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PAPER READ BEFORE

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THE interest and the importance which attach to the subject we have selected for this paper, is, perhaps, best shown by a tabular statement of mortality rates, by seasons, in some of the large cities of the world, as compared with our own.

Quarter ending	London.	Paris.	New York.
June 30	15,630	10,875	5,540
Sept. 30	16,406	10,520	8,660
Dec. 31	18,413	18,000	4,760
March 31	20,422	11,850	5,900

It will be observed that while in the two great cities of Europe the mortality runs highest during the cold months, in our own city the most fatal months are the ones including the heat of summer.*

* This peculiarity of low summer mortality as compared with that of winter, and with our own mortality in hot weather, is manifest all over Europe, as the following table exhibits.

	Winter.	Summer.	Spring.	Autumn.
New York City	27.	43.	28.	28.
*Belgium	31.08	20.	26.42	22.05
*Turin	32.42	18.56	25.43	23.59
*Naples	32.58	21.77	26.18	19.50
*Nice	32.41	19.86	26.61	21.12
*Holland	29.38	21.20	24.63	24.79

The quotations marked * are taken from a table, published in the third annual report of the Metropolitan Board of Health, and show the per cent. in those countries and towns under one year of age. From this exhibit the following unaccountable statement is made at p. 524: "Dr. Henry Lombard, a very distinguished hygienist of Geneva, Switzerland, has stated to us that our summer mortality of infants in New York seems to follow very much the same course as that which is experienced by the cities on the Mediterranean border of Southern Europe." How any one can form such a conclusion from the figures of this table would be unaccountable, except we consider the author of the statement. With him anything is possible. Even he is compelled to produce a table on p. 526, and include in it all children under five years as infants, in order to make it appear that this statement is true.

One of the most striking examples of the destructive influence of atmospheric heat upon large masses of population, was furnished during the summer of 1868 in this city. Under a mean increase of the temperature of 8°, during the week ending July 18th, the mortality of this city rose from 600 to 1100. True it is, that, under similar circumstances, the degree of humidity of the atmosphere has its effect upon health, but to nothing like the extent which characterizes the thermal state. It is generally understood as true, for example, that a dryness of the atmosphere counteracts heat, and that, on the contrary, its humidity augments the influence of heat. But while that is no doubt true in principle, the practical results of the fact are very liable to deceive us, as is shown in the instance just cited, when the mortality almost doubled in a single week under an increase of 8° degrees of temperature, though the humidity was $\frac{8}{100}$ less than during the previous week. Its effect to diminish mortality was therefore greatly outweighed by a few degrees of heat. Dr. Ballard's first aphorism is then unquestionably founded in truth. It runs as follows: "An increase of atmospheric temperature is normally associated with an increase of general sickness." Its illustration is not apt to be very marked in this part of our country, except the increase be above 75° or 80°. That is to say, when the temperature, having been about 75° for a time, suddenly runs up to 78° or 80°, the effect on public health is at once apparent; and still more when it runs from 80° upwards. Changes, however, from 60° to less than 75° do not in this country produce results either so uniform or striking. Starting from these high points, the third aphorism of this author is equally true; viz.: "That for the most part, the increase or decrease of sickness is proportional in amount to the extent to which the atmospheric temperature rises or falls." Results however are liable to be prolonged, so that what is effected by a sudden rise of temperature this week, often does not reach the record till the next week, when by a fall in temperature the general health is much improved. Hence improved weather tells less accurately in the death lists than do sudden accessions of heat. It will no doubt be admitted without further statistical reference, that the atmospheric heat prevalent during our summers is the more or less direct cause of the fearful death rate we have to annually record. The most generally recognized method of its destruction of human life is by the pathological effect known as sunstroke. A very just conception of the amount of life destroyed by atmospheric heat directly, may be formed by inspecting the following table:—

Deaths attributed to sunstroke in New York.

In 1863	133.
" 1864	37.
" 1865	11.
" 1866	310, and effects of heat.
" 1867	4.
" 1868	171, and effects of heat.

It will be observed that though 1868 was a year of almost unprecedented heat, its mortality from sunstroke, and recognized effects of heat, did not equal 1866. This finds a very instructive explanation in the fact that, during the intense heat of that season, a large number of mechanics and laborers, who furnish material for this cause of death, were engaged in a strike, and consequently not exposed as during labor.

As to the exact pathology of the cause of death in the condition known by the various names sunstroke, coup-de-soleil, coup de chaleur, ictus solis, insolatio, erethismus tropicus, &c. we will here venture to simply say that the great bulk of proof stands in support of the view that it is one of more or less suddenly depressed vitality. The symptoms, however, are so unusual for conditions of depression or exhaustion, that the profession was very slow in learning the real truth in respect to it. From a somewhat careful perusal of the history of sunstroke, it has appeared to us that more has been learned of its pathology and treatment by copying the instinctive, or perhaps experimental practice of unenlightened nations, than by any other means The poor Hindoo taught the learned and proud Briton that the means by which life could be saved, in *threatened* or actual sunstroke, was simply to keep the surface of the body wet and cool, and to place the patient in a state of physiological and physical rest. And that is about all we know of the matter to-day. This simple rule is applicable to the two forms of this diseased condition well known as febrile or hot-skin form, and the syncopal form with cool skin and depressed pulse. In the latter form, the skin being already cool, there is of course no indication for the water to the surface, but the rest is indispensable.

