay	170
— open violence	30

Total 1000

It thus appears that 30 per 1000 are the victims of open violence, the fourth and last of the classes into which I divided the several modes of human extinction.

Decay being my theme, I am prevented from entering on the consideration of the many interesting ques-

tions which violent deaths suggest; I will only state, that they are exceedingly uniform, averaging throughout England and Wales nearly 12,000 annually. The number for the years 1838-39 and 40, were 11,727 11,632, 11,594. This is, compared to the total mortality, as 32 per 1000; in reference to the population, it is as 8 to every 10,000 persons living. Decay in the male sex is considerably more rapid than in the female. In the three years ending June 30, 1840, the total number of deaths among males throughout England and Wales was 518,006, while the deaths among females were only 499,058, giving an excess of male deaths, in three years, of 18,948. After this statement, it cannot appear surprising to you that the number of females in any country should notably exceed the number of males. At the present time, in London, there are 996,000 females to 878,000 males, or an excess of 118,000 ladies. Coupled with this fact, and obviously depending on it, is the superior longevity of the female sex. There died throughout England and Wales, between 1st July, 1839, and 30th June, 1840, 5,247 females, aged 85 and upwards; whereas, of the same age, there died only 3,954 gentlemen, leaving what is called in the city a *balance* in favor of the old ladies of 1293. Among the females who died, 71 had passed the age of 100, but only 40 males.

There are only three diseases, common to the sexes, which carry off more females than males—they are, consumption, cancer, and dropsy. The deaths by childbirth form but a very small fraction of the mortality in the female sex. The proportion is only 8 per 1000 of the total mortality; and as (unfortunately) half a million of children are annually born in England and Wales, and scarcely 3000 deaths take place in childbirth, so there is only 1 death to 170 confinements! The researches of the registrar-general have brought to light some singular results with reference to the proportion in which acute disease affects the two sexes. In the zymotic tribe the UNIFORMITY is quite extraordinary. Thus, out of 8194 persons dying of measles in 1840, throughout England and Wales, 4143 were males, and 4051 females, a difference of only 92. Again, out of 17,862 persons dying of scarlet fever in the same year, 8927 were males, and 8935 were females, a difference of only 8!

On the other hand, it appears that out of 14,806 dying of pneumonia, 8177 were males, and only 6629 females. Out of 22,787 dying of convulsion, 12,689 were males, and only 10,098 females.

The superior value of female life, which these and all statistical considerations tend to prove, and which our insurance offices, by their variation of rates, acknowledge, is not attributable to any differences in the original construction of the body, for man is built of stronger materials than woman, but first, to the smaller demand made upon her vital power during the middle period of life; secondly, to the healthier condition and temperature of the female mind; and thirdly, to the lesser amount of toil and anxiety which, in a highly civilised country, falls to the share of woman. I must say one word regarding the influence of trade and occupation on the average rate of decay in the human frame. The greatest foe to health and long life is poverty. Not only do all epidemic visitations fall with tenfold severity upon the poorer classes of society, but all descriptions of disease find in them their chief victims. In has been found, in France, that of an equal number of infants taken from among the poor and those in easy circumstances the proportion of deaths among the former is as 2 to 1.

Soldiers are, of all classes of society, the most obnoxious to severe disease and rapid decay. The result of an inquiry made by Mr. Edmonds (an eminent London actuary) into the loss sustained by the British army during the Peninsular war, has shown, that whereas in England the average annual mortality is now 22 out of every 1000 of the population, the mortality among soldiers in time of active warfare rises to 160 per 1000! Out of this number, 40 per 1000 occur from wounds received in battle, and 120 per 1000 from disease and privations, and the other miseries attendant on war.

Happily, wars have ceased, and a gradual improvement is taking place in the value of human life. Every year a larger proportion of the population are carried forward to advanced age and die of the disorders which advanced age entails. In the time of the Romans the expectancy of human life was not more than 25 years; a life was not then worth more than 25 years' purchase; great changes have since occurred. The Geneva tables show that from 1750 to 1800 the mean duration of life in that town was 34½ years; in 1833 it was 45 years and 29 days! At Paris, among the easy classes, the mean duration of life is calculated at 42 years; in England, according to the calculations of Mr. Finlaison, it is now 50 years, so that the expectancy of life, the number of years which a child may be expected to attain, is double what it was at the commencement of the Christian era.

No one can doubt that if much of this improvement is attributable to the effects of medical science, more is due to the humanising effects of the Christian religion—a religion which has reared the majestic institutions for the reception of the sick and indigent poor which overspread the land, in one of the oldest and noblest of which we are now assembled—a religion which has diffused throughout society that spirit of active benevolence which incessantly labors to lessen the sum of human misery, and protract the period of man's decay.

ACADEMY OF SCIENCES, PARIS.

March 6, 1843.

FORMATION OF FAT.

M. Liebig addressed a letter on this subject in reply to the remarks of MM. Dumas, Boussingault, and Payen. According to the last named writers, it is the waxen matter produced in plants, which is changed in the animal body into stearic, oleic, or margaric acid.

Although the transformation of wax into fatty acids has never as yet been observed, and though it be difficult to understand how a substance which is not saponifiable, and which melts at a much higher temperature, than that of animals, can pass into the blood to be oxygenised and changed into stearic acid; still the opinion of such distinguished chemists deserves inquiry. I, therefore (says M. Liebig), examined the excrements of a cow which had been fed, for a length of time, on hay and potatoes, and, to my astonishment, I found nearly the whole of the waxen or fatty matter of the alimentary substance of the animal contained in the excrement. The cow, which consumes daily thirty pounds of potatoes and fifteen pounds of hay, takes in with the food about thirty drachms of materials soluble in æther; this makes one hundred and eighty drachms in six days; now the excrement furnishes nearly one hundred and seventy drachms in the same period of time.

According to the experiments of Mr. Boussingault, which agree exactly with the results obtained in our dairies, a cow fed on the quantity of hay and potatoes above mentioned, will give in six days about one hundred and thirty pints of milk, containing nearly ninety-eight ounces of butter; now, it is quite impossible that these ninety-eight ounces of butter should be derived from the one hundred and eighty drachms of waxen matter contained in the food, because the excrements of the cow contain nearly as much of that matter as has been taken in by the animal.

SHEFFIELD MEDICAL SOCIETY.

March 9, 1843.

Mr. OVEREND in the Chair.

Dr. Favell exhibited—

1. Two small portions of lung taken from a man, by trade a butcher, who had died of pneumonia in the third stage, with purulent infiltration. The specimens exhibited were dense, dark colored, sunk readily in water, and contained a quantity of cretaceous matter. They bore a very close resemblance to the specimens of diseased lung taken from the bodies of grinders, exhibited during the session, and, in Dr. F.'s opinion, throw some degree of light on the pathology of grinder's asthma.

2. A portion of the aorta with the two iliac arteries taken from a man, aged sixty-six. The lining membrane of the aorta contained several patches of yellow discoloration. In the left iliac artery there was a deposit of bone of more than half an inch in length on the side of which ulceration of the lining membrane had commenced.

3. The left lobe of the liver in a state of cirrhosis. The specimen was obtained from the body of a man, aged sixty-six, who had died from an affection of the chest. Until he became confined by his last illness,