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Contributors

Tucker, James, M.D.

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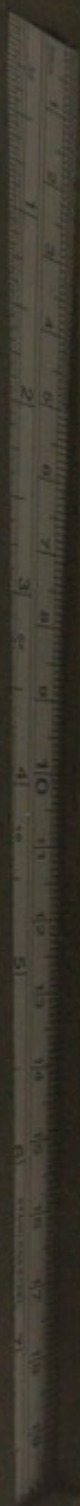
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ESSAY
ON THE
NATURE AND TREATMENT
OF
CHOLERA AND
WITH
MEDICAL REMARKS
ON THE
TREATMENT OF CHOLERA
AND AS APPLIED TO
PUBLIC HEALTH

BY
JAMES TUCKER, M.D.,
AUTHOR OF "THE HUMAN THROAT"

DUBLIN:
JOHN FALCONER, 33, UPPER SAE
LONDON: CHURCHILL & SONS, NEW
1861.

ESSAY
ON THE
NATURE AND TREATMENT
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TREATMENT OF CATTLE PLAGUE:
ALSO AN APPENDIX ON
PUBLIC HEALTH.

BY
JAMES TUCKER, M.D., M.R.C.S.E.,
AUTHOR OF "THE ROMAN THERMO-ELECTRICAL BATH."

DUBLIN:
JOHN FALCONER, 53, UPPER SACKVILLE-STREET.
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1865.

NEW YORK

WILLIAM AND SON

CHOCOLATE AND CANDY

WILLIAM AND SON

THE GREAT OF LITTLE

WILLIAM AND SON

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TO
WILLIAM STEVENS, ESQ., M.D.,
D.C.L. Oxon.

MY DEAR DOCTOR,

“To honour the physician for the need thou hast of him,” is a tribute due to those good works men do, which live after them to perpetuate their memories. To soothe and to save life is a higher function than to enjoy it; to extinguish maladies through the light of medical science is, perhaps, the noblest work of the physician. You have been successfully engaged in these philanthropic pursuits, and, in consequence, you now enjoy those durable testimonials of scientific merit, and of moral worth, which may be transmitted down through time for centuries, as marks of honour in your biography.

It is not for me to attempt to decorate your character with the flowers of language, when such durable fruit is so eloquent an encomium of your fame. I deem it, however, due to you, and to the subject of my Essay, to refer to those memorials of merit which you now so honourably bear.

The Royal gift, equivalent to a noble independence, bestowed upon you by the late King Christian VIII., of Denmark, in consequence of your improvements in medicine and surgery, and your successful saline treatment of His Majesty's subjects in the West Indies, when attacked with yellow fever; the honorary degree of D.C.L. Oxon., conferred upon you by the late illustrious Duke of Wellington, in company with that distinguished surgeon, Sir Astley Cooper, Bart., and with his Grace's eminent consulting

physician, Dr. Hume; and the prediction of the late scientific authority, Dr. Prout, that your paper, read before the Royal College of Physicians, London, in 1830, "contained the germs of discoveries of the last importance to mankind," are a rare collection of honourable testimonials; while the "*brilliant*" you bear from the late Emperor of Russia may be regarded as the crowning memorial of your superior merits.

The inscription upon the hundred-guinea plate, you received from the Court of Magistrates of the Metropolitan County of England, will be a lasting record of your fame. When your enemies and the deadly opponents of your scientific views are forgotten, these durable words will declare, to generations yet unborn, the scientific truths on the nature and treatment of fevers and of cholera you were the first to expound:—"Presented to W. Stevens, Esq., M.D., by the Court of the Magistrates of the County Middlesex, as a testimonial of the high sense they entertain of the importance of his discovery for the treatment of cholera, and in consideration of his great attention to the sick in the prison of Coldbath Fields, during the prevalence of that disease—1832."

Scotland gave you birth; you enjoy your *otium cum dignitate* in England; the crowned heads of Northern Europe and the Illustrious Warrior who placed the Lion of England upon the field of Waterloo honoured you, while a fellow-countryman of the Great Duke begs to dedicate his Essay to you, in terms of profound admiration and respect for you, his sincere friend,

And has the honour to remain,

Yours, with much esteem,

JAMES TUCKER, M.D.,
M.R.C.S., Eng.

PREFACE.

THE end I have in view, in the accompanying Essay upon the nature and treatment of cholera, fevers, and the typhoid fever of cattle—the Siberian plague—is to show that they are members of one family of zymotic or fermentible disorders. Though they be distinct in species, they resemble each other in so many points, that the same first principle of medical science is generally applicable to the treatment of all, whether in man or animals. They are independent and distinct as regards their vital germinal origin, but have one common fosterer. We inhale these pestilential germs in foul air—we drink them in foul water. Dr. Lionel Beale has described them as the source of contagious diseases. He says:—"These particles of living germinal matter may retain their vitality for some time after their escape from the seat of their formation; may pass through the air, be preserved in clothes, in fluids, or moist solids; the smallest particle—less than the $\frac{1}{100000}$ of an inch in diameter—being introduced into the body in a fit state for its nutrition may grow, multiply, give rise to a particular form of disease, and produce myriads of particles like itself; but, when introduced into a healthy organism, such particles die, or the organism resists their influence."

The germs of cholera this year had a polluted centre in the Mahomedan pilgrimages at Mecca for their cradle; ships for their transport to several European cities and towns, ripe for their reception. Similar fostering causes may account for the spread of the Russian germinal cattle plague. Both these pestilential scourges have moved the French Government to an international consideration of the vital question of public health, with a view to devise measures to check the decimating influence of this allied army of epidemic and epizootic diseases. The office of the physician will be to co-operate, so as to endeavour, under Divine Providence, to extinguish these maladies in the light of sanitary science.

The object of my Essay is to show, that the indications of the medical treatment of them should be to recruit the blood in all its constituents; I have, therefore, endeavoured briefly to resolve the animal body into its ultimate elements—its mineral constituents—in order that we may clearly perceive what it is we should re-supply, to support the salutary efforts of nature. If we fail to recognise her wants in the blood, it will fail accordingly. We should, therefore, recruit its saline, alkaline, iron—its electric-mineral constitution. We should also respire pure air, drink pure water, refrain from alcoholics, and enjoy electro-muscular open air exercise. The electric properties of mineral waters are now being recognised by French scientific authorities. They have more to recommend them when taken in the form of such social beverages as spirits, or sherry and Seltzer, &c., than these alcoholic drinks,

whiskey punch, ale, porter, &c., which are wanting in all the mineral elements of the blood, and are, therefore, false friends which elaborate that degraded tissue—fat—that figures in coarse corpulency.

The beneficial influence of pure water may be perceived when we reflect that it is composed of eight-ninths of oxygen, the atmosphere having only one-fifth of that vital element, which is vastly more condensed in the fluid form than in the air we breathe. We can, therefore, understand its salutary influence in the hydropathic wet-sheet pack, or jacket poultice all round the body, to allay irritations of the mucous membranes; when the water being imbibed through the pores of the skin, and transmitted to the capillary system, there undergoing electro-chemical decomposition, to liberate its oxygen, in an ozonized state, to support the electro-chemical combustion of the pestilential germs, and of the refuse matters of the living body, and then to eliminate their remains. I have, therefore, suggested this hydropathic medical adjuvant for the present typhoid fever of cattle, with the dilute internal alkaline treatment, to allay the irritation of the pneumo-gastric, and intestinal mucous membranes, which is so remarkably severe in this pestilential disease.

The oxygenating (peroxide of hydrogen) saline waters exhibited by Dr. Richardson, and the hot-air baths should also be tried in the treatment of the rinderpest, before the barbarous lynch-law practice of wholesale slaughter of the

sick be prescribed, which entails serious loss to the proprietors and to the nation—is an outrage upon humanity and an insult to medical science. We are told that in the middle ages, whenever a pestilence broke out in a city, the people hanged the physicians for poisoning the wells; though the wells, doubtless, were poisoned then, as they are now, by the soakage of contaminating sewage, for which some parties are now gravely responsible. We are on the threshold of great improvements in sanitary science. It is not in this age that surgeons of any class should consign their patients to slaughter—a sentence, not a prescription, which is terribly suicidal to their professional reputations.

