The effects of cold on the human body.

In speaking of the effects of cold on the human body, it may be objected that the term is used in such a manner as would lead one to infer that there is a force, capable of a peculiar mode of manifestation, possessing as distinct a manner of acting upon matter as Caloric; and as one might speak of the effects of heat, so the effects of cold, by no means named, might be regarded as the result of the influence of such a force upon man. And, although some experiments, which have been made, have been powerful to convince a few, that cold may be radiated in the same way as heat, yet that consequently it is an agent of a kind as positive as the latter; the term "cold" is not used in this thesis under any such impression, nor with the aim of investiture with the nature of a distinct power or force, but its effects will be spoken of as proceeding from the action of something positive, only with the view of avoiding
Conceived and unnecessary circumloquiation, for, once for all, it may be stated, that the term "cold" is relative—relative to that sensation produced in the animal body, by the abstraction of caloric from it, the result of the application of, or contact with, a solid, fluid, or gaseous substance of a lower temperature than that body. Moreover, it may be mentioned, that this sensation itself is not determined by the same degree of temperature, for there is no fixed degree of which it can be asserted, that substances partaking of it alone, will produce the feeling of cold by their contact with bodies endowed (with sensibility) for to an individual, who has for some time experienced a degree of temperature (not much above) the temperate of Fahrenheit's scale, a sudden diminution of but a few degrees will be attended with a painful sensation of cold; while for another, who had been exposed to a low degree of cold, an increase of temperature at this last, (maybe far from agreeable and therefore there)
is not one degree of temperature by which the sensation of cold can be measured, and the intensity of this would seem to depend greatly on the previous state of the body, but also, on the mode in which cold is applied to it.

Neither too high, nor too low a temperature is attended with benefit to the human frame. However man is capable of sustaining a temperature of 260° of Fahrenheit's scale for a short time without much inconvenience, as has been demonstrated by the experiments of Doctors Jodiceps and Blagden, and he can likewise endure and maintain life under a degree of cold considerably below the zero of the above scale, but a continued exposure to a degree of temperature, greater than that at the equator would exhaust his bodily powers, and an amount a little lower than the lowest around the Poles, depress vitality beyond recovery.

The temperature, which is perhaps most congenial to the human body, may be said to range between 50° F. and 70° Fahrenheit.
the greatest vigour being exhibited by those, who inhabit Temperate Climates, in a proportion so much greater than the natives of either the torrid or frigid zones, that as one approaches the nearer to the poles, so does man appear to become proportionately more stunted and dwarfed, and though the natives of hot climes...
Combination of Bismuth and Antimony into vital force) finding in the tissues of the human body the substance most favourable for its metamorphosis into vital force, urges the organic functions of the animal into greater activity, so that the body sooner "turns" as it were, "into seed", as is shown by the early attainment of puberty by those who are placed at the equator - it being nothing uncommon for a woman to become a mother at ten - in comparison with the natures of temperate and northern latitudes. Nor is this speed of maturation confined to man, but influences the lower animals and vegetation as well, and man growing, ripening sooner in hot climates, the turn of life is sooner early reached. It is confirmatory of the depressing effects of a very high temperature, the evaporation and evaporation of frame, complained of by those who have long been resident in the tropics.