The fatal cases of sunstroke, however, are very rarely of this form, but of the ardent, febrile, and often apoplectic form. The same semi-barbarous Hindoo also taught that the condition could generally be prevented by the same care not to produce fatigue, and whenever the natural moisture of the skin ceased to keep it cool by evaporation, it was to be effected by moistening the surface with cool water, allowing it to evaporate, and thus protract the cooling effect. These affusions he practised, and still practises, upon the uncovered skin, occasionally varying it, as a matter of economy of time, by wetting the light cotton or linen clothing worn by the person. The theoretical and the practical result sought in this process is the reduction of the temperature of the blood, from which danger to life proceeds. Dr. Dowler, of New Orleans, taught the doctrine that there is as much danger perhaps from the heat conducted from an exposed sun-heated surface to the blood, as there is from that generated in the system itself by the chemico-vital processes going on. Hence he thought that the covering of the body with articles of clothing of considerable thickness was a valuable means of protection against sunstroke. The Hindoo, however, understands this to be an error,

as the slightest reflection must convince any one that it is.* It is a philosophical axiom that evaporation is more rapid, and consequently more caloric is consumed, from uncovered surfaces. Therefore the evaporation from, and the cooling of, an uncovered skin, bathed in perspiration, is much more rapid and effective than when covered. It is an easy fact to demonstrate, and one which we have often done, that the body bathed in perspiration is much cooler in the rays of the summer sun when uncovered, than when clothed in the usual style. It therefore follows that the nearer naked the human body can be allowed by the laws of society, the better state it will be in to resist the influences which induce sunstroke, and then, so long as perspiration is copious, there is little danger of sunstroke. But the arrest of the perspiratory process from nervous exhaustion, is the danger we have to look for and avoid, by supplying an artificial perspiration, under circumstances best calculated to cool the greatest amount of surface. As any means of cooling the blood under the circumstances attending sunstroke are generally beneficial, we will mention the invaluable one of taking ice-water. Nothing is so grateful and so useful to

* The idea advocated by one of the gentlemen who participated in the discussion had upon this paper, that the phenomena of sunstroke are to be accounted for by the sudden suspension of the process of elimination of effete and poisonous material by the skin, is a totally untenable one, for the following reasons:—First, Cases of sunstroke are not always preceded by a drying up of the skin; and hence in such cases there is no *even probable* reason for supposing that elimination of poison from the blood has been suspended, so far as the skin is concerned. Second, The time between the drying of the skin and the occurrence of the grave symptoms of the disease is, in a great proportion of cases, too short to render it at all probable that arrested elimination is the cause of those symptoms. Such rapidity has no analogue in the known suspension of the eliminating function of any organ of the body, if we except the lungs. Third, Physiological experiments upon the lower animals, and thermometric observations upon the human victims of sunstroke, suffice to show that the overheating of the blood and tissues of the body is the real cause of the phenomena of this affection. The argument, therefore, that to prevent sunstroke perspiration must be promoted by heavily clothing the person, even in tropical temperatures, has no pathological support, and is directly contradicted by the most extended observation, as well as by the teachings of natural history. If it were true, as this argument assumes, that the animal body is protected from solar and atmospheric heat by covering it, is it probable that the Creator would have made it a characteristic of tropical animals that they have little or no hairy covering? And in the temperate zone, would He have ordered that the thick and heavy fur and hair covering possessed by its animals in winter should fall off at the approach of summer, leaving the skin comparatively nearly naked during the heated months? We think no reflecting person can long entertain such views of the pathology of sunstroke, nor of the influence of heavy clothing in protecting from it. The example given, on the occasion of the discussion, of the heavy dress of the inhabitants of the steppes of Russia, has certainly very little weight in the argument; for while these people have but comparatively few hot days in the year, they occur during a period in which the atmosphere is extremely dry, so that evaporation of the perspiration and consequent cooling is rapid, even though the body be thickly covered.

the heated thirsty laborer or soldier as an unlimited supply of ice-water. The theoretical objection to large draughts of cold water after prolonged abstinence, and with devouring thirst, we have never seen a demonstration of; but, granting the objection has foundation under such circumstances, there is certainly no danger in cases where no deprivation has been practised, but, on the contrary, frequent and more or less copious draughts have been indulged in. This practice not only introduces a large amount of liquid to which caloric is imparted, thereby helping to keep down the temperature of the blood, but it supplies abundant fluid to be employed in perspiration, and thus serves to protect the economy more or less perfectly. These propositions being admitted, which we think must be, it follows that an overheating of the blood under high temperatures is normally prevented by the application of the cooling process to the capillary circulation; and upon this it would follow that the greater the amount of capillary circulation thus exposed, the more rapid would be the consequent depression of the mass of circulating fluid. This fact is too often ignored in both the prophylactic and curative treatment of the effects of solar heat, an example of which we have in the following published instructions:—

"1. When exposed to excessive heat, the natural perspiration or sweating must not be checked. Let the sweat flow, and do not throw off all the flannel garments.

