EPIDEMIC CHOLERA.

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[Second Article.]

VARIATIONS IN THE SYMPTOMS.

The general features—what one may term the contour—of Cholera *Asphyxia*, that compendium of the prominent phenomena from which, in all latitudes, seasons, localities and classes, the disease may be easily and certainly made out, being sharply defined and uniform, the same symptoms, nevertheless, vary infinitely on the degree of their intensity, "according to circumstances" internal or external to the individual—from the simplest diarrhea with little pain and no cramps, and no graver derangement of the circulation and temperature of the surface than occurs from the operation of an ordinary purgative, up to the overwhelming attack of a prostration so paralyzing that the person stricken has scarcely become sensible of pain when the secretions are suppressed and the heart's action sinks suddenly.

Sometimes the premonitory symptoms are protracted, and the patient has a week or more of warning, in the form of diarrhea, uneasiness, and a sense of heat and "thrill" in the stomach and bowels; in some cases, not diarrhea, but *obstinate costiveness*, prevails. Sometimes he "falls dead in his tracks," like the men in the army of the Marquis of Hastings. At Bellamy, in India, a tailor was attacked while at work, and died in his working attitude, cross-legged on his mat; and a merchant, concluding a bargain, vomited twice and instantly expired. At Mecca, individuals in perfect health were suddenly stricken to the earth, vomited, turned cold, and died. Between these two extremes the merciful admonitions are of various duration, from a few hours to a few days; in the large majority of cases the disease takes from six to twenty-four hours to fully develop itself, and terminates by death or convalescence in from one to two days from the inception of collapse.

Sometimes the patient sinks at once, after discharging a small quantity of colorless fluid by vomiting and stool; sometimes the vomiting and purging are preceded by the spasms. Sometimes the matter vomited, instead of being colorless or whey-like, or like seething of oatmeal, is green, and the dejections instead of being thin, and whitish and muddy, are red and bloody, or they may even consist of a greenish pulp, like half-digested vegetables.

We have described the cramps as usually beginning in the extremities, and thence creeping gradually to the trunk; but in some cases they are simultaneously in all; and sometimes the order of succession is reversed, the abdomen being first effected, and then the hands and feet. Generally, neither the vomiting nor the purging are symptoms of long continuance; either they are checked by art, or the enfeebled body is no longer able to perform those violent motions—so that they, together with the cramps, usually disappear some time before death. After the first emptyings of the bowels the stools have been observed to be yellowish, turbid, or frothy like yeast, and though generally inodorous, they sometimes emit a rank, fleshy smell. The dejections are seldom attended with much griping, and sometimes they are effected without effort or uneasiness, though generally the calls are sudden and irresistible, and the discharges expelled with alarming force. Tenderness of the belly, on pressure, is not among the most common symptoms, nor, we repeat, are the vomiting and purging by any means the most important or dangerous; in a great number of fatal cases they have not been profuse, and have ceased, even without remedies, early in the attack.

The cramps sometimes precede the vomiting and purging, but in the low and most dangerous form of Cholera spasm is often absent, or is present in a very slight degree. Tetanic spasms of the legs, thighs and loins have been observed, but there is no general tetanus (lock-jaw), or even trismus. Hiccough in Cholera is not indicative of danger; on the contrary, when it occurs in the interval of struggle between death and reaction, it is a favorable sign, and generally announces the return of circulation. The spasm at the pit of the stomach is often very acute, and the belly is almost always drawn toward the spine by a remarkable permanent contraction of the abdominal muscles.

The pulse occasionally, though rarely, keeps up tolerably for several hours after the disease has plainly declared itself. Generally it becomes small and accelerated at an early stage, and on the accession of spasm or vomiting, suddenly disappears from the extremities. On the cessation of the vomiting or spasm, and sometimes, apparently, from the exhibition of remedies, the pulse will return to the extremities for a short time, and then again be lost. In the less severe cases it is not wholly extinguished, though much reduced in volume, and a thread of pulse, however small, is almost always felt at the wrist, where recovery from the blue or cold stage is to be expected. The sinking of the pulse in Cholera is a symptom not less characteristic than the cadaverous countenance, or the hoarse, plaintive whisper (*vox cholerica*), or the discolored skin, or the *chilled breath*; when it can be felt, it is generally regular and extremely feeble, "sometimes soft, not very quick, usually ranging from 80 to 100."

In the state of the skin, as in the other symptoms of Cholera, striking variations are found. The surface is sometimes observed to be dry, though cold; and in a few, rare cases, natural—"nay, of preternatural warmth." A rise of temperature has been repeatedly observed to take place just before death; but the development of heat under such circumstances appears to be confined to the trunk and head, and in almost all cases may be regarded as a fatal symptom. It is not indicative of any restoration of the diffused energy of the arterial system, or of any improvement in the function of respiration. The heat, in such instances, has continued well marked for some hours after death. The skin, in complete collapse, is generally insensible even to the action of chemical agents, and hence the usual vesicatories fail to blister. The application of mineral acids or of boiling water, in this condition of the skin, produces little or no effect, and now and then a patient is found who is insensible to the operation; nor can leeches draw blood from an early period of the attack.