The human body possesses within itself the means, which enable it to
To adapt itself to extremes of temperature — the means provided by Nature for cooling the body, when necessary, are of the simplest possible character. From the whole of its soft moist surface, simple evaporation will take place at all times, and the amount of this will be regulated merely by the condition of the atmosphere as to warmth and dryness. The more rapidly moisture (vapours can be dissolved in atmospheric air, the more will be lost from the surface of the body in this manner. In cold weather very little is thus carried off, even though the air be dry. But simple evaporation is not the chief means by which the temperature of the body is regulated. The skin contains a number of vessels, whose office it is to secrete an aqueous fluid, and the amount of this exhalation appears to depend solely or chiefly upon the temperature of the surrounding air. Thus when the external heat is very great, a considerable amount of fluid is produced from the skin, this in evaporating carries off a large amount of the free Caloric,
which would otherwise (raise the temperature of the body. If the atmosphere be hot and dry, and also be in motion, both exhalation and evaporation go on with great rapidity. If it be cold, both are checked, the former almost entirely so, though if it be dry, some evaporation still continues. And on the other hand, in a hot atmosphere, saturated with moisture, exhalation continues, though evaporation is almost entirely checked, and the fluid poured out by the exhalant glands accumulates on the skin. But the human body has another, more efficient means of counteracting the effects of a low temperature than the arrest of exhalation and the diminished amount of evaporation, consequent upon such temperature. To wit, the power, which forms part of its vital manifestations, of generating and evolving heat, and this, within certain limits, proportioned to the demand made upon it for an increased quantity, according to the coldness of the atmosphere. And the conditions to meet this demand for an
increased supply of heat, are furnished
by this (very coldness, within due bounds, of
the atmosphere), in the increased appetite
for food, which is experienced, particularly
by those of a vigorous constitution, on a cold
day, and in the greater call for, as well as
inducement to, muscular exertion, the
generation of heat being the result of those
vital processes, which are continually
continued on in the system, whereby a reaction
is ever taking place between the blood and
tissues on the one hand, and the atmosphere
and blood on the other; and thus every
molecular change going on in the body, and
preeminently those which are concerned in
the disintegration of its textures, and in the
elimination of their products. Respiration
may be looked upon as participating in the
function of calorification. Moreover the
evolution of heat would appear to be greatly
dependent on the integrity of—by some even
said to be actually performed—from the theory
of the transformation of some force into heat
of the nervous system—and the experiments
of Dr. Benjamin Brodie have been adduced
...
To establish this point - to the effect that when the Brain is removed from an animal, or its functions suspended by the agency of a narcotic, and artificial respiration practiced, the body loses its heat, nor can it (maintained at the usual standard) - but the question, how far the nervous system is subservient to the generation of heat, the theory of the meta-morphosis of some force into heat, advanced to explain the results of these experiments, need not be considered here. The efficacy, with which the effects of cold will be resisted, will be in proportion to the activity and integrity of the heat-producing functions, and these will therefore be most evident in those of a vigorous constitution, in whom both respiration and circulation, and the other vital processes are carried on with the greatest activity; and will be less apparent in those of a weakly constitution, and are most readily depended as well in those of an advanced age, as in those of a tender age. Perhaps the effects
of cold on the human body, are princi-
mainly exerted on the nervous system,
for as this system is the channel, through
which impressions from external agents
are received, so cold may be considered
as acting upon it in the first instance.
Cold, when applied in no great intensity,
and if intense, but for a short time, to the
body, acts as a tonic; it increases the
sensibility, gives greater clearness and
sharpness to the faculties, and produces an
elegancy and cheerfulness of spirit; but
when intense, and if the duration
of its application be prolonged, then it acts
as a sedative upon the nervous system,
at first blunting its sensibility; heavy, light,
touches become imperfect, and at length
it tends to depress its vital manifes-
tations, as ultimately to annihilate these
completely, producing death, which is
generally preceded by somnolency, delirium
and convulsions, rather than usually in
the way of coma—Among the effects
of extreme cold upon the system, an
overpowering and all but irresistible
dizziness & drowsiness is said to ensue, and this has been attributed to a want of the due supply of blood to the brain, on account of the diminished action of the heart; though it would seem to be more the consequence of congestion of the brain, owing to the blood accumulating internally, being driven inward from the chilling of the surface and extremities. This tendency to drowsiness does not, however, invariably form one of the symptoms of the protracted exposure to cold, nor always indicate the measure of its action on the nervous system; as would appear from the narrative of the shipwreck of an American vessel on the coast of Ireland in December, 1790, and given by Dr. Currie in his Medical reports. Most of the crew—who were fourteen in number—were immersed to a considerable depth in water, the temperature of which did not exceed 33° of Fahrenheit. The master of the ship was the first to succumb under the effects of the cold, the account of his death...
The Master of the Ship, Captain Scott, a native of South Carolina, and about forty years of age, died first. As they were in the dark, Mr. Long (the mate) could not see his countenance, but he was first alarmed by hearing him talk incoherently, like one in the delirium of fever. By degrees his voice dwindled into a mutter, and his hearing seemed to fail; at length he raised himself up in a sort of convulsive motion, in which he continued a few seconds, and then fell back dead on the deck. Soon after this Captain David Sams (a passenger on the same vessel) who was about twenty-eight, began to talk incoherently in the same manner as the other. He struggled longer, but died in the same way—finally the cook of the vessel perished. What especially relates to the alleged soporific tendency from exposure to intense cold it is further stated. Though immersed in the sea, they were all of them unconscious, and though exposed to such severe cold, Mr. Q, Primally was not drowned, nor were any of the men drowned, nor did sleep precede
death in those that perished. But although the disposition to sleep would seem not to attend constantly on exposure to deadly cold, yet from several accounts given of the extreme effects of cold, this tendency would appear to be far from uncommon. In the account given by Captain Cook of the excursion of Dr. Solander and Dr. Joseph Banks, with nine other individuals, over the hills of Fernandina, for the purpose of botanizing, an illustration of this effect of cold is afforded. Dr. Solander, who had previously seen instances of the torpor and death produced by extreme cold, put his companions on their guard, and enjoined them to resist determinately the overpowering tendency to sleep, which, he anticipated, some of them would feel, and two words were—"whoever sits down, will sleep; and whoever sleeps, will scarce arise more." Dr. Solander was the first to be seized with the new symptoms against which he had warned his companions, and notwithstanding the admonition he had given them, and his knowledge of the danger of gratifying
the inclination to sleep, he begged to be allowed to lie down; but his wishes were however for some time strenuously resisted, and partly by entreaties, and partly by force, he was restrained from yielding to the drowsiness, which overpowered him.