"2. Wash the head and neck frequently in cold water, and, if exposed in the sun or in any very hot place, wear upon the top of the head, under a hat or otherwise, a light handkerchief or other thin folds of cloth wet with cold water. Remember that the head and neck must be kept cool, and also be free from the pressure of tight clothing.

"3. If headache, dizziness, a feeling of tightness across the forehead, a failing of sight, or a feeling of weakness and prostration ("giving out") occurs, let the person immediately go to a cool place and lie down, with the back and the feet covered, and have a few quarts of cold water poured slowly upon the head and the sides of the neck. If the symptoms are not at once relieved, send for the nearest good physician.

"4. What to do until the physician comes. If the patient is still sweating, let him drink freely of cold black tea or coffee; tea is best. But if sweating has ceased there is very great danger. Then the head, face, neck, and entire chest should be rapidly sponged with ice water, and a bag of powdered ice, well covered with a towel, should be kept under the head and the back of the neck; give a mixture of the carbonate of ammonia (hartshorn) and muriate of ammonia, eight or ten grains of each in water, every ten or fifteen minutes, until the physician comes, or until the patient rallies and sweats." *

The blood is quite as rapidly cooled by applications to a single

* Board of Health publications in the daily papers.

arm as to the head and neck, so that if all the extremities are included, the mass of circulating fluid is reduced in temperature in a fraction of the time required for applications to the head and neck only. It is a serious delusion to suppose that the blood temperature is materially reduced by the ice pillow. It is a fact well known to physiologists, that circulation is nearly perfectly arrested in capillaries whose temperature is reduced so low as 32° to 36°. Hence no important amount of cold blood leaves the tissues subjected to the influence of the ice pillow, to appropriate caloric from the highly heated fluid. The application of ice to the head and neck is therefore of very limited efficacy, and really prevents what it is supposed to accomplish. Water between 40° and 50° is far more efficacious in cooling the blood when applied externally; and when applied to the mucous membrane, from which there is no evaporation to prolong its influence, it may be used below 40°. Concisely, then, much of the mortality resulting from sunstroke may be prevented by the general adoption of the principles here sketched, thereby promoting free perspiration when it may be necessary for cooling the blood, and removing all possible obstruction to its evaporation from the surface, adding to its effect the free internal use of ice-water, and, when indicated, the free and general use of cold water externally, together with physical and physiological rest.

The ignorance of the laws of natural philosophy and pathology, displayed in this first rule, is not only characteristic of its author, but it echoes a deep-rooted error entertained by both the profession and the populace. The error consists in the supposition that the "flow" of perspiration is necessary to safety; that, no matter what becomes of it, if it simply flows life is secure. A more unfounded doctrine never was promulgated, and a more dangerous one could hardly exist. It has sweated many an unfortunate man to death. It, in the first place, is not true that a flow of perspiration is of itself a source of security in high atmospheric temperature. It is of no service against heat and its consequences, except by the reduction of the temperature of the blood effected by its evaporation. Perspiring is in itself an exhausting process, and therefore it is better to avoid it as much as possible by avoiding the necessity for it. This is done effectually by cooling the blood, which we have just seen may readily be done by the application of cool water to the surface of the body, by instituting the process of evaporation from the surface, by cool drinks, and by physical rest. We may also add, the application of cool air to the surface of the body. The quicker the perspiration is stopped, by transferring a man on the verge of sunstroke from an atmosphere of 120° to one of 60°, the sooner he will be placed in safety. It is a dangerous doctrine that a covering of flannel must be maintained during even our hottest days, as a protection against changes of weather that might arrest the flow of perspiration. What sane man of the most ordinary habits of observation, would venture to

say that he has ever seen other than the most salutary results, upon both individual and public health, from the reduction of the heat of the weather of 20° or 25°, say from 100° to 75°? Apply these facts, which cannot be controverted, to the prophylaxis and the treatment of sunstroke, and we shall have a just idea of the rule above quoted.

Any details of treatment and management need not be mentioned here, for they will suggest themselves to the mind of any physician. It is a thoroughly well understood fact that, other things being equal, the higher the standard of vitality maintained by the individual, the less liable he will be to require artificial aid to keep his functions going under protracted high temperature. At best, however, the vital forces are so taxed to support the refrigerating process, and their restoration is so much interfered with by disturbance during the usual hours of sleep, that most of the functions of the economy are performed with little vigor, and often very imperfectly. Digestion and assimilation are especially obnoxious to this depressing effect, so much so indeed, that however destructive to life heat may be directly, the disease and death produced by it indirectly, through disordered digestion, greatly overbalances all other methods, and swells the death rate during our summers to an alarming figure. I need hardly allude to the fact that the digestive organs of the infant very especially suffer from this cause, as our death records have long taught us. During the heated term of July, August, and September, at least 50 per cent. of our enormous summer mortality, occurs in children under two years of age, and from disorders of the organs of digestion and assimilation. We are taught by observation that there are two methods of controlling this fruitful cause of mortality. We learn that a change of atmospheric temperature of a few degrees lower, has a prompt and remarkable effect in increasing not only the desire for food, but the ability to digest it. This is effected by permitting refreshing sleep, and by diminishing perspiration and its consequent drain upon the nerve forces.