The *blueness*, so characteristic of Cholera in the East, has by no means been found an invariable, or even a very common phenomenon in England or the United States. Dr. White, one of the physicians to the Gateshead Dispensary and Cholera Hospital, states that in scarcely one case in ten, in his practice, did the discoloration assume that form; but there is often a deep, brownish hue of the face and hands. This blueness or brownness can often be temporarily dissipated by energetic friction. Absence of the peculiar "cold sweat" is a rare, and, we believe, a decidedly unfavorable sign.

The urine, from having been limpid and free will become more and more scanty, and its passage will some times be attended with such difficulty as almost to amount to strangury; but as the collapse advances this condition gives place to that in which the kidneys have ceased to perform their office, and there is no more secretion. Some patients complain of an urgent and painful desire to empty the bladder; but the bladder is empty already, and after death is found to be dwindled to the smallest size; the desire may arise from the contraction of the posterior disk of the bladder, hard against the internal meatus, as disclosed in post-mortem examinations.

The pains of Cholera are agonizing to the sufferer, and at times so pitiful as to move the attendants to tears. The patient tosses incessantly from side to side, and complains of intolerable weight and anguish at his heart. As he struggles for breath, his imploring looks and gestures make you almost feel the horror that is burning and gnawing, and wrenching and strangling at his stomach and chest. At times, especially when the cramps are most severe, he rolls about and screams—and then there is that weary, weary cry for "water, water, water," and that heart-rending, haunting wail when the cold, bony grip of death is on him.

Violent headache is far from being a common symptom in cholera—a neuralgic pain over one eye is less rare. The cramp is invariably increased on moving. In some cases the patient declares himself free from pain and uneasiness, just when the dead-cold skin and the sharpened, anxious features, and the absence of pulse at the wrist, most surely portend speedy dissolution.

During all this mortal struggle and commotion in the *body* the mind remains clear and the perceptions unimpaired, almost to the final moment of existence. "The patient, though sunk and overwhelmed, listless, averse to speak, and impatient of disturbance, still retains the power of thinking and of expressing his thoughts, so long as his organs are obedient to his will." The mortal lies all down-beaten and distraught, but the immortal is still master of itself. Dr. Lawrie, Professor of Surgery in the Andersonian University, who closely observed the epidemic as it appeared at Sunderland, Newcastle and Gateshead, in 1832, commenting upon the declaration of the majority of medical men, that the mind is *always* unimpaired, says it appeared to him, in many cases, affected to a degree little short of what we find in concussion of the brain. He remarked this particularly in several children; when undisturbed they lay in a dull, sleepy, semi-comatose state, breathing with perfect calmness; when roused, they thought only of relieving their distressing sensations, and called vociferously for cold water. But he does not say that he found them irrational or incoherent, or that their condition was other than that which should attend upon congestion of the vessels of the brain.

THE STAGE OF FEVER.

A patient, having once fairly entered the stage of collapse, is rarely restored to health without passing through a fever closely resembling the typhus *mitior* of Great Britain. The system, under the influence of the peculiar and mysterious poison by means of which the Asiatic Cholera does its work, has been sunk into the lowest state of human existence. Those vessels that had ceased to pulsate, and all those muscular fibrils that had been for days convulsed, contracted, and, as it were, knotted and twisted in spasm, cannot at once resume their healthy action. The *vis medicatrix naturæ*, in resuming its efforts, seems over-eager for the restoration of the functions, and consequently sets up an exaggerated and dangerous action in every artery. After the "blue" cold period has lasted from 12 to 24, seldom to 48 hours, the vital powers begin to rally, the circulation and animal heat to be restored, the cramps to relax, and the vomiting and purging to diminish, if they have not already ceased. The warmth returns gradually, the pulse rises in strength and fullness, and then becomes sharp, and sometimes hard. The patient now complains of headache, with ringing in the ears. The tongue becomes more loaded, redder at the tip and edges, and dryer; thirst continues, but there is less nausea. High-colored urine is passed with pain, and in small quantities. The pupil is generally dilated, and soreness is felt on pressure over the liver, stomach and bowels. The stools are no longer like water; they first become brown and thin—then dark, or black, and pitchy; and for some days the bowels continue to discharge immense loads of vitiated bile. A profuse critical perspiration may appear, on the second or third day, and leave the sufferer convalescent, but more frequently the quickness of pulse and heat and dryness of skin are aggravated, the tongue becomes deeply furred, brown and dry, and sometimes hard, the eyes suffused and drowsy; there is a dull flush on the face, with stupor and heaviness. Commonly, at this time, there is low muttering delirium, or other marked affections of the brain; dark sordes collect on the lips and teeth, the patient is pale, squalid, and low, catches his breath, is extremely restless, and moans "solemnly." The pulse becomes weak and tremulous, on the skin rigors alternate with flushes of heat. Then comes a blessed insensibility, and the patient soon sinks under the prostrating effects of frequent pitchy alvine discharges—death arriving on the sixth, eighth or tenth day, or even later, to the very individual whom the most assiduous attentions had barely saved in the cold stage. Constipation is not an uncommon symptom in the febrile stage, and the urine is often secreted abundantly—in fact, dangerous retentions are to be guarded against. It is probable that the duration of the consecutive fever is, in the majority of European cases, commensurate with the duration and severity of the collapse, and not materially dependent on the kind of remedies employed. But, sometimes a very mild case precedes a dangerous fever, especially in Europe; and sometimes after the severest collapse there is no fever at all, especially in India. In England the consecutive fever has been regarded as more frequently fatal, unless strictly watched, than collapse itself; and in cases of recovery from even mild forms of fever, relapses, more or less alarming, have not been very uncommon there.