WHAT IS MAN?

BEFORE we review the nature and treatment of cholera it may be well, briefly to consider the constitution of man, in order that we may contrast his healthy and his disordered conditions. What is man? He is an immortal spirit, endowed with light from eternity, and endowing flesh with life *pro tempore*. As the latter more immediately concerns our present inquiry I shall confine myself to it. What then are the constituents that enter into the construction of man's living tenement? Suppose him to weigh 12 stone 4 lbs., and to be resolved as follows:—Into water, 111 lbs.; gelatine, 15 lbs.; fat, 12 lbs.; fibrin and albumen, 7 lbs.; phosphate of lime, 7 lbs., amounting in all to 153 lbs.; and a variety of other matters which appear, upon a more minute examination of their ultimate elements, as follow:—The metals of magnesia, 10 grains; of potass, 150 grains; of soda, 1 oz.; of lime, 2 lbs.; iron, 100 grains; phosphorous, $1\frac{1}{2}$ lbs.; sulphur, 4 oz.; silicon, 1 grain; carbon, 21 lbs.; hydrogen gas, 14 lbs., or 3,000 cubic feet; oxygen gas, 111 lbs., or 750 cubic feet; and nitrogen gas, 20 cubic feet. The foregoing materials make up the bricks and mortar, as it were, of our living tenements, which are all so chemically combined and condensed, that we appear to be a solid structure; but are being constantly consumed and dissolved, and either go off, partly like smoke, as invisible vapour, through our own throats, partly in perspiration, through a cuticular sewerage of about 28 miles in extent, and are partly drained away through the kidneys, &c. "We die daily." "In the midst of life we are in death." The matter changes, but the man remains the same, yet different; no longer the same matter, but still the same man. "Singular—to be once another and the same."—*Sir W. Scott.*

The various structures of our living bodies are all removed in time, and should be replaced—such is the wear and tear of life.

The blood—"the life of the flesh," the internal atmosphere of our living bodies, though not an organ, is one in the act of formation, or rather the sum of all the organs that are being formed—supplies the pabulum for every part of the body—all the constituents that I have enumerated, and maintains through them, all the electro-chemical functions of the living body. Dr. Bence Jones, of London, says, that the human body may be regarded as consisting of four parts:—"a funnel, a circle, an envelope, and a drain." A funnel to receive the nutriment, a circulation to diffuse it, an envelope to retain it, and a drain to remove the refuse materials. He also states that if one single saline of the blood be left out of our daily food, disorder, and ultimate death, may be the result. It is, therefore, obvious that the occasional use of these artificial mineral waters, Seltzer, &c., which contain the same salines that are present in the blood, are clearly indicated to recruit that vital fluid, with those electro-excitant salts and mineral matter which are required to repair the waste of the muscular, nervous, and bony structures, and to elaborate that animal electricity, which is so essential to the development of animal heat, and to sustain the electro-magnetic condition of the iron of the blood. Dr. Stevens perceived the deficiency of these conditions in the yellow fever and cholera of 1832. He proved by experiment that the electro-chemical power of the blood to attract oxygen, through the pulmonary membrane into the circulation, depended upon its alkaline and its electro-excitant saline condition, without which there can be no electricity developed to render the iron of the red globules of the blood electro-magnetic, in order to attract and to carry oxygen through the circulation. The electro-excitant saline condition of the blood is as essential to our existence as the air we breathe, if there be a deficiency of it, there can be no electro-chemical union of oxygen with the carbonaceous and nitrogenous matters of the body. Dr. Bence Jones, of London, seems to advocate now the same views first published by Dr. Stevens in 1832; for he states that there can

be no union of ozone or oxygen with the organic compounds of the body without the aid of some alkaline carbonate to promote their oxidation, and to resolve them into simpler substances—carbonic acid, water, and ammonia. Thus, he says, the carbonates of lithia, of soda, of potass, of lime, of magnesia, &c., are indirectly oxidizing agents. Dr. Stevens pointed out in his book, on the Blood, Fevers, and Cholera, published in 1832, how necessary it was to recruit the saline condition of the blood; he accordingly ordered Seltzer water *ad libitum*, in cholera, and his special remedies, seidlitz and his oxysaline powders in solution. The Seltzer water when properly prepared should contain the same saline constituents that are present in the blood. In every variety of blood disease the electro-excitant salines form the right arm of medical treatment, whether they be given as they are found in whey, beef-tea, mineral waters, or prescribed to suit each particular case. If they be omitted from the treatment of febrile and pestilential diseases, it will matter little whether we adopt Dr. Graves's plan, to feed fevers, or Broussais's, to starve them—in either case the living body will crumble into dust.

The new views of Dr. Bence Jones, seem again to harmonize with the old ones of Dr. Stevens, for he also recommends the alkaline gaseous mineral waters, as Seltzer, &c., to neutralize the acidity, which imperfect combustion produces. He maintains that from the deficiencies of the chemical oxygenation, and, therefore, of the imperfect combustion of the refuse materials within the living body, these noxious sub-oxidized acids, the uric acid of gout, the lactic acid of rheumatism, the oxalic acid of other dyspeptic disorders, are elaborated, and a host of diseases of sub-oxidation are engendered.

Electricity acts in all the vital functions under influence of the living spirit, assuming simultaneously each and every character upon the stage of human life. It is the universal agent of nature, and foreman of all works within us.

Matteucci compares the process by which the muscular electric current is generated in man to a voltaic apparatus, and attempts to

show that the current from the interior to the exterior of a muscle is as follows:—

Oxidable zinc represents the true fibre of the muscle.

The acid or saline exciting fluid, the arterial blood.

The copper or platinum conducting plate, the surface of the muscle.

Baron Liebig states that the muscular fibre is acid, and that the blood is alkaline, and that myriads of electric currents arise in every mass of muscle, from the reaction of the acid fluid exterior to the blood-vessels, on their alkaline contents, and, therefore, a muscle becomes an electro-genic apparatus. To show that the muscular action of the arms can excite electricity, we have only to hold a wire in each hand in connexion with a galvanometer, at their opposite ends, and to work the muscular power of each arm alternately, and the needle will deviate accordingly from right to left, and *vice versâ*. Such electric currents are supposed to exist in every part of the body. The lungs and skin are electro-positive, the liver and bowels are electro-negative. The internuncial function of the nervous system is a magneto-telegraphic motive power. Faraday has rendered it probable that there is a greater amount of electricity required to decompose nine grains of water under digestion than is liberated in a thunder storm; and that if a human being could be balanced upon the pivot of a magnetic needle, he would point equatorially and not from pole to pole.

The salts of the blood are electro-excitant in their action; they are also decomposed by electricity within the living body, which might be fairly regarded as an electro-magnetic and a magneto-electric machine. The iron of the blood is electro-magnetic, and can, therefore, attract oxygen from the lungs into the circulation. Baron Liebig states that without oxygen morbid matter cannot be destroyed or removed from the body; that in febrile diseases the blood, through reaction, becomes a means of cure as a carrier of oxygen; but the blood in fevers and in cholera must be fortified with the electric salts—alkaline carbonates, chlorides, and

electro-magnetic iron, for without them the oxygen cannot be attracted into the blood, carried round the circulation by the red globules, to combine electro-chemically with the carbonaceous matters, and thus to elaborate carbonic acid, and to liberate animal heat, and bodily sensation, in the capillary cells. The successful results reported by some from the inhalations of oxygen gas in the treatment of cholera, and the failure of it in the hands of others, seems to depend upon the electro-excitant saline, and the electro-magnetic condition of the blood being favourable or otherwise, for its administration. The experiments of Mr. Broughton show that animals confined in oxygen gas die comatose in a few hours.