Hence the deduction, that inasmuch as we cannot control atmospheric temperature, we must resort to all available means of keeping down the temperature of the body and of preventing perspiration. This we may accomplish by frequent baths in water of 75° to 85°, removing all obstructing clothing, and by keeping the child as quiet as possible. I know of no one proceeding so invigorating to the heated and depressed infant, as a bath, followed by a nap, made agreeable by a current of air or by constant fanning.

This same idea was urged in this city a quarter of a century ago, as we learn by consulting *Copland's Dictionary*, whose editor says that the child "should be daily exposed to the invigorating influence of the cool, fresh air, and to frequent ablutions with cool water when the weather is excessively hot, and by adapting the clothing to existing temperature. These are important measures, both in the prevention and cure of cholera infantum,

and should never be neglected in the heat of summer, in localities where this disease is endemic." Next to it in utility is the unlimited use of ice-water as a drink. No infant can pass through our heated term, without untold suffering, who is forbidden this luxury, nay, this necessity.

More can be done to husband the vitality of the infant, and to aid its digestion and nutrition, by keeping it cool, than most of us are aware. And yet this most desirable result has been systematically and directly opposed for generations, by the almost universal covering of the body by flannels. We have often stated our belief to be, that infinite harm is done to our babies by keeping their little bodies swathed in flannel, often of the thickest and roughest and dirtiest variety, throughout our summers, and we still entertain and urge the truth of that statement. No infant can be kept as cool and as comfortably at rest in such a temperature, while wrapped in flannel, as when clothed lightly in cotton or linen, nor as cool as the great mass of infants require to be for the preservation of health. Even the specification made in some general rules for public guidance, of "light flannel," does not remedy the popular abuse of the use of this class of coverings during the hot weather of our summers. Thousands of the infants of this city are tortured to death by the heat, the dirt, and the obstructed perspiration resulting from the impermeable character of the flannels habitually used upon them. How this abuse could have been handed down from generation to generation, with the uniform fact standing conspicuously before the world, that the most sudden changes from hot to cool weather are followed by marked improvement in the general health of the people of all ranks, and all dresses, without arresting more general popular and professional attention, we are at a loss to understand. What flannel had to do with the decrease of the death rate of this city from 1,100, for the week ending July, 1868, under a mean temperature of 88°, down to 700 for the very next week, under a rather sudden fall of temperature of 10°, as well as the fall of rain, will be very difficult to say. Will anybody venture to declare that, had the children all been naked during that cool week, the death rate would have fallen less? We trust not. But we will venture to say that, had they been so uncovered, thousands would have been happier and healthier, if not saved from death.

We have long been convinced that, could the rule be enforced of removing every particle of flannel from the skins of our babies, during the months of July and August, and as much more time as the character of the weather would make its absence a source of comfort, vastly more happiness and better health among them would be the result. In no country is Dr. Ballard's fourth aphorism more strictly true than in our own, and especially in this city. It reads as follows:—

"It is an error to suppose, as is popularly held, that sudden changes in temperature are, as a rule, damaging to public health.

A sudden change from cold to *hot* weather is indeed very damaging; but a sudden change from hot to *cold* is one of the most favorable circumstances that can occur, when sickness is regarded broadly as respects a large population."

This remark compares most strikingly and practically with the following untruthful, and misguiding one, from a recent health report, viz.: "Clothing is another important subject for study in relation to health, especially in this climate, where the thermometer sometimes falls, in the *warmest weather*, twenty or thirty degrees in a few hours." * Were it true that we have a climate that is accustomed to changes of temperature from 100° down to 80° or 70° in a few hours, there are no records to prove that it is a source of danger to public health. On the contrary, it always does good, in whatever dress it may find the population, and it is safe to say that those who are nearest naked, are most beneficially influenced by it.

Among our infant population, this law of Dr. Ballard obtains in a most manifest degree. So far, therefore, from there being anything dangerous to apprehend from the changes from hot to cool weather of our summers, they are to be desired as the most salutary occurrences. But as we are unable to command them when desired, it follows as a physiological sequence that we should adopt every available means to secure a similar or an approximative result. Remove the individual from every circumstance which tends to augment or promote the effect of the atmospheric heat, and expose him to the natural agencies for keeping the body cool.† With these suggestions we submit the details of measures to keep our little people cool to the inventive faculties of the physicians, who, after doing all possible to secure that desirable condition, will then have to direct their attention to the food which shall be supplied to the invigorated digestive organs. The importance of adopting all practicable means of preventing the depressing effect of summer heat upon the digestive system of the infant is, perhaps, more strikingly shown by the natural his-

* Third Annual Report, Metropolitan Board of Health.