The points of difference between the phenomena o the European and the Indian forms of the Epidemic were intelligently stated by Drs. Russell and Barry, in a joint report to the British Government, dated "St. Petersburg, July 27, 1831," and by Dr. Lawrie of Sunderland and Newcastle, in a communication to *The Medico-Chirurgical Review*, in 1832. We believe that the same points of difference will be observed in the Epidemic now advancing toward these shores:

First: "The premonitory stage occurs in a much larger proportion of cases in the English than in the Indian disease. In the latter it is the exception, in the former the general rule." [The writer of the present article can verify, from personal observation, so much of this statement as relates to the phenomena of cholera in Malacca, Burmah and Hindostan.]

Secondly: "The evacuations, both upward and downward, seem to have been much more profuse and unguvernable in the Indian than in the European cholera though the characteristics of the evacuations are precisely the same."

Thirdly: "Restoration to health from the cold stage, without passing through consecutive fever of any kind, is far more frequent in India than in Russia or England, nor does the fever in India assume a typhoid type." [Recovery *directly* from the cold stage, without the fever, is the rule in India; whereas, in England or in the United States, we believe that few who once have been fairly collapsed, will escape the consecutive fever.]

Fourthly: "The proportion of deaths in the cold stage, compared with those in the hot, is far greater in India than in Western Europe."

Fifthly: "The head is more frequently affected in the British than in the Indian form of cholera—as shown by greater mental oppression and insensibility during collapse.

Sixthly: According to Dr. Lawrie, "the discoloration of the surface is neither so frequent nor so extensive in India as in England." [The *blue* is the common discoloration in India, the *brown* in Europe; though in many cases, in both England and this country, there has been a well-marked *purplish* change.]

When we come to consider the Pathology of Cholera, the reader's mind will revert to some of these variations and phenomena, as confirming our views of the nature and process of the morbid changes, and of the treatment scientifically and logically treated.

RECOVERY.

When the more formidable symptoms of collapse have set in with severity, the chances of recovery are in all cases precarious; and if the constitution has been impaired by previous disease, or has failed by reason of age, the case has always been regarded as nearly hopeless. But in childhood, youth, and the vigor of life, a well-instructed, sagacious, courageous and persevering use of remedies will often be rewarded with complete success.

A thread of pulse, however small, is almost always felt at the wrist where recovery from the "blue" or cold stage is to be expected. In such less formidable cases, it is never wholly extinguished, though much reduced in volume; the respiration, too, is less embarrassed, and the oppression and anguish at the chest are not so overwhelming although vomiting, purging and cramps may have been more intense. Just where the favorable turn is taken, in the first feeble efforts at reaction, the return of circulation is often curiously announced by hiccough. Then the surface begins to grow warm, the pulse reappears at the wrist, and increases in strength and volume, and the natural hue of the skin is restored. Next, the vomiting and purging cease, or rapidly diminish—(in certain cases of recovery from extreme collapse they even *return* for a time, after having quite disappeared)—the cramps are relaxed, fæcal matter reappears in the stools; bile, urine, and saliva are once more secreted and discharged; the voice becomes stronger and more natural—the racked and broken wretch sighs, weeps, and lives.

FALLACIOUS RECOVERY.