The atmospheric mixture of this gas is more congenial to our constitutions; it is not from any want or deficiency of oxygen in the air we breathe, but from the want of means to attract it into the circulation, that patients suffer in the last stage of cholera.

The importance of the respiratory functions for the purification of blood in the lungs, and the attraction of oxygen into the circulation, may be perceived from their nature and extent. At each respiration twenty cubic inches of air enter the lungs, which are diffused over a pulmonary surface thirty times the extent of the external cutaneous surface or skin; four hundred cubic inches enter in a minute, and 376 cubic feet, or 36 hogsheads of atmospheric air, in 24 hours. To meet this amount of air, one-fifth of which is oxygen, the heart propels two ounces of blood at each pulsation into the lungs, which at 75 pulsations in the minute, will amount in 24 hours, to a quantity equal to 24 hogsheads. Electricity is the power by which this immense amount of work is performed.

The following estimate, founded on the experiments of Dalton, shows the relative amount of work performed by each vital organ in the removal of the refuse materials and will throw much light upon the treatment of cholera. Ninety-one ounces of solid and fluid ingesta are thrown out, as exhalations, through the several outlets of the body, as follows:—

		By the lungs.	Skin.	Kidneys.	Bowels.
	oz.	oz.	oz.	oz.	oz.
Fluid egesta, . .	$76\frac{1}{4}$	$20\frac{1}{2}$	$6\frac{1}{2}$	$45\frac{1}{2}$	$3\frac{3}{4}$
Solid residue, . .	$14\frac{3}{4}$	$10\frac{1}{4}$	$\frac{1}{4}$	3	$1\frac{1}{4}$
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Total, . . .	91	$30\frac{3}{4}$	$6\frac{3}{4}$	$48\frac{1}{2}$	5

Solids subdivided into carbonaceous, nitrogenous, and saline matters :—

		Lungs.	Skin.	Kidneys.	Bowels.
	oz.	oz.	oz.	oz.	oz.
Carbonaceous, . .	$11\frac{1}{2}$	$10\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$
Nitrogenous, . .	—	—	—	$1\frac{1}{2}$	—
Salts,	—	—	—	1	—
Residue of undigested matter,		—	—	—	$\frac{3}{4}$

Half the solids and fluids are removed by the kidneys, a third by the lungs, a thirteenth by the skin, and an eighteenth by the bowels; whilst, of the fluids alone, the kidneys remove two-thirds, more than one-fourth are removed by the lungs, less than one-twelfth by the skin, and about one-twentieth by the bowels. The lungs remove two-thirds of the solid parts of the body in the form of carbonic acid and water in the state of vapour, the soluble nitrogenous and saline matters of the system are chiefly drained off by the kidneys. The exhalations from the skin and the bile abound in salts.

Electricity is the agent which acts in all the eliminating functions referred to (depending upon the electro-excitant saline condition of the blood), and which liberates the two electricities—one on the external acid surface or skin, the other on the internal alkaline mucous membrane. Matteucci shows that these electric currents are weakened by summer heat and morbid poisons, and are increased by active respirations. The important remarks of Sir James Murray are worthy of notice. He says:—"As the oxidation of one of the metals in the galvanic trough is the cause of decomposing electricity, and as the presence of a fluid is essential to that display, so the oxidation of carbon, and of blood, and its iron, may exert similar decomposition of dormant electricity of the air in an admirably adapted voltaic pile, like the cells of the

respiratory organs. All my experiments show a difference between the electrical equivalents of venous and arterial blood. No system of contrivance can be more beautifully fitted to equalize the distribution of electricity than the system of respiration and circulation; black iron in the blood under magnetic influence; circulating fluids, revolving and controlling polar arrangements; pulmonary evaporations generating electricity from a surface thirty times the extent of man's surface; steam electricity at every expiration; pressure and expansion of all the cells and cavities in the chest; water passing off in vapour, and vapour condensing into water—all and every one of these being great and well-known generators of electricity—all of them contributing, in health, enough of that vital fluid, or of its elements, to maintain due equilibrium, to revive the animal functions, to support animal excitability—all communicating a sufficient proportion to parts, or to the whole body, if partially exhausted, and neutralizing or rendering dormant other parts, or the whole system, if overcharged or overloaded with the vital spirit now under consideration. If the respiratory machinery be admirably adapted as voltaic poles, the alimentary cavities are equally so as galvanic cells. . . . Endless peristaltic motion and friction; chemical changes between molecules of dissimilar materials; saline and other fluids charging the revolving substances; the liberation of elements—carbon, oxygen, hydrogen, and nitrogen—from their nutritious atoms; hunger exhausting electricity, repletion overloading it; secretions composing and decomposing without end—all produce electric alterations in proportion to their own changes, and all of these phenomena are controlled and regulated by that universal principle of health and life—electricity itself." Dr. Stevens seems to have defined the true nature of things in man more precisely. He states that the source of the vital electricity is the vital air respired by our lungs, and thence by the attractive power of the saline matter into the blood, in which it is circulated, or carried by the red globules to the capillary system, where the vital electricity becomes developed from the oxygen in a free state, and becomes the cause of bodily

sensation. On the other hand, the terrestrial electricity, or life of the flesh, is secreted by the cerebro-spinal centres, and conducted by their nerves to the muscular fibres of the heart and the capillary arteries; the vital electricity in the saline matter of the blood communicates the vital stimulus to the muscular fibres of the vascular organs of man and of all animals. The vital air is the fountain of the vital electricity; our mother earth is the source of the terrestrial electricity, from which, in combination with it, all the nutritive materials of our bodies are supplied under the influence of the life.

AN EPITOME OF DR. STEVENS'S THEORY OF CHOLERA.

The remote causes of cholera and yellow fevers are essentially different, but are produced in the same way; or, in other words, are absorbed into the blood, through the influence of which the vital fluid loses its saline ingredients, and thereby becomes incapable of circulation and of supporting the life of the flesh. The specific poisons of yellow fever and cholera are aërial—are inhaled with air into the lungs, and thence into the circulating blood. In yellow fever, when the temperature is above or below a certain fixed point the disease disappears. Cholera prevails in all temperatures—under a Russian snow and an Indian sun. Frost checks yellow fever, but has no such influence upon cholera. The action of the poison seems to be fostered more or less by filth of all kinds, though perfectly distinct and independent of it, as much so as the seed is from the soil in which it grows. The aërial poison by which cholera is produced, like that of all malignant fevers, appears to multiply itself in the blood, and, emanating from the bodies and excretions of the sick, taints the air around, and therefore becomes contagious. The sickness of stomach is produced by the poison being rejected from the tainted blood into the gastric organ. There is an excess of muriatic acid in the stomach of cholera patients, as well as in those attacked with yellow fever.

The cholera manifests itself in three stages; the first presents

vomiting and diarrhea, the second cramps or spasms, and a sinking pulse, the third is the stage of collapse. In the latter dismal state the circulation is arrested—neither heat nor vital electricity is evolved; the body becomes cold, sometimes colder than death, and often as pulseless; the countenance more cadaverous; the eyes sink in their sockets—they become hollow from the abstraction of their saline fluids, and retracted from the spasmodic contraction of the recti muscles; the voice is a sepulchral whisper, or croak; the breath is cold, expires no carbonic acid; the tongue feels like a frog; there is lividity of lips, and of the skin generally. The patient complains of a sense of heat and oppression, and desires to lie uncovered. There is insatiable thirst and extreme restlessness, and prostration of all the physical powers; there is a gradual diminution of the respirations and of the pulsations, until the latter disappear altogether. The blood resembles treacle—"thick, black, and stagnant puddle, manifesting a state of universal congestion," or stagnation proceeding from the loss of its saline materials, electro-magnetic iron, and its alkaline carbonates, which endow it with the power to attract oxygen from the lungs into the circulation, then to be conveyed by those carriers of oxygen, the red globules, to the capillary system, there to support electro-chemical combustion, to elaborate through its vital electricity, carbonic acid, water, urea, &c., and to develop animal heat and bodily sensation. Dr. Stevens denies that the consecutive fever is essentially a stage of cholera; it is merely an accidental fever, produced by maltreatment of the disease by opium, brandy, and all other diffusible stimulants of that class; while those patients who have been confined solely to the saline treatment that Dr. Stevens prescribed, have been remarkably exempt from that accidental result of the stimulant opiate and astringent practice. It seems perfectly obvious that this state of things invariably results from stimulants, as I hope now to show more clearly.