† The doctrine of securing the health of our infants during the heat of our summers, by preventing the over-heating of their blood and tissues in every possible way, has received a most notable confirmation since this paper was read, in the character of the weather during the summer of 1869, and the mortuary records of this city during the same period. It has been a remarkably cool summer, as compared with that of 1868 and many others, and has had a correspondingly low mortality. If we look for the class which has been thus favored by this cool summer, we find that more than the aggregate gain has been made in children under five years of age, most of it indeed in children under two years. That is to say, that while we have lost a few more adults than during the hot weather of 1868, we have lost so many less infants that the aggregate mortality is far less than during 1868. Were it possible for us to create cool summers, we could control our infant mortality wonderfully; but as that is impossible let us do the only thing left us whose results are next effective, viz.: keep their little bodies cool by frequent bathing and light dressing.

tory of that frightful annual plague of American cities known as cholera infantum than by any other means. This appears to be more an American name than an American disease. Dr. Dunglison says that it is "a disease so termed by American physicians," and that "it differs little, if at all, from what is vulgarly called *Water-Gripes* in England." What we know is, that a very large majority of the cases certified to as cholera infantum in this country present the identical symptoms described in England and in France as characterizing diarrhœa, chronic or acute, of infancy. Since the days of Rush, if not before, we have been familiar with the name, and unfortunately we are very familiar with the disease. So almost invariably is the development of this disease coincident with a high range of atmospheric temperature, that all writers agree that this circumstance is almost if not quite essential. In the history of this disease in our own city, it is a noteworthy fact that, from the earliest mortuary records of the present century down to date, the number of annual deaths ascribed to cholera infantum has always been more or less considerable, with the exception of a single year.*

This exceptional year was 1816, during which but one case of death from this disease is recorded in the Vital Statistics of New York City.

When we seek an explanation of this unusual exemption for that year, the important fact is disclosed "that the summer of 1816 was singularly cold;" that up to about the end of July the weather was so remarkable as to excite general comment in the newspapers of the country, and the temperature ranged from 15° to 20° below that of ordinary years. The highest temperature for the whole summer did not reach 90°, while the mean temperature went but a little above 60°, instead of 75°, the usual mean of New York summer temperature. (Stewart, op. cit.)

When we take this historic fact in connection with the unquestionable one that our infant mortality during summer, from this cause, reaches a far higher per cent. than any of the large European cities, we are led to inquire how our usual summer temperature compares with those cities. We then find that as to high ranges of temperature, it is far more unfrequent to see the thermometer indicate 85° to 88° in London, than it is to see it indicate 100° in New York; and that while the mean temperature of summer in the former city ranges but little if any above 60°, it averages, as we have seen, 75° in the latter. The average London summer temperature, then, is about the same as that which prevailed in our own city during the only year in its history not marked by mortality from cholera infantum.

If we now turn to Paris, it will be seen that for the last two hundred years a record of the rise of the atmospheric temperature of that city to 100° is found but once, viz., 8th of July, 1793. But to come down to more modern times, we find, for example,

* Stewart, Trans. New York Academy Medicine, vol. i., p. 288.

that during 1865, which is recorded as presenting a mean temperature of near 1° above any of the preceding forty-five years, the temperature reached 80° on but two occasions only, the 5th and 6th, and the 14th and 15th of July; and that the mean temperature of the three summer months was about 65°, or ten degrees below the New York average, and about 5° above that of London. Were we to pause here it might, with apparently sufficient reason, be concluded that we had discovered the secret of the fact, that while London and Paris exhibit their greatest mortality during the cold months of the year, New York, as well as many other of the American cities, show their greatest contributions to the grave during the hot months; especially if the additional fact be considered, that this excess of our hot weather mortality is almost exclusively made up from our children under two years of age. We might very justifiably conclude that our appalling summer mortality is exclusively due to our great heat of weather. But we at once encounter facts which at first sight appear to directly oppose this conclusion, if we consult the records of some of the large cities of our own country. New Orleans, for example, which, according to the meteorological tables of the United States Army Reports, has, through a period of twenty years, shown an average summer temperature of about 82°, and a daily elevation to 90° and upwards, does not suffer from cholera infantum to anything like the extent and percentages of the cities of the North, such as Philadelphia and New York. This fact has led authors and practitioners to conclude that other causes than heat help to develop the disease. Says the American editor of *Copland's Dictionary of Medicine:* "In our Southern cities it is even less rife than in Philadelphia, Baltimore, and New York, which proves that it is not dependent on heat alone, as some have supposed." We think there are two reasons why, though heat be the cause of this disease in the Northern cities and country, it does not produce cholera infantum in our Southern cities. The first is, that the style and arrangement of the dwellings in those cities favor the very free circulation of air over and about the population during their long summers. The light airy style of dressing adds greatly to the cooling effect of this free ventilation, so that the population, as a mass, are surrounded by circumstances which enable them to keep their bodies cooler than it is possible for the dwellers in the blocked-up cities of the North to do, though the thermometer marks an actual higher degree of heat. Even the country houses in the two sections, present the same difference of arrangement, so that in the South they are open and airy, while in the North, more perfect ovens than most of the houses in the rural districts are, during the hot days and nights of summer, are hard to find. In all tropical and nearly tropical regions, like New Orleans, these favorable circumstances of habitation and dress, have a marked influence in reducing the effect of the high temperature of the atmosphere, and, as we