When the vital forces have begun to rally, the physician cannot be too vigilant; he must watch nature warily, suspiciously, to prevent recurrence of collapse on the one hand, to repel congestions of the head and viscera on the other. Where the strength of the patient's constitution, or the curative means employed, are, although inadequate wholly to subdue the disease, sufficient to resist the violence of its onset, nature makes various efforts to rally, and holds out strong but fallacious promises of returning health. Or when the restorative efforts are opposed by previous organic disease, general feebleness of constitution, or the worn-out energies of age, we must not calculate too confidently on any imperfect reaction that may be induced. In all such cases, the lost heat may be wholly or partially restored; if only partially, the chest and abdomen will become warm while the limbs remain deadly cold—a most evil omen; the pulse may return, growing moderate and full; the vomiting and cramps may cease; the stools may become green, pitchy, and even feculent; there may be a partial restoration of the natural excretions—and yet the patient will suddenly relapse and sink, "not from violent reaction or the development of any local inflammation, but from want of energy in the vital powers to carry forward the attempts at restoration which seemed so happily begun." The sufferer may have fallen into a flattering slumber; but now anxiety and sleeplessness will return, and all the alarming symptoms be reestablished. These ignes-fatui of rallying sometimes flicker for two or three days, and all that time life and death will be poised in a sensitive balance. In some of the most rapidly fatal cases warmth has partially returned to the surface, and the pulse has fluttered and flattered immediately before death. Be it remembered that the real danger is by no means in proportion to the quantity of matter discharged from the stomach and bowels. In some of the most trying cases this is not very considerable, and in some of the most successful it has been very great. Neither is cramp or spasm a sure criterion. The great danger arises from suspended or imperfect circulation. Restore and equalize this, and you have "cured the Cholera."

APPEARANCES ON DISSECTION.

The appearances disclosed on *post-mortem* inspections of the bodies of those who have died of Cholera, vary according to the duration and intensity of the attack, the age, constitution and previous health of the "subject," and the remedies administered; but enough of uniformity is found in the reports of the most instructed and careful observers—especially as to the points most significant, and of the first pathological importance—to serve the purpose of a description addressed to the unprofessional multitude through the columns of a miscellaneous journal. Enough, too, we think, to afford an accurate definition of the disease, in place of the bewildering guess-work of the text-books. In the language of the *Medico-Chirurgical Review*, "The man who would treat disease successfully, must not consider his only aim and object to be the knowledge of the various morbid changes which take place in the structure of the different organs, and of the symptoms by which they are distinguished; his researches must be directed beyond this—to the laws of vital actions, to the manner in which they are disordered, and to these agents capable of restoring them to their healthy state."

The bodies of those who have sunk in the earlier stages of Cholera exhibit hardly any unhealthy appearance; the stomach and intestines are apt to be paler, and more distended with air than usual, and some explorers have discovered, fancifully perhaps, a "characteristic fœtor" from the abdominal cavity. But in the more protracted cases, a greater or less degree of injection of the mucous membrane, with occasional *ecchymosis*, is the most frequent appearance. It has also been observed, in cases where the violence of the spasms proved the most prominent sympton, that the mucous membrane presented that appearance which approaches nearest to inflammation. The large intestines are sometimes filled with whitish and flaky-turpid fluid, sometimes with greenish, yellow, or tarry matter—in other words with the characteristic discharges, or with vitiated bile, just as the patient may happen to have died in the earlier or later periods of the attack, in collapse or in the struggle for reaction. In like manner the stomach contains either the injesta in an unaltered state, or the same "veal-soup-like" stuff that the patient has been vomiting; or its contents may be green or dark. So, likewise, as to the vascular appearances presented by the alimentary canal, the varieties seem to correspond, with instructive regularity to the duration, the stage, and the intensity of the attack. The mucous membrane is generally somewhat softened; sometimes of an unnatural paleness throughout, "but oftener having various portions tinted of various hues," from the pale rose to the dark brick-dust and slate-colors, as venous or arterial injection predominates; patches of *ecchymosis* and arborizations of the larger branches are frequent; but the most common appearances have been a red or purplish speckling of the mucous membrane, generally over the whole surface but more apparent in some parts than in others. Sometimes these different appearances are scattered throughout the entire extent of the alimentary canal; at other times the stomach alone is colored and the intestines pale, or the stomach pale and different portions of the intestines darkly injected. The venous trunks of both stomach and intestines are generally found remarkably engorged. The *rule*, divested of its numerous exceptions, or rather modifications, dependent upon circumstances and conditions which the intelligent physician will not fail to take into the account of each individual case, is: Where the patient has not lingered, but succumbed early to a rapid attack—no striking vascular change, beyond general venous congestion, and turgidity of the prominent vessels. Where collapse, in its completest form has been developed, repelling and damming the current of the blood—universal dark engorgement, with deep discoloration of the internal surface of the stomach and intestines. Where the disease has been protracted, and has reached the stage of consecutive fever—every degree of arterial injection, in addition to the congestion, from the lightest blush to the angry flush of exaggerated action and incipient inflammation. These are *the keys* to the *stages*; the mad malady rings many a change on them.