The efforts of nature to eliminate the cholera blood-poison, by vomiting and diarrhea, drain away the alkaline carbonates and the electric salts, in the serous fluid of the blood; the animal electricity

accordingly becomes so diminished in the capillary system that nature endeavours to supply the deficiency by the extraordinary electro-muscular spasms of her electro-genic apparatus, the muscular system, which dissolves down a portion of the muscular structure, and reduces it into that simpler noxious nitrogenous compound, urea, which requires to be eliminated through the kidneys as fast as it is elaborated—otherwise uremic stupor and coma must be the result of its accumulation in the blood. The alkaline carbonates and electric salts are the special remedies to prevent and to remove this state of disease; while the stimulant, opiate, and astringent practice not only tends to lock up the cholera poison in the blood, but to produce and to accumulate the uremic poison therein, which causes the consecutive fever, that may attack some cholera patients, but which is merely an accidental, not an essential, stage of the disease. I am reminded of the remarks of a medical practitioner who was retained in Paris to treat cholera in 1832. He said:—“I first cured the patients of the bowel complaint; then they got fever; I cured them of the fever; but still they died, and no thanks to me.” He relied entirely upon art; he had no knowledge of nature’s efforts to relieve herself; he, as it were, locked up the poison of cholera in the system, and engendered a new one by his treatment, which caused the fever. We can, therefore, perceive how absolutely necessary it is to avoid such noxious remedies as alcoholics, opiates, and astringents, lest we promote congestion of kidneys, suspension of their functions, and, therefore, the retention of urea in the blood. Dr. Ross, of London, considers the routine combination of calomel, opium, and stimulants to be literally “murderous.”

Post mortem appearances have thrown little light upon this disease. They seem to indicate that it is a blood-poison, and not an organic disease, in which the serum of the blood contains albumen and urea in excess; and, although the salts of the blood are collectively diminished, the potash and the phosphates are said to be rather increased; so it seems to be salts, and of soda, that are required. Dr. Stevens is of this opinion, for the salts of soda that

he recommends are seven times the proportion of the chlorate of potash, which is a salt so remarkably rich in oxygen that every three grains of it will yield four cubic inches of oxygen gas.

The heart, brain, lungs, and liver are usually found healthy; the kidneys generally gorged with venous blood, what might be expected from the uremic poison of the fever. The bodies after death are much reduced, of a livid colour, and putrefaction more delayed than usual. Very remarkable muscular contractions are sometimes noticed, shortly after death, from this disease. In the *Cholera Gazette*, for 1832, it is mentioned that in India the dead bodies of the soldiers were so violently convulsed that their comrades, "in order to calm the timid, bound the limbs to the bed-frame." The heat of the body often increases after death from cholera, which also sometimes happens with these *post mortem* muscular contractions. In the *Electro-Chemical Notes on Cholera*, published by Sir James Murray, M.D., in 1849, he gives a letter to the *Lancet*, dated November 4, 1848, from a Mr. Atkinson, in which he states that he observed "streams of electricity given off from the bodies of some cholera patients, as if they were in opposite electric states to the surrounding bodies." I am inclined to think that the beneficial influence of dry rubbing to relieve the cramps of cholera patients depends upon the amount of muscular electricity that the operator discharges into his cholera patient who is *minus* that important element.

Treatment.—Nearly every article in the *Materia Medica* has been tried for the cure of cholera. "Everything by starts and nothing long" seems to have been the ruling empirical practice for this disease; there was no fixed principle until Dr. Stevens prescribed a scientific code. The most opposite remedies were recommended. Purgatives and astringents, acids and alkalies, calomel in large and also in small doses, had each their advocates; sulphur, charcoal, creosote, castor oil, croton oil, cajeput oil, emetics, opiates, astringents, alcoholic stimulants; æther, camphor, ammonia, inhalations of oxygen gas, hot-air baths, bleeding, &c., were each and all tried against the pestilence. Dr. Graves, of Dublin, recommended

acetate of lead and opium in cholera, and condemned calomel, which he found to fail in almost every instance. Dr. Watson, of London, recommended calomel, which he tried in *six cases*, and congratulated himself that the loss in his practice was not greater than the average mortality; "only three died, and three recovered—I will not say were cured." Referring to brandy, opium, cajeput oil, he believes that each seem to do good in some cases; but still he cannot doubt that sometimes some of them did harm.—(See *Lectures on the Practice of Physic*). Mercury has been highly praised by Dr. Ayre, but the facts adduced by him are not worth much, for he can only show 360 recoveries from 725 cases. Drs. Baly and Gull, in their reports to the College of Physicians, showed recoveries of from 45 to 55 per cent. from the most opposite plans of treatment. Dr. George Johnson, of London, advocated the use of castor oil, but upon what medical principle it is difficult to comprehend, unless it be to eliminate the pestilential poison and the patient together. It appears that of 89 cases treated by castor oil 68 were fatal; recovery occurred only in 15 cases; 6 remained under treatment. It seems absurd to suppose that opiates, astringents, alcoholics, chloroform, or any form of mercurial or other medicine, save salines, can remedy the saltless state of the blood. What Dr. Elliotson says of fever—"give wine indiscriminately and you kill half the patients"—appears equally true as regards cholera patients, for give opiates and stimulants indiscriminately and the mortality will be 50 per cent. or upwards, as appears from the tables published by Dr. George Ross, in the *Medical Times*, 1848.

Other medical practitioners would combine the plans of treatment recommended by Dr. Graves, Dr. Watson, Dr. Ayre, and perhaps that of Dr. G. Johnson, and thus take the business as speedily as possible out of the hands of nature, believing that she alone was unequal to her difficult position. Remedies the most antagonistic in their nature and effects have been recommended for this disease—some, as it were, to export the poison; others to retain it, and to elaborate from the animal tissues an excess of that blood*

poison, urea. By this means we would have two poisons playing upon the vital organs—the original cholera poison and the uremic poison of consecutive fever, which latter, Dr. Stevens has long since demonstrated, is not a stage of cholera, contrary to the opinion of Sir David Barry, who fancied that it formed the third stage of that disease. Hot alcoholic stimulants fail to produce reaction in severe cases, and in less severe ones they are injurious, for they cause the poison of urea to be retained in the system, and thus produce the fatal consecutive fever. Opium and calomel are not natural nor necessary ingredients in the living blood. The therapeutic action of mercury in inflammation is to kill a portion of the blood—to dissolve new structures—to diminish sanguification, and, therefore, to lower the vital power of resistance to the noxious influence of cholera poison.

Dr. Stevens has published facts, and solicited the fullest inquiry into their accuracy, to show that in about 504 cases that were under his saline treatment in the Coldbath Fields Prison, London, 1832, the mortality was under six per cent.; whilst, under the first irruption there, 165 cases were under his own immediate superintendence, and the mortality was only about one per cent.! The following is an outline of Dr. Stevens's saline treatment, pursued in the prison of Coldbaths, 1832, under his personal superintendence:—Patients presenting the premonitory symptoms, or first stage, of vomiting and diarrhea, were removed into an observation ward, where an even temperature, by night and by day, and great attention to cleanliness and ventilation were required. On their admission a seidlitz powder was administered; and if sinking of pulse was felt, without bowel complaint, three or four teaspoonfuls of Epsom salts were added to the seidlitz powder. On the bowels being moved, plenty of thin beef-tea, seasoned with salt, was given. If much irritability of the stomach prevailed, a sinapism was applied to the gastric region, and thirst was relieved with seltzer, soda, or pure water *ad libitum*. This simple treatment was so successful that a great number of the patients had no further complaint, and were dismissed, cured, in a few days.