believe, really reduce the effective heat below that prevalent during the heated term in our Northern cities, so that the apparent contradiction furnished by the Southern cities to the theory that cholera infantum is more or less directly produced by heat, is not, after all, a contradiction, but a confirmation. Our observations have fully convinced us that we have only to imitate New Orleans in the matter of uncovering the bodies and exposing the skins of our infants to free currents of air during the hot days and nights of our summers, in order to reduce the mortality among them to a rate approximating the infant mortality of that city. The other reason, we think, is found in the fact that the infants of our Southern cities are, as a class, better fed than those of the Northern cities. This results from the well-known fact that among the poor of the South there is found but little of the extreme and squalid poverty and want so often met with in the cities of the North. On this account infants are better cared for by their mothers. Among the wealthier classes the *disposition* and the ability to, and the practice of nursing their offspring, is more generally possessed and encouraged than with us, so that their infants are better fed and cared for in this respect. Added to this is the abundant supply of controllable and faithful wet-nurses from among the colored women in those sections, thus completing the provision for the best and for the most abundant stores of infant food in the cases where the mother cannot or does not nurse her child. We see in this combination of circumstances what to us appears sufficient reason why the population which contributes so enormously to the summer mortality of our great Northern cities furnishes a far smaller *percentum* of the deaths in cities whose range of temperature is higher and much longer continued. It does not in the least invalidate the doctrine that the heating of the blood and tissues of our population, and especially of the infant portion of it, during summer, is the chief cause of summer mortality. To impress us with a proper idea of the potency of this cause of death, as displayed in our own city, we will present it numerically. Taking nine weeks from the first part of the year 1868, during which the weekly death rate ran from 400 to over 600, and another nine weeks from the last part of the year, during which the weekly rate was about 350, we get an average weekly rate of about 400 for these eighteen weeks, which differs little from that of the whole weekly average of the year, excepting nine weeks from July and August, and the first week of September, during which the average per week was about 740, a clear increase of 340 per week, 300 of which, at least, were from children under two years of age, most of them under one year. Having thus, as we think, convincingly shown that, other things being the same, the simple elevation of the temperature to the degree experienced during our summers would produce cholera infantum anywhere, and having indicated the rational means of counteracting its effect to be the uncovering and cooling of the

bodies by all available and physiologically proper means, we wish to pointedly call attention again to the tormenting and destructive effect upon infant existence and life, of the use of flannel next their skins during our intensely hot weather, authority and promulgated rules of Health Boards to the contrary notwithstanding. There is no reason for it found in the history of summer diseases, there is none in well-observed experience, and there is none in the laws of physiology.

But with all we may possibly do to prevent overheating and vital depression, this dangerous condition, in more or less degree, is almost inevitable, manifesting itself in the impairment of all the functions of the economy. Its effects upon appetite, digestion, and nutrition are *most* forcibly brought to the notice of both the people and the physician, though these are mere disturbances of function consequent upon exhausted nerve-power, the real centre of diseased action. As infants, who make up an enormous per cent. of our summer mortality, are especially dependent not only for their maintenance, but for their growth and development, upon the integrity of the functions of digestion and assimilation, the question of food and the ability to digest it is, to them, of the highest importance. Were all women in the enjoyment of the health, the physical vigor, and the functional power which were bestowed upon the primeval specimens of the sex, this question would not be agitating the world at this late date. Unfortunately, however, the influence of advanced civilization, to say nothing of that of the original sin, has, when brought to bear upon women, in all ages, markedly disturbed her ability to nourish her young from her breasts. This being a general truth, we should not be unprepared to witness its illustration in our own land, whose women, as a mass, rank first, probably, among the civilized and enlightened women of the world. Very few practitioners of medicine have failed to discover the decaying powers of our women for the discharge of the functions of a mother, and especially among the highly cultivated and intellectual ones. So marked has this become in our large cities, and in New England, that to-day the lady who can fully nourish her babe at her own breast is the exception, and those who can only in part, or not at all supply its wants, the rule. This ability to nurse is variously estimated, according to the individual experience of various practitioners, from one in two to one in ten of our women. Dr. Nathan Allan, of Lowell, Mass., one of the most industrious and intelligent observers in New England, makes the following observations upon this important subject: "From considerable experience and observation, as well as from inquiries upon this subject, we are satisfied that large numbers of our young married women having children at the present day cannot properly nurse them." He adds the statement that the obstacle is absence or deficiency in the milk, or an imperfection in its quality. "Many women of the present day," says he, "have comparatively no *natural* breasts." "As a