The liver is commonly found enlarged and gorged with blood; but not always. In some cases it is large, soft, and light-colored, and not very turgid; in others it is even collapsed and flaccid. The gall-bladder is, almost without exception, full of dark green or black bile. The spleen and kidneys are not always surcharged with blood; quite frequently they present a perfectly natural and healthy appearance. The bladder is always empty and contracted. The lungs have often been found in a natural state, even in cases where there has been much oppression of respiration. Much more commonly, however, they are either gorged with dark blood, so that they have lost their characteristic appearance and have rather assumed that of the liver or spleen, or they are remarkably collapsed, their bulk so much reduced that they lie in the hollow on each side of the spine, leaving the cavity of the thorax nearly empty. In the majority of cases the heart and its larger vessels are distended with very dark blood. *All the cavities* of the heart are filled with a thick, blackish treacle, and blood so dark that, when extended on a white surface, it resembles in color the piece of the darkest cherry, is often found in the arch of the aorta and in the other great arterial trunks. The principal venous vessels are usually found engorged—the most forcible injection could not have more completely filled them—and the contained blood is black and sirupy. The vessels and membranes of the brain are frequently turgid with blood, particularly toward the base. A fluid is sometimes found effused into the convolutions in considerable quantity, with more or less serum in the lateral ventricles. The blood-vessels of the vertebral column and spinal cord may be noticeably congested, and in some cases there are marks of inflammatory congestion in the larger nerves. But the cases in which the brain presents a natural appearance, and those in which the sinuses and the veins leading to them are stuffed with almost black blood, are of equally common occurrence.

HELPS AND HINTS TOWARD A PATHOLOGICAL DEFINITION.

The consecutive fever of Cholera is not an integrant and necessary part of the disease. It cannot be distinguished from an ordinary continued fever, except by the rapidity and fatality of its course. It is the result of nature's effort to recover herself from the stunning shock that has prostrated her, and the oppression that keeps her down.

Cholera is only cognizable *with certainty* during the cold or "blue" period; of the three stages, the collapse alone is true Cholera.

Where medical measures have been promptly, energetically and successfully employed, the essential and diagnostic symptom, sudden sinking of the circulation, has often not developed itself; and there are cases where an excited vascular action has accompanied the first tumult of the system in Cholera. These are precisely the cases which yield most certainly and promptly to the remedial measures. In India it has been observed that these favorable indications chiefly appear among the European soldiers, who usually imbibe spirits freely at the commencement of the attack. During an invasion of Cholera in Malacca and Burmah, in June and July, 1852, the writer of this had medical charge of an East India Company's war steamer in the Bay of Bengal and the Straits of Malacca. The ship's company was composed of Europeans and natives—Malays and Mohammedans—in about equal proportion. Under the peculiar treatment, to be described further on, not a single case of collapse occurred among the Europeans, all of whom "indulged" liberally, the officers in wine and toddy, the men in their regular grog, twice or three times a day, and in irregular "drinks" as often as they could get them; whereas, among the natives, most of whom were abstemious by reason of "piety" or vows, every case was collapsed; but the recoveries, even from the cold stage, amounted to eighty per cent.

If the superficial veins and arteries be opened in the cold stage, the contained blood may flow out; but their walls then collapse, and no more blood can be drawn. There is no authentic fatal case of Cholera on record where the circulation has not been arrested, in the extremities at least, long before death.

An increase of temperature is often observed, just before dissolution; but the development of heat in such instances is *partial*, being confined to the trunk and head, and is a fatal symptom. This mocking warmth is generally appreciable for some hours after death.

The application of boiling water to the skin, in the worst cases of collapse, produces little or no effect, and some patients are insensible to the operation; but it is certain that in a body but just dead of some other disease, boiling water will vesicate readily. So extreme is the diminution, or so complete the destruction of the nervous energy of the skin, in the cold collapse of Cholera, that there is less vitality there in such cases, the patient being still alive, than in the skin of a body recently dead of *a different disease*. The writer has applied boiling water to the feet and lips of patients in India, without eliciting a tone or gesture of complaint.

The change in the condition of the blood—"dark, black or tarry, thick, ropy or sirupy"—is fully proved to be in the ratio of the duration of the disease, the blood more or less rapidly changing from a natural to a morbid state, as the disease advances; such is the general rule. Observe, that the blood is usually found to be less changed in those cases of Cholera which are ushered in with *excitement*, than where collapse has occurred at an early period of the attack.

The blood is sometimes found, on dissection, to be of as dark a color in the left as in the right side of the heart—affording reason to believe that in the whole arterial system it is equally changed. In many cases the temporal artery has been opened, after attempts to procure blood from the brachial or jugular veins had failed, and the blood in the artery was found dark and thick, like the venous blood; it flowed in a languid, ropy stream, and then the artery collapsed.

Hiccough is a favorable sign, and seems to announce the return of circulation, especially when it occurs in the intermediate moments between the threatening of death and the beginning of reaction.