If cramps, coldness, and sinking pulse were present, the patients were in the second stage. The nonpurgative salts were then administered every half hour, or more or less frequently, according to the severity of the symptoms, as follows :—Muriate of soda, one scruple; carbonate of soda, half-a-drachm; chlorate of potass, seven grains. When the irritation of the stomach was very severe a large sinapism was applied, and when the patient complained of heat or burning at the stomach an additional quantity of carbonate of soda was added to the saline. In the collapsed, or third stage, when life seemed rapidly ebbing, a strong solution of the same salts, at 100° of heat, was thrown into the bowels. In extreme cases this method was more successful than the injection of the electric salts into the veins. The saline mixture was given every half hour, or oftener, and in severe cases the muriate of soda was increased to a drachm. These powders were given dissolved in four ounces pure water for each dose. When the stomach was extremely irritable the carbonate of soda, with the tartrate of soda and potass, in a state of effervescence, was the most effective remedy. The alkaline carbonates are invaluable to allay irritation and to neutralize the noxious acids of the stomach. Mr. Moss, of Windsor, would undertake to cure almost every case, in the first stage, with the *carbonates alone*, but in the last stage would adhere strictly to Dr. Stevens's plan. Mr. Moss further states "that he believes the salts possess a specific influence in neutralizing or destroying the poison of the cholera," and says :—"I am far from solitary in deeming the discovery of this remedy as one of the most important and beneficial of the age; and its author (Dr. Stevens) is not only a real benefactor to mankind in general, but one of the greatest contributors to medical science."

The enema, found of such immense value in causing reaction, was composed of a tablespoonful of muriate of soda, with some sugar or starch, and administered every two or three hours, at as high a temperature as the patient could well bear. Sinapisms were applied, as early as possible, over the region of the stomach and between the shoulders, and to other parts, and frequent frictions

with warm towels or flannels. A pure air to breathe was a matter of great importance to the person whose blood was contaminated with poisoned air.

Drs. Russell and Barry, in their instructions published by the London Board of Health, recommended "opiates and astringents to check diarrhea; leeching if the patient be plethoric; cordials and quinine if there be cold sweats; confine the patient to bed; keep up heat by diet—by emetics." "If there be no medical man at hand put the patient into warm blankets, and give immediately, *and at once* if he be an adult, two tablespoonfuls of common salt in six ounces of warm water." These learned lights imagined that there was softening of the spinal cord; they accordingly recommended that the actual cautery be freely applied on one, two, or more places on each side of the spine.

During the six weeks visitation of cholera in Sligo, 1849, I had recourse to the saline treatment in about 100 cases. The result was successful in *every case* where I had commenced the treatment before the stage of collapse set in; whilst many who seemed beyond all hope recovered under the use of the electric salts, blisters, sprinkled with turpentine applied over the heart, and sinapisms to other parts. I was first induced to try bleeding in a young man aged twenty-three years, who had been for some hours under saline treatment in a close, ill-ventilated, crowded cabin, where the poisoned air probably interfered with the effects of the remedies, and prevented reaction. I could only get an ounce of black gore. I despaired of recovery, from the bad quality of the blood, and the languid pulse, scarcely perceptible. I applied the turpentine blister over the heart, sinapisms to other parts, gave beef-tea seasoned with salt, and steadily continued the electric non-purgative salts of Dr. Stevens. In two hours I visited him, found that reaction had taken place, the vein bled freely, blood of a brighter hue, and the patient much improved. This recovery without opium, alcoholic, or other stimulants, induced me to pursue the saline practice in other severe cases, and with equal success. I had nothing like consecutive fever to contend with. In no instance did I attempt to check the vomiting

and diarrhea by opiates and astringents. On the contrary, I commenced the treatment with a seidlitz powder, or an equivalent dose of sulphate of magnesia, with one scruple of the carbonate of soda, the same quantity of the muriate of soda, and three grains of camphor dissolved in a tea-spoonful of spirit, and the entire taken in half a pint of water. This dose was followed in a short time by hot tea, or some such drink, which caused profuse perspiration, and also acted on the kidneys. One dose of the above powder was generally sufficient to check the disease in the premonitory stage, followed with salted beef-tea, arrowroot, or rice. An egg beaten up with one pint of strong green tea, might be taken as a substitute for beef-tea. No solid food was permitted for cholera patients for several days after recovery. All impurities were immediately removed, and fumigation with gunpowder was had recourse to daily. If the vomiting were severe, the muriate of soda was omitted for a time, and soda effervescing draughts and larger doses of chlorate of potass were given alone, or with the soda draughts. The beneficial influence of chlorate of potass may be understood when every three grains of it yields four cubic inches of oxygen under decomposition in the body. Water also, which is the solvent of all these electric salts, is decomposed under the influence of salines in the living body, yielding eight-ninths of oxygen gas.

Dr. Stevens laid down a scientific basis for the use of salines to recruit the blood in fevers in his paper read before the College of Physicians. He there shows that the blood owes its bright red arterial colour, its stimulating quality, its high temperature, its self-preservative, and antiseptic power to its saline condition, which prevents those chemical changes in it that otherwise might cause fatal fevers and diseased action in the solids. The use of muriate of soda, of nitrate of potass, carbonate of soda, tartrate of potass and soda, and of other salines, was attended with signal success in his hands; viewing cholera and fevers as pestilential blood poisons, he recommended the same saline antiseptics for both these diseases.

He arrived at the following conclusions:—

1st. That all acids give a dark colour to the red globules of healthy blood, and render their colour black in proportion to their strength; resembling the black vomit of yellow fever.

2nd. That the pure alkalies have a similar effect in changing the red colour of the blood to black, but not to the same degree.

3rd. That the whole of the neutral alkaline salts change the dark venous blood into a bright red arterial colour.

4th. That even those salts that contain an excess of alkaline, the sub-carbonate of soda for example, immediately changed the dark venous blood into a bright arterial colour.

5th. That when the neutral salts were mixed with the dark and dissolved blood that had been taken from the heart of those who had died from yellow fever, even this black dissolved fluid was immediately changed from black to a colour that was highly arterial.

The healthy blood contains a given proportion of saline matter; arterial blood contains a larger proportion of it than the venous blood, for all the solids and the secretions derive their saline matter from the arterial blood, which must be constantly recruited, to keep up its exact quantity.

Dr. Stevens's views respecting the nature of the blood may be regarded as a key to his treatment of cholera and fevers. A leading member of the Council of the College of Physicians in the *Quarterly Review*, published December, 1832, stated:—"Twenty years hence, if we be not greatly mistaken, Dr. Stevens will be honoured as the author of one of the most important works in the medical literature of our age—nay, as the patriarch of an era in medical treatment." Dr. Andrew Ure wrote:—"In case cholera return Dr. Stevens will be the sole practitioner for that disease, at least by proxy."

M. Muller, Dr. Copland, Dr. Prout, Dr. Elliotson, and Sir Astley Cooper, and many others, openly expressed their opinions in favour of the saline treatment of cholera. The new views by Dr. Bence Jones on the chemical nature of suboxidation disease

tend to support those published by Dr. Stevens in 1832. Dr. Bence Jones states that without the alkaline condition of the blood and the use of alkaline carbonates the oxygen would not combine chemically with the organic substance of the body; according to Dr. Stevens, oxygen consumes all these constituents of the body, through the chemical influence of the electric alkaline salts of the blood; oxygen alone without their aid will not neutralize the noxious acid and then develop the red colour.