consequence, it is found necessary to feed some infants, in addition to nursing them; others are brought up entirely by hand, and for others wet-nurses are procured, and multitudes die because they cannot have the nourishment and care which a healthy and perfect mother can bestow." "This inability of our young women to nurse their offspring presents one of the strongest arguments possible that there is some grand fault in their organization, and that a great change has, in this respect, occurred within forty or fifty years. Aged physicians speak of this as a marked change in their practice. Once our mothers and grandmothers could nurse a large family of children, and raise them too." These remarks are undoubtedly strictly true as respects New England, and indeed of the whole of our country; but from the fact that authors upon the subject of women and children's care and diseases, of one hundred years ago, went more or less extensively into the subject of feeding children by hand, we must admit that some necessity existed for it; so we are forced back to the original conclusion that high civilization—which means high cultivation of the nervous system—is incompatible with the perfect development of the reproductive function. These are points we respectfully suggest for the consideration of the sisterhood,—the "Sorosis,"—leaving them to decide between the encouragement of the development of perfect mothers, and *perfect female politicians.* Whatever may have been the history of the insufficient supply of breast-milk in past times, in other countries, the fact indisputably is, that the necessity for providing for such insufficiency is upon us. As this deficiency has a very direct bearing upon the mortality of our summers, we cannot omit its consideration on this occasion. Admitting the necessity of supplying some substitute for the natural food of the infant, and considering the debilitating effect, at best, of the heat of our summers, we are called upon to direct. Upon physiological and common-sense principles, the milk of some other woman than the mother would be the first choice. This, however, is of but very limited availability, as we all know. A very large number of our women require some aid simply, to fully supply their children. The number is so great that the idea of wet-nursing is quite out of the question; indeed we all know that the demand for wet-nurses is very far in excess of the supply, and we therefore have to look elsewhere for the material for infant food. The milk of some animal is clearly the next choice, and has been from all time among those who have permitted the promptings of nature to guide them. The deductions of chemistry have, however, been much invoked, and the findings of the analyst have been extensively employed as a defence for various kinds and degrees of modification of the milk of the animal, with the view of assimilating it to the healthy milk of the human female. We have been long convinced, and we are by no means alone in this conviction, that this practice has become a perfectly enormous and destructive abuse. It has not only sent thousands upon thousands of infants

to the grave by slow starvation, but much greater numbers have thereby been destroyed by the diseases of the digestive organs induced by crowding into them substances for the digestion of which nature never prepared them. The remarks we shall make, be it understood, refer to the milk of the cow, almost the only kind used in this portion of the world. After due reflection, a very considerable amount of experimentation, and a large experience practically, we pronounce the whole system of diluting milk with water, with the view of rendering it more like human milk, a totally unfounded delusion. It in the first place assumes as fact that which is known to be untrue, viz.: that milk, either of the cow or the human female, is always the same. Nothing is better known than the remarkable variations of both classes of milk under varying circumstances of seasons, food, periods of the day, &c. It in the next place assumes as a fact that which is equally without support in truth, viz.: that the water added is similar in character and organization to the *serum lactis ;* and that its addition renders the caseine of the milk, to any appreciable degree, less coagulable and more digestible in the infant stomach. We know that this is not practically true. What is practically true, however, and which one needs not a Newtonian intellect to comprehend, is, that if we add twice as much water to a milk that differs but a small fraction from the human milk, and then allow the child to take the same amount of this mixture that it requires of human milk, we put him upon a starvation diet. And on the other hand, if we take the same amount of cow's milk as the child is wont to consume of breast milk, and add twice the amount of water, with the view simply of giving it in a dilute form, we overwhelm the stomach, tissues, and blood of the infant by a vast excess of fluid, which sooner or later results in serious mischief. The simple physiological and practical fact in all this matter is, that nearly all infants have digestive accommodation quite sufficient to enable them to meet and to easily dispose of the variations continually taking place in the milk produced by the human and by the brute female. It is too well known almost to require mention here, that many females give milk richer in every solid ingredient than some cows. How absurd it would therefore be to dilute such cows' milk. Now, if we come to the consideration of the quality of the milk delivered in our large cities, we at once encounter the fact that, with rare exceptions, it is all diluted before it reaches market, and that at best we have a milk that is below the average quality of cow's milk. The result is, that we are far more liable to starve our infants on city milk than we are to surfeit them. Water can never be added to it with any advantage, but will always result in reducing the food of the infant, to a more or less serious extent. It is simply from the fact that milk thus reduced affords insufficient nourishment, that its dilution with farinaceous decoctions, such as barley, rice, arrowroot, &c., often does better than when water

alone is used. More nutrient material is thus supplied, and if the stomach and other digestive organs of the child possess the required development, it does much better than on simply dilute milk. And these are the only circumstances which afford the slightest evidence that these farinaceous additions to milk improve it as food for the young infant. It is, however, an unphysiological, a totally unfounded, and a very dangerous mistake in practice, to suppose they add essential or useful ingredients to undiluted cow's milk, as food for the infant under six months of age. For more details upon this important subject, of the great and only available substitute for this general failure of natural infant food, we would refer to one of the best papers we have ever seen published, and found in the Transactions of the Medical Society of Pennsylvania for 1868, by Dr. Hiram Corson. The Dr. takes the ground that, both in the cities and in the country, undiluted cow's milk, properly fed, is an excellent and unequalled substitute for the breast, and that with it children may be raised with little if any more difficulty than upon the breast, and we unqualifiedly and heartily coincide with him. We believe that more can be done to reduce our summer mortality by practically admitting this doctrine than by any other one thing. But while we entertain these views, we have a full appreciation of the probability that it will require the united efforts of the profession for a very considerable time to overcome the lactophobia which the swill-milk excitement during the last twenty years has created, and which the teachings and the practice of medical professors have rendered more inveterate.