While burning thirst, pain at the stomach, cramps, asphyxia, clammy sweat, cadaverous coldness, and aphonia, may all be present, vomiting and purging may be absent, and "yet" the case will rapidly run to a fatal termination. The fact is, the vomiting and purging are not only "far from being the most important or dangerous symptoms"—it is not only true that "the danger of the case is by no means dependent on the quantity of matter discharged from the stomach and bowels," and that "in some of the worst cases this is not very considerable, and in some of the most successful it is very great"—but it is our conviction that the vomiting and purging are, in their original intention, genuine efforts of nature to relieve the engorged vessels, and restore the equilibrium of the circulation; that they constitute nature's safety-valve to the congestion; that their presence, *in collapse*, is generally a favorable, and their sudden disappearance a very unfavorable sign. They almost invariably cease a short time before death in the cold stage; they frequently *return* in a notable degree at the beginning of reaction. Mr. John Fyfe of Newcastle, England, attended 579 cases of Cholera; and in all these, he says, collapse never came on "until after profuse serious discharges from the bowels." Was not nature, by those discharges, struggling to prevent the collapse?—in the language of Dr. James Johnson, Physician Extraordinary to the King of England, was she not making "violent, but too often unsuccessful, efforts to restore the broken balance of the circulation, and to reestablish the secretions, by sickness and purging—the ejected fluids being *exudations*, not secretions?" Here nature cries to us for help, and shows us *how* to help her—disclosing to us the inner mystery of Cholera. If we do not make haste to aid her in the direction she points out, she will exhaust herself by her own tremendous efforts.

In Cholera there is every reason to believe that every species of secretion, in all parts of the body, is abolished. No known function of the mucous membrane of the alimentary canal could form matter like that which is discharged; and as there is no circulation going on in the skin, but rather a complete state of asphyxia there, there can be no secretion of *perspiration*. The "cold sweat" of collapse is not true perspiration (like the critical perspiration of the consecutive fever), but exudation; and, viewing the skin and the mucous membrane as one continuous surface, it is just to conclude that this exudation is homogeneous throughout. "Whence, then, and how, come these discharges? On the skin, certainly not from circulation, for there is none there; and it is more than probable that the capillary circulation of the mucous membrane of the intestines is equally absent. It would seem as if the elements of the body, composing the parts nearest to the surfaces, became subject to new affinities, forming a new substance, incapable of being retained by the membranes, but rapidly oozing through them. Two facts go to support such an hypothesis: First, the abundant new formation transuded, where no circulation exists; and second, the rapid *amaigrissement* of the body. This wasting of the body is not merely apparent, it is real; the usual roundness of the parts is taken off, and tendons and other salient points become strikingly prominent." We quote from the report of Dr. Robert Nelson, member of the Medical Board and Commissioner of Health at Montreal.

Of the two great classes of functions performed by the organs of which man is composed, one only is primarily paralysed by the poison of Cholera. The operations of the senses, and of the intelligence, are either left untouched or are affected but in a secondary manner. It is the *animal* that dies; the Intelligence, awe-stricken, surveys the scene of death, and trembles and wonders. Those functions by which mere existence is preserved—those complicated powers by means of which we are forever appropriating, and converting into a part of ourselves, portions of the matter around us—are, all at once and all together, deranged and disabled by the blow of this terrible angel. Nutrition is annihilated; respiration becomes difficult, irregular, and inefficient, the involuntary muscles no longer perform their offices; the voluntary are contracted in painful knots by other powers than the will; the blood ceases to circulate; its physical properties are altered, its serous element suddenly thrown out upon the intestinal mucous surface of the body; the secretions are all arrested, and animal heat is no longer produced.

The victim of Cholera does not die "solely of starvation, caused by vomiting and diarrhea," as certain doctors hold; but by paralysis of the nervous system, and consequent chemical and organical decomposition of the blood.

During the prevalence of Cholera, there are observed among persons otherwise healthy various anomalous affections of the nervous system—such as cramps, cold sensations of the hands, feet and legs, a peculiar thrilling in the extremities of the fingers and toes, and an oppressive feeling of anxiety in the region of the heart.

After the first, or premonitory, stage of Cholera, bile ceases to be formed. We always find the gall-bladder full; but this filling has taken place before collapse set in. There are no signs of bilious absorption.

Adult age exhibits a much more lively susceptibility to the Cholera poison than early life; great numbers of children escape it, simply because they are less subject to the predisposing influence of *Fear*.

The idea of Bleeding, in the stage of collapse, has its origin in an hydraulic theory totally inadmissible in Cholera. There is not too much blood in the whole body, but too much at the centers and too little at the surfaces. A return to healthy distribution and *circulation* will not result from abstracting, any more than from adding, a portion of the dammed-up mass. The cessation of arterial action is not owing to the state of the fluids, but to determinate derangement in the nervous power by which the machinery of circulation has been stopped. Besides, in most cases you cannot bleed; thickened and stagnant in the vessels the blood cannot be made to flow; and if a few ounces be squeezed from the orifices it hangs from them in long tarry strings—to no purpose.

The experiment of Galvanising is a kindred absurdity. The desideratum in cholera is not the *supply* or restoration of vital or nervous power, but the propulsion of that power to the surfaces from which it has receded.

In our third article we will state the pathological conclusions, and define the Treatment they indicate.

THE LEAD MINES OF ILLINOIS AND WISCONSIN..I.

Extent of the Lead Mines—Wild and Free Life of the Early Miners—English Lead Miners—Indian Diggings—Going Down into the Mines—Poor Miners Making Fortunes—Surface Diggings—Future Prospects of the Mines—Prices of Land and Mines—Immense Profits.