Fevers and cholera are pestilential blood poisons—lesions in the capillary system manifested by different symptoms, by different efforts of nature to eliminate their specific poisons. Fevers are, in fact, nature's animal heat-cure to consume a blood poison, and to eliminate their morbid matters upon a critical day. Cholera, on the other hand, endeavours to discharge its pestilential poison directly, without periodic order, dissolved or diffused in the saline serous fluid of the blood. By a beautiful provision of the self-preservative power of nature, she develops electricity by electro-muscular spasms, at the sacrifice of muscular structure for the elaboration of urea, a noxious principle which, accumulating in the system, becomes the cause of consecutive fever.

I cannot better conclude this essay than by the following quotation from Dr. Tanner's *Practice of Medicine*:—"The only plan of treatment really deserving of notice, since it is the only one based upon a scientific foundation, is that by salines, as suggested by Dr. Stevens."

CATTLE DISTEMPERS.

AN essay on pestilential blood poisons in man would be very deficient if the terrible cattle plague, which prevails in England and Scotland just now were not brought under review. It is the special province of the physician to consult nature in every region of knowledge and in every kingdom of nature. The formidable cattle distempers come, therefore, within the field of medical science, of observation, and reflection. Heretofore some learned physicians were described as being deep read in books, but shallow in themselves and in the book of nature; but now we are required to study that book of books—nature, for all other books are secondary to her. The public press—the *Times*—call upon medical men to question nature more closely, and to interpret her replies for the good of mankind. Never was there a period in the history of man which demands it more urgently than the present, when cattle plague has invaded us, and cholera threatens us. It is right that the public mind should be made perfectly familiar with the nature, and, if possible, with the preventive and curative measures to check this plague. If it were not that Harvey and Jenner consulted nature in the animal kingdom, which she answered through the language of experimental facts, we might, perhaps, be in darkness still upon the circulation of the blood, and the self-preservative powers of inoculation and of vaccination, both of which discoveries enable us to solve some of the mysteries of our present subject.

Not having personal experience of this cattle plague, I shall quote from the able paper read by Dr. W. Budd, M.D., before the British Medical Association. Dr. Budd states that the materials for his essay were derived from the following sources:—1st. Professor Simond's able *Report on Cattle Plague*. 2nd. Roll's *Lehrbuch*, and the writings of other German authorities. 3rd. *The Report*

of the Russian Government Commission, lent him by Professor Gamgee. 4th. *Personal Observations of the Present Epizootic Disease at the Royal Veterinary College, London, and at an Infected Dairy at Marylebone.* Dr. Budd was requested by the British Medical Association to take up this important subject for study. His essay, read at Leamington, on the 4th September, 1865, is the successful result of his scientific labours. His conclusions are:—

1st. Cattle plague is a contagious and eruptive fever, peculiar to the cattle tribe, in which the eruption instead of occurring on the skin, as in small-pox, occurs on the internal surfaces of the alimentary canal (bowels) and the air-passages, nostrils included.

2nd. The poisonous germs thrown off by the eruption are cast out of the body in the discharges from these surfaces, which thus become the chief means of propagating the disorder. In Russia the plague is often inoculated by virus from this source.

3rd. The specific poison which causes cattle plague is, like the poison of small-pox, the product of the disease itself; and the living body of the animal affected with it is the only known medium in which it is bred.

4th. (A proposition which is merely a corollary of the last) cattle plague, like syphilis, like human small-pox, and sheep small-pox, and the living organisms which people the earth, having first come into being under conditions of which we know nothing is never known to spring up spontaneously now, but is self-propagated only.

All attempts at prevention must be based on these principles, reduced to three practical points:—

1st. To destroy the further manufacture of the poison by slaughter of the infected cattle.

2nd. To get rid of all poison cast off by them.

3rd. To prevent re-importation of the pest.

It is in the body of the living ox that the pestilential germ is generated and multiplied. Typhoid fever, cholera, and other pestilential diseases, are propagated by specific germs, which are cast into drains, and soak into drinking water. Improved drainage

and drinking water are the best safeguards against these scourges. To destroy these vital germs immediately on their escape from the body is our only certain security. These remarks apply to fevers and cholera, for the conclusions arrived at from the cattle plague, or typhoid fever, apply to contagious fevers generally, more especially to the typhoid fever of man. Dr. Budd has traced the similarity of this cattle typhoid fever to the typhoid fever and to the small-pox of man.

The intestinal disease of cattle plague resembles the intestinal typhoid fever of man; the disease or discharge from the animal's nostrils is identical with that from the intestines, and will propagate the disease by inoculation, and prevent a return of it hereafter. Once diseased or inoculated, the animal is rendered proof against this pestilence afterwards, which is, therefore, the analogue of the sheep small-pox and of the human small-pox.

A question for consideration doubtless will be, how far our vaccine lymph might render cattle proof against this varioloid or typhoid plague, whether it might be rendered milder by passage through the horse?—thereby follow Jenner's experiments, who inoculated the cow with the virus from the grease of the horse's heels, and from the cow then vaccinated the human subject. The typhoid fever of man and of cattle have each a period of incubation—are each contagious—each destroy the living body by multiplying within it—occur but once in life—each confined to its species—each characterized by an internal eruption—the law of one fever seems clearly the law of the other, as if their specific material causes are of the same nature—have the same specific origin, growth, and evolution, with all the same specific limitations.

The pestilential germ of cattle plague takes from five to eight days for incubation before the animal manifests any disorder. The symptoms commence with rigor or shivering, followed by increased febrile heat, frequent pulse, and sudden prostration of the powers of life, which are the prominent signs. The coat is stark; fodder is refused; and rumination ceases in a few hours. The sickened animal stands with its back arched; its head hanging down; its

ears lopped; its legs gathered under the body. Transient shivering of muscles betray the severity of the nervous disturbance. The animal looks dull; unable to move; staggers on, moaning from weakness; the cows lose their milk. In some few cases the bowels are torpid first; but in a few hours, or on the second day diarrhea sets in, discharges profuse, at last dysenteric. The evacuations are fluid, dirty yellow, or blood stained, have a peculiar sour smell, charged with flocculi from the diseased intestines. As the diarrhea proceeds the animal becomes weak; the tail has lost its power over the torturing summer flies; it remains unmoved. In malignant cases the discharges become involuntary; the lower bowel prolapsed, raw, fretted, and irritated. At an early period, sometimes at the commencement of the disease, a mucous discharge flows from the eyes and nostrils, transparent at first; becomes charged with whitish opaque flakes. As the disease advances this mucous fluid stands in viscid pools before the head of the animal. When this condition extends to the throat and windpipe, cough sets in, and respiration becomes hurried and embarrassed with a peculiar rough moan that seems very characteristic. The temperature of the body, at first higher than natural, is now unequally distributed; so that while the mouth and roots of the ears are hot, the tips of the ears and the extremities are often deadly cold. The strength failing, the animal lying with its head hanging back on its shoulders, recalls to mind the look of abject prostration in cases of typhoid fever in the human species. As life ebbs the belly becomes tympanitic, the limbs agitated by involuntary twitchings, and the back and loins crackle when pressed, from the extrication of putrid gases in the areolar tissues. At this stage the respirations become rapid and irregular, and the temperature falls every hour until the sufferer sinks. There is one characteristic of the disease—an internal eruption, profusely scattered over the intestinal canal and air passages. This eruption is the source of the discharges. When an ox or cow becomes suddenly seized by a fever, with prostration and profuse discharge from bowels and nostrils, the presumption is strong that it is a cattle plague. The rapid death, and extension of

the disease to others, removes all doubt upon the question. I have quoted the foregoing from Dr. Budd's paper, read before the British Medical Association, believing it to be the most correct report of the nature and symptoms of the Siberian cattle plague.

Treatment.—To arrive at the true treatment of this disease, like that of all others, it must be based upon the primary principles of medical science, and adapted to the scientific nature of the disorder. As lawyers interpret one portion of an Act of Parliament with the light of another, so, in like manner, physicians interpret the true nature of cattle distempers—epizootic diseases with the light they derive from epidemic diseases. It is by such comparisons alone that they can arrive at scientific truth.