The public prejudice against milk in general, which the swill reports excited and have kept going, have clearly, in our opinion, done much more harm than good. They have induced the very general adoption of almost any other substance than milkman's milk as infant food, and this has been coincident with a marked increase of summer mortality among those same infants, and from causes which their unnatural diet induces. Even swill milk is undoubtedly better than crackers, farina, arrowroot, barley, &c. It is, in our opinion, clearly the duty of every physician to do his utmost to counteract this result, and to cultivate public confidence in the only available and good infant food provided for us, cow's milk.

We must all believe, and then we shall all teach, that the undiluted milk of the cow is an excellent, and the best generally available substitute for the mother's milk, and so in time we shall convince the people that barley, and arrowroot, and farina, and crackers, and flour, and all that class of articles, are never to be thought of as infant food while milk is to be procured. We shall then prevent untold amounts of infant disease and death during our summers: first, by providing the enfeebled stomach with a proper and easily digested food in sufficient quantity; and second, by diminishing in a notable degree the general and

growing practice of wet-nursing, than which we know of nothing which so directly tends to deprave public morality and to provoke infanticide. If we all believed that our children could be raised as well and as certainly upon the bottle as by wet-nursing, would any of us pay a woman to abandon her own offspring to an almost certain death, and devote her services and substance to the care and development of our children? Few, we presume, will answer this question affirmatively, but many of us, it is feared, too many, alas! answer it at the sacrifice of one human being, as the practice now is. We have tried both the wet-nursing and the bottle-feeding, and as a result of both experience and observation, we would about as soon prescribe poison to an infant, as to encourage its mother to abandon it by offering her money to nurse our child. Could children thus abandoned be intelligently and sufficiently fed by the bottle on pure and good milk, the chances would be excellent for their healths and lives; but we all know that they, as a rule, are exposed to the most abominable neglect, and that consequently they, as a rule, die. We need not dwell upon the various ramifications that this social evil sends forth to the nurture of various degrees of crime. Any reflective mind must see them at a glance. Nor do we possess the happiness of expecting to see the day in which the money of the rich will not induce the poor mother to abandon or otherwise dispose of her offspring, and yield the life and health-giving stores of her breast to the favored infant of the wealthy.

But we do expect to see the practice of wet-nursing abandoned where it always has been, and always must be, a fruitful cause of our summer mortality, viz., in the public institutions. This practice, as is well known, consists of requiring the pauper mother to divide the milk furnished by her own breast between her child and one or more motherless children. The result is, in ninety-nine cases in the hundred, that, unless watched and compelled, in the language of the warden of one of these institutions, to give "their due share of attention to the orphan children," such orphan children are left to die of starvation, or to be destroyed by improper feeding. But if watched, and made to duly distribute her care and substance, the process of slow starvation is commenced in two or more children at once, and the death of all may be almost certainly predicted. This might all be expected by any one who will reflect upon the fact we have already mentioned, that large numbers of our women have barely sufficient milk for one child; and upon the additional fact that women are very rare indeed in this country who can properly nurse two children. The rule should therefore be, that no woman in our public institutions should ever be required to breast-feed more than one child. If she have a child, that of course should have the breast, thus giving it a fair chance for life. She, however, is able generally to take very good care and properly bottle-feed one or two infants besides her own. If for so doing she be allowed a reasonable remunera-

tion, in the form of a salary or premium, we fully believe most satisfactory results would be obtained. But overtaxing the human breast, in the attempt to supply our pauper and orphan infants with wet nurses, can, in the very nature of things, result in nothing but disaster, in this city and country. We well remember the flattering promises held out to us some time ago, from the effort to wet-nurse one of our public institutions for infants, but never believing in the practicability of the plan, we were not surprised to read that the result of the effort, in the language of the reporter, was a "mortality scandalous to the profession and to the department." Let mothers nurse their own children while they have milk, taking it for granted that they never have too much. Let the orphan children have all the good undiluted milk of the cow they will take, and cold water when they need it, and we have done all we can do for them in the way of food. We forbear entering into further detail, for a word to the wise is sufficient. Keep our adult and our infant population as cool as possible during the intense heat of our summer. Encourage every mother to nurse and take care of her own children, if possible, and discourage wet-nursing, in both private and public, by every possible means.

When the infant is only partly or not at all supplied by the breast, give it all the best cow's milk it will take, and our summer mortality will be very greatly diminished.