From Our Special Correspondent.

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The Lead Mines of Illinois and Wisconsin include a space about 60 miles east and west, and sixty miles north and south; this embraces eight townships in Iowa. Nearly through the center runs the fifty-or's fifth principal meridian, which extends south through the Missouri and Arkansas mines. The City of Galena is said to be in the center.

Lead was obtained by the white men near Galena as early as 1817. The Indians got it in small quantities long before. Probably they always knew where it lay, but had no great use for it before they were possessed of firearms. The earliest settlements were not made in this part of the State. It is a cold country, and as mining regions usually are barren, this also was supposed worthless for farming purposes. Every Spring, boats would leave St. Louis, loaded with miners and provisions, and they came up Fever River, which is 16 miles from the Mississippi, and landed in the center of the diggings, where a few trading houses were established, on the present site of Galena. A small stream empties into this river about 15 miles above the town, called Small Pox, which is said to have its name from the fact that a tribe of Indians, camping on its border, had the small-pox. While the fever of this disease was highest, the Indians were in the habit of running to the larger stream and plunging into its deep, cool water, which resulted in the death of very many; hence the name of Fever River. A few years ago the name was changed to Galena River, because it did not look well on the map, or sound well abroad. Perhaps, after all, it really got its name from the early miners having some kind of fever, owing to their rough life; but it is a beautiful stream, and it is made up of springs and brooks as clear and sparkling as can be found in the world. Fevers and agues are uncommon, and consumption is rare. It is said by some late physicians, that limestone water is a preventive of consumption. Swamps are unknown except along the Mississippi. The country is rough and mountainous, much like the Hudson River country. In traveling, one sees a vast extent of sloping, lofty hills, amid which rise blue mounds.

When cold weather approached, the miners would leave for home; hence, in the Winter the mines of the country were deserted. Of course a few remained in the town, shut up between lofty and steep hills. In 1830 the population was 700. With the opening of the Spring the miners returned. There is a well known fish called the sucker, which, early in the Spring, goes up rivers and streams. In the Fall it goes back. It was in Galena that the people of Illinois first got the name of Suckers.

These first miners were Americans. In those days the ore was found on the surface; that is, by digging from three to 40 feet. Often veins opened on the tops of hills to the light of day, when a cart was backed in and the mineral shoveled up, or it was wheeled out of crevices in barrows on the level ground. In bottoms and at the feet of cliffs there was found float mineral—sometimes in large quantities. It has been plowed up in heavy masses in fields and gardens. Such specimens were the only ones the Indians obtained, and they never did more than to scratch around. So far as energy, fair day's work, and foresight are concerned, the Indian is the weakest and most trifling being on the face of the earth. There is more worth, hardiness and hope in a common farmer's boy than in the proudest, biggest, blackest, greasiest Indian that ever lived on corn raised in 90 days by his patient squaw.

There were no smelting furnaces in those days. A huge heap of logs was made in a little hollow; the mineral was piled on top, a fire kindled, and the lead ran out on the ground. This was a most unhealthy occupation. They who made it a business did not live long. Some died in three months. After that cheap furnaces were built, and next better ones. They are remote from houses. Often the chimney is off on a high hill, while the works are in a valley, which is necessary, as they are run by water-power, and the smoke and fumes are carried up the hill in a passage built of rock leading into the chimney. If hens or dogs are fed on the grass near a furnace they will die. Cattle will not eat the grass, but hogs go everywhere—nothing hurts them. So plentiful was the mineral first that miners made money like dirt.

In hundreds of instances did miners strike leads or veins which yielded thousands of dollars. Immediately they quit work and commence spending. They lived on the costliest food and wines. Some had eight or ten gold watches strung in front of them. They went to St. Louis. If their money held out, they would reach Louisville or Cincinnati; but in the end they come back to the mines in rags, and with black eyes and swollen faces. That was called being "busted."

Then they would go to work, perhaps strike another lead, and start off as before; but a few trips finished them. Even some citizens of the town, who bought leads that were struck and made fortunes, started off in pretty much the same style—their families being willing—and they led a few years of wild life, till at last poverty came and stayed with them. Such characters seem to run mostly after gold watches. I heard of one who had 27 at one time, each with a costly chain, and worth, altogether, $5,000 or $6,000. This, remember, was several years ago, when a dollar meant something.

But there were many who were wiser. They saved everything, and, when they got enough, they went off with all they could scrape to their families. Perhaps these were the gay and happy Suckers the song speaks of. Few thought of remaining and making homes; nor was there much encouragement, for Government would not sell the land. There was an agent at Galena who gave the miners license to work such tracts as they might select, for which they paid a tax; and though there must have been paid a very large sum, I have been informed that the Government never got a cent. The account of the final selling of the land, and the tricks used to prevent it, the conflicting of claims, and the immense trouble which followed—covering several years—I omit. Beside miners, there were men who sold goods, who bought ore and dealt in lead, or even had furnaces. These, if they used common judgment and had good habits, became wealthy. In short, there was no other place in the whole country where a man of almost any occupation could so easily get rich. Gen. Grant's father established a leather house here in those days.