At length from exhaustion, they were obliged to leave him behind, along with two black servants, who were similarly affected. Not long after some who had preceded the party returned and acquainted them, that they had succeeded in kindling a fire at no great distance, on this new endeavour was made to awake P.J., in which they were successful, and though he had been asleep but a very short time, he had almost lost the use of his limbs, and the flesh was so thornish, that the shoes fell from his feet. He, by the assistance of his companions, thus narrowly escaped death, but all efforts to save the two black servants were fruitless. Fatigue and exhaustion may in a great measure he combined with cold in producing this disposition to somnolency.

Another remarkable effect of cold, which in all likelihood precedes the state of dormitory.
Just mentioned, is to blunt the senses, and under the intellect confounded, as to give the individual the appearance of one intoxicated, and the supposition is perhaps not so groundless, which describes the death of many of those, who are reported every winter to have perished in the streets from the effects of intoxication and exposure to cold, to the neglect of the laws by under the suspicion, that they were the "worse of liquors"; when, in truth, they were stifled by the cold.

The effect of cold on the vascular system may be looked upon as almost coincident with its action on the nervous. Cold of no great intensity, and applied for a short period will be attended with marked improvement in the general health, provided the vital energy of the body be unimpaired, for the impression of it being momentary, the heart and large vessels are enabled to react, and an increase of the force of the circulation is the result. But should
it operate for a considerable time, and especially if intense, cold is a direct depressant of the circulation, and diminishes the bulk of the tissues, causing shrinking of the external parts. The superficial arteries and veins become contracted, and unable to transmit the usual quantity of blood through the integuments, the secreting zones of which are at the same time diminished in calibre; hence the skin becomes pale and contracting round the pilose, glandular and hair bulbs, presents a peculiar rough appearance which is known as the "cutis anserina". The blood driven inwardly, accumulates in the large veins of the internal viscera; the action of the heart becomes more and more weak, and at the same time diminished in frequency, and after light and inefficient attempts at recovery, the circulation dries entirely. The functions of the skin are interfered with in proportion to the degree of cold, as has already been in - clined, in considering the means by which the system accommodates itself to
Extremes of temperature, but to that it may be added, that so long as the nervous and circulatory functions are not depressed by cold, diminution of the cutaneous and pulmonary exhalations is compensated, and plethora of the vessels prevented, by an increase of the secretion of the kidneys. When cold is moderate, and exercise is taken, and the skin and extremities sufficiently protected, respiration is carried on with greater energy, and the changes between the blood and air follow with corresponding rapidity, and a sufficiency of heat is generated to supply what is lost; but should cold be in excess, and the nervous power depressed thereby, and the circulation not stimulated by muscular exertion, then respiration becomes laboured, quick and painful, and more heat is abstracted from the system, than can be produced to make up for the deficiency. So long as the nervous and circulatory systems are unaffected, animal heat will be developed with freedom, but according as these
functions are interrupted, so do the heat-evolving processes fail, and are only resumed in proportion to the restoration of these. It is during the internal clashing between exposure to cold, and the effort made by the system to rally from its effects, that disease is most liable to be set up. This reaction consists in the return of the action of the vascular system; if this be moderate, the boundary of health are not overstuffed, but when great, the excitement of the circulation may be so increased, as to constitute fever, which may ultimately