Man and animals are preyed upon by a deadly brood of vital pestilential germs, which seem to propagate in the blood of both, and to destroy its vitality by the action of the same powers. They appear to be members of one pestilential germinal family, some species of which are common to man and to animals.

A blood and a germinal pestilence common to both, indicates more or less of a preventive and a curative treatment common to both. Medical remedies are prescribed to aid nature in epidemic diseases, to eliminate the blood poisons or pestilential germs, and latterly to kill them and to prevent their reproduction within the blood. When Professor Polli, of Milan, neutralized the poison of glanders in a dog, with the aid of two drachms of bisulphate of soda, administered daily to the animal, under which antiseptic treatment he recovered—while other dogs similarly tainted by the injection of glanders virus died under its influence—we are not without hope. Professor Polli maintains that morbid ferments, of zymotic diseases, and all sorts of febrile disorders, may be arrested by the use of the bisulphites of soda, potass, and magnesia, and that we have in them a remedy to prevent, as well as to cure all such pestilential blood poisons. Dr. De Ricci, who has also advocated their beneficial influence in arresting zymotic diseases, has now an ample field to test their salutary powers, since the medical profession are remarkably cautious in suggesting remedies for this

cattle plague. The *Times* invites them to take up the subject; every suggestion is worthy of consideration. We should not despair from the statement of the Professor of the Veterinary College at Warsaw, addressed to the Earl Russell, that "all experience proves that all remedies for this disease are fallacious." The General Board of Health, London, pronounced a similar opinion upon cholera in 1851:—"That the medical experience of Europe enabled them to state that for the collapse stage of cholera there is no cure." There are living exceptions to contradict that sweeping assertion as regards cholera. I trust that the proclamation of the Polish professor will be equally unfounded. In cattle plague (like cholera) nature, by an eruptive effort upon the mucous membranes of the stomach, bowels, and bronchial tubes, endeavours to throw off the pestilential blood poison in the mucous discharges. It is the duty of the physician to recruit the blood of the sickened animal—to re-supply its saline and alkaline conditions. The alkaline carbonates are specially called for to allay the irritation of the mucous membranes, which are alkaline in health; but in this disease the law of nature seems to be reversed—they become irritated by acid, acrid, noxious humors. In animals, as in man, the blood becomes a means of cure as a carrier of oxygen, without which the morbid matters and pestilential poisons of febrile diseases cannot be destroyed or removed from the living body. If the saline, the alkaline, and the electro-magnetic iron condition of the blood be not sustained under the exhausting discharges from it, the vital power, the animal heat, and all the powers of resistance to the pestilential poison must fail. Unless the alkaline condition of the blood be kept up the oxygen will not combine chemically with the carbonaceous and nitrogenous compounds, to form those simpler ones carbonic acid, water, and urea, which are thrown off by the skin, the lungs, and the kidneys. Unless the saline condition of the blood, by common salt, chloride of sodium, be constantly kept up, the most important electro-chemical actions within the animal laboratory cannot proceed. The decomposition of salt into chlorine and sodium, causes also the decomposition of water into eight parts

oxygen, and one part hydrogen, and liberates electricity within the body. The hydrogen and chlorine combine as muriatic acid, so necessary for gastric juice; the eight-parts oxygen is set free in an ozonised state to combine with, and to consume, electro-chemically, all the noxious humours and pestilential germs it may meet with. The loss of salt in food would cause death from worms engendered within us. What may kill or check the propagation of worms, may have a similar influence over pestilential germs, when skilfully administered with chlorate of potass, a salt which is so remarkably rich in oxygen that every three grains of it yields four cubic inches of oxygen in an ozonised state, suited for chemical combination. Iron is also an essential condition of the blood—in its electro-magnetic state, it forms the red globules of the blood, attracts oxygen from the lungs, and carries it through the circulation. It can be conveniently administered in the soluble form, combined with iodine, which resembles chlorine in its indirectly oxidising power. Chlorine water might also be judiciously tried for the reason just assigned. When the premonitory symptoms are detected, castor oil and turpentine would be a salutary dose, perhaps, to kill the germinal life of this zymotic fermentable fever, as turpentine kills worms.

This alkaline saline treatment has more to recommend it than the alcoholic treatment had recourse to for Miss Burdett Coutts's cattle, which does not appear to be founded upon scientific principle. The alkaline saline treatment in some form is the one generally had recourse to in almost all the chemical suboxidation disorders of the animal systems. Oxygenation, perfect combustion of morbid matters, and elimination of their chemical products, seems to be the salutary end and object to be desired.

The alkaline salines suggested are :—

Bicarbonate of soda, one ounce ;

Muriate of soda (common salt), one ounce ;

Chlorate of potass, half an ounce ;

Rochelle salt, one ounce ;

To be dissolved in one gallon of water.

One pint to be given every second hour, or oftener.

As the digestive functions must be impaired or destroyed, it will be necessary to support the animal with nutriment requiring little or no digestive action. A raw egg dissolved on each pint of saline solution might be given with great advantage; or milk and barley gruel, half-and-half, in which perhaps one drachm of the syrup of iodide of iron might be given on a pint of such demulcent fluid, once a day. The animal might also be packed in wet sheets soaked in salted water, and covered with some woollen blanket to retain heat and moisture, and thus to relieve the internal mucous membranes upon hydropathic principles. The decoction of the Irish Carrigeen moss would be a cheap nutritive, demulcent drink, well suited for diseased cattle. It is more than thirty years since I first suggested it as cheap salutary nutriment, in combination with milk, for the rearing of calves. Since then it has been much used, and found to be a very salutary food.

I am glad to find that the Edinburgh Medical Committee appointed to inquire into the nature and treatment of the rinderpest, "deprecate and protest against the indiscriminate slaughter" of the sick cattle. They recommend that the disease be treated with a view to cure; that it should not be considered hopeless. They regard it as of a low type. That the diseased animals should be placed in a warm well ventilated byre, temperature 70°, be carefully rubbed down, and covered with a warm rug; that warm drinks of gruel, bran tea, or hay tea, be copiously administered, as the only food suited for the early stage; with cold water to drink *ad libitum*. Stimulant diuretics and diaphoretics to be also administered, to act on the skin and kidneys, to relieve internal congestions, and to eliminate the poison. Dr. Smart's dose—2 oz. of acetated water of ammonia, 1 oz. of sweet spirits of nitre, and 6 drachms of carbonate of ammonia, in 9 oz. of water; to be given three times a day. The above dose seems to me too stimulant for the irritated mucous membranes, and contains nothing to recruit the blood. The committee recommend the loaded bowels to be relieved by mild laxative medicines; Professor Dick's dose—16 oz. of linseed oil and a mutchkin of whiskey; or Dr. Smart's

dose—2 oz. of sulphur, 1 oz. of nitre, and 1 oz. of powdered ginger, 1 lb. of treacle, and a quart of water. The committee suggest, that whichever of these laxatives be given it should be repeated at intervals of some hours, till a full effect be produced. They very properly condemn *strong* saline and drastic purgatives. Professor Dick recommends for diarrhea a quart of lime water and $\frac{1}{2}$ oz. of laudanum to be given three times a day, and 6 drachms of carbonate of ammonia three times a day.

To promote convalescence $\frac{1}{2}$ oz. of sulphate of iron to be given twice a day, or Dr. Smart's dose of one ounce and a half of powdered cinchona.

It is due to the learned medical committee to give this summary from their report, which may be open to some remarks. On the same principle that they forbid solid food I would condemn such insoluble medicines as sulphur, ginger, and powdered cinchona; also such strong doses as 6 drachms of carbonate of ammonia three times a day, and $\frac{1}{2}$ oz. of sulphate of iron twice a day. They seem to forget the severe irritation of the mucous membranes of the stomach, bowels, &c., which are the formidable complications of this typhoid fever. The mild diluent alkaline saline and gentle tonic iron treatment, with fluid nutriment, such as their bran tea, or hay tea, and barley gruel, with, perhaps, the stimulant of camphor or of garlic juice, dissolved or diffused in these tisans, would be more congenial to the diseased digestive organs of the sick beasts. Dr. Allnatt, in the *Times* of the 17th October, gives the following prescription of a practical farmer, who received it from an experienced farmer and cattle breeder in Wiltshire, thirty-five years since, but it seems too strong a pickle (one part saline to two of fluid) for cases of such severe gastro-intestinal irritation, as is characteristic of the rinderpest:— $\frac{1}{2}$ lb. common salt, $\frac{1}{4}$ lb. Epsom salts, $\frac{1}{4}$ lb. brimstone, 2 oz. ground ginger, 2 oz. nitre. Strong saline solutions are not absorbed, they rather drain from and impoverish the blood; while weaker ones are calculated to recruit its saline constituents.

As sulphur is insoluble in water, I would suggest that a soluble

form of it be given in cattle plague. When one part of quick lime and two parts of sulphur are boiled together in ten parts of water, they dissolve each other, and unite perfectly. This sulphur and lime solution might be safely given when largely diluted, say one ounce to the quart of water or other fluid, and perhaps with as great benefit in killing pestilential germs within the animal body as it does parasites in some parasitical skin diseases.

The hot air bath has been tried with great benefit in the treatment of pleuro-pneumonia, the lung distemper of cattle, which is also a blood poison *originally and essentially*, while the lung complication is the *accidental* disease that accompanies it. If a favourable opportunity presented, I would suggest the trial of a hot-air bath in the present cattle plague, for "it is calculated to relieve internal congestions and inflammations of the mucous membranes, by bringing the blood in pounds to the surface of the skin."—Dr. Armstrong. A hot-air bath of high heat is said to kill animal poisons. It is only a few weeks since the case of a Dr. Buisson, who was cured of hydrophobia by a hot-air vapour bath, went through the public papers. In conclusion, the saline treatment combined with the wet sheet pack, and the hot-air bath, have more reason to recommend them than either the Lynch law practice for the slaughter of the animals, or the brandy practice for their intoxication.

I see by the *London Gazette* of Tuesday, the 17th inst., that a despatch from the British Ambassador at St. Petersburg encloses an account of the successful treatment of the cattle plague there by means of the vapour bath, cooling draughts, and food easily digested.

The vapour bath is too debilitating for a disease of intense debility like the rinderpest. The *hot air* thermo-electrical bath which I recommended in my essay, page 34, published 1860, is to be preferred to the relaxing vapour bath. "As vapour and water are good conductors of electricity, they must exhaust the living body of its due supply and debilitate it; while hot air, being a non-conductor of electricity, is well calculated to regenerate and retain it within the system."—Dr. Tucker (see page 79, Mr.

Urquhart's *Manual of the Turkish Bath*, edited by Sir Joh. Fife, F.R.C.S.). At page 34 I state :—"The rational scientific treatment should be to aid nature to eliminate the poison, the whole poison, and nothing but the poison; bring about a diversion by action on the skin—by hot air baths, which are calculated to bring blood to the surface of the skin, as Dr. Armstrong said, in pounds, and thus relieve internal congestions and inflammations." "Cold water to drink, and hot air to breathe will eliminate blood poisons by perspiration, produce a crisis as in fever, while hot air of high temperature, 240° , kills vermin, their eggs, and all animal poisons, pestilential germs included."

I cannot conclude without a brief notice of the hot-air bath, a sanitary institution which, notwithstanding many abuses in ancient and modern times, has contributed towards the promotion of personal and public health, and the prevention and cure of many diseases. For those of sedentary habits who cannot enjoy a sufficiency of electro-muscular exercise, they can have in the thermo-electrical hot-air bath a sanitary substitute, in which the pores can be opened, the lungs expanded, the whole system ventilated, and the refuse and noxious matters eliminated by copious perspiration. "In the sweat of the face shalt thou eat bread," then wash and be clean, for "cleanliness is next to Godliness," are household words on the physical virtue of personal purification. There is, however, as much difference between a purified hot-air bath and a foul hot-air bath as there is between a pure current of spring water and a stagnant putrid pool. There can be no greater salutary luxury than the former, and no greater noxious evil than the latter. They should be placed under sanitary inspection, to protect bath operatees against the respiration of the foul re-breathed air of overcrowded and ill-ventilated baths. Dr. M'Cormac, M.D., of Belfast, has fully exposed, in his able work on consumption, the noxious influence of ill-ventilated apartments in promoting, by the respiration of foul air, pulmonary consumption, and other tubercular diseases. The patented bath of Dr. Bolton, of Leicester, which is preferred at the Newcastle Infirmary, and the radiated hot-air bath

of Mr. Urquhart, London, are great improvements upon the hypocaust of this country. The more the bath of Dr. Bolton be ventilated the more it is heated, for both results are accomplished by one process. Under the hypocaust, the more the bath be ventilated the more it is cooled, for heating and ventilation are accomplished by different processes. The latter is, therefore, open to great deception, and should be subject to daily inspection.

To Mr. D. Urquhart, lately M.P. for Stafford, this United Kingdom is deeply indebted for his successful efforts to re-introduce into this country the ancient hot air bath, in an improved form, by radiated heat, as his able writings on *Heat a Mode of Cure and a Source of Strength for Men and Animals*, edited by Sir John Fife, Senior Surgeon, Newcastle Infirmary, so clearly show.

APPENDIX.

PUBLIC HEALTH.

As the questions of public health and of sanitary science seem to be urging their importance more and more every day, in consequence of the alarming spread of cholera in several European cities, it would be culpable neglect of a medical officer of public health not to co-operate in agitating the public mind at such a critical period. Sligo was more severely scourged by cholera in 1832 than any other town in Europe. This pestilence generally repeats its visitations to its old haunts, with renewed virulence if neglect of sanitary economy still continue.

An epitome of the sanitary points under discussion before the British Medical Association may be seasonably offered. The conclusions they arrived at were—1st. That Boards of Health should be established in every township, composed of two laymen, one medical man, one lawyer, and one civil engineer. 2nd. That these Boards should possess conciliatory manners and compulsory powers when the public good required. 3rd. That in laying out new streets and altering old ones, provision should be made for a supply, in purity and abundance, of light, air, and water. 4th. That the drainage, sewage, paving, and cleansing of streets, and the ventilation of churches, schools, public buildings, and private houses should be carefully attended to. 5th. That the habitations of the poor be placed under special superintendence. 6th. That baths, if on ever so small a scale, be established in every city, town, and village. 7th. That the sale of patent quack medicines be

discouraged, and that unwholesome, spurious, adulterated articles (bad spirits, meats, &c.,) be confiscated, and their venders fined.

All these matters require the attention of legislators and the active supervision of medical officers of public health.

Dirt and pestilential poisons seem to have the same attraction for each other that solar metallic radiation has for its kindred metallic vapours on this earth. They seem to embrace and to support each other. Not the distance of millions of miles will obstruct a ray of light, until it meets with, and is absorbed by its own kindred metallic vapour. I am inclined to believe that pestilential vapours observe the same law of affinity for dirty localities.

There could be no greater stigma on a municipal community than to neglect to provide for an abundance of pure air to breathe in all public institutions; and in private houses pure water to drink, and baths to cleanse. Where these three primary conditions of healthful existence are neglected epidemics and pestilential poisons prevail—morbidity and mortality must there be the sad tragedy of every hour.

In Dr. Stevens's *General Observations on Fever*, page 315, he states:—"It has been confidently asserted that of those persons in St. Petersburg who used the artificial saline waters, as a preservative against cholera, few were attacked, and not one died." In the treatment of cholera, page 460, he states:—"Seltzer water was allowed *ad libitum*, and a strong infusion of green tea was occasionally used in severe cases with advantage."