England has Lead Mines so extensive that they have produced more lead than all the world beside. Certainly that must be a remarkable country. When it was known that America could produce lead, the English, according to their custom, determined to break up the business; and they offered lead in eastern cities at such prices that our miners could not afford to get it out. Then Congress put a duty on pig lead. Thereupon the English established large smelting works in Philadelphia and sent the ore thither to be smelted. The next thing for Congress to do was to place a duty on the ore. That was nothing; for our kind friends—who long ago elected that we should raise nothing but meat and grain—began to supply us with statuary, and sent us large quantities of the busts of our great men, living and dead, all in lead. This was an artful operation in the fine arts. Then Congress laid a duty on lead in any shape or form. This brought them to something of a stand. After a time they went to work with all their might, opened their mines still more, and, by the help of cheap labor, produced large quantities of lead, and, shipping it hither, sold it so low that our miners found the business paying poorly enough. We have established no important branch of industry in this country which they have not attempted to break up. Their plan is simple. With cheap labor and their enormous capital they can richly afford to lose a few millions of dollars in under-selling us; then, when they break up our works, and our artisans or mechanics go to raising grain, they are ready to supply our market—when they reap their reward. It is a game of bloating and brag, united with real strength. The Englishman reminds one of an impudent bully standing before a man not quite as fat, and perhaps not knowing as much, and the bully says scarcely anything but "Boo!" Add an "l" to the word and it shows how he got his name.

All things come to an end. Originally—say 2,000 years ago—the English mines were worked as the Galena mines have been; that is, on the surface. Then they sunk shafts deeper, but as water came in, they ran adit levels from the lowest valleys; but the lead still going down into the water, they constructed powerful pumps, which raised the water into these adits, and then they got the lead out of the remotest recesses. Some of their mines were from 1,000 to 1,800 feet deep. In places they have drifted under and across rivers, and even under the ocean itself. But during the last 15 years their mines have failed. They are getting to the end of their rope, and now is the time for American mining to begin.

The geological structure of the great lead region of the Mountain of Cross Fell, where the counties of Northumberland, Cumberland, North Riding of Yorkshire, and Durham meet, is similar, if not identical, with the mineral-bearing magnesian limestone of Illinois and Wisconsin.

Now, there are scarcely any of our mines which are much over 100 feet deep. The deepest I went into was at Shullsburg, 110 feet deep, and I did not hear of more than half a dozen which had been drained by adit levels; and none of these were as low as they might be by from 50 to 150 feet. Except in these few instances, and where millions of dollars' worth of mineral have been taken out as a consequence, the only mining that has been done has been by taking out the mineral to the water, when the mines were abandoned.

I know that there are parties claiming to have scientific knowledge who say these are nothing but surface mines, and that most of the mineral has been taken out—in short, they say there is no mineral below the water. Almost every miner will whistle at this, and thousands relate how they left the mineral, as large as ever they saw, going down into the water. Some will not even tell where they saw it last, and are waiting for the mines to be drained. I was in mines myself where ore was taken out of swift streams, and I lifted masses of almost pure lead with my own hands, out of beds of lead in the water. More than this, I was in mines where thousands, if not millions, of dollars' worth had been taken out after the water had been drained off by pumps or adit levels. In short, this condition is so general and so well known, that to those on the ground it is unnecessary to say a word. I have more to say on this when I speak of the blue limestone. From this, I am forced to conclude that, when the mines are drained, then only will they be fairly opened, and that a long course, perhaps a thousand years, of prosperous mining is before us.

The shafts, or pits, by which the mines are reached are dug like a well, but they are square, about five feet across, and, till the rock is reached, curbed with small logs or boards. Sometimes I went down in a bucket made of half of a barrel, with one leg out to guide my descent. Sometimes I put one foot in a loop at the end of the rope, holding my hands high up on the rope, while a miner worked the windlass. In coming up, it is necessary to be careful and not get one's fingers between the rope and windlass. At other times I went down perpendicular ladders, with no interruption—unless a round were out, which the miner who goes along generally tells of, and one has to take a long step. At other times there were sections of inclined ladders, 10 feet long, with landing-places at their feet where one could rest a little. To come up a straight ladder 100 feet high requires heavy lifting and makes one pant. Sometimes, though not often, women go down. A lady told me how she went down in the tub, while the owner of the mine also stood in it and put his arms around her. Of course they had to stand face to face, with the pail and rope between them. The next who went down was the wife of the owner, and she went with a big Englishman. The standing in the tub is precarious. It is as wavering as a log canoe, and it behooves such parties to be on their good behavior, else, in the bottom of the shaft, there would be a big pile of broken bones and a little pile of calico. One soon learns to like it, and after a time I cared nothing about going down, unless I had to wade through deep water. Some of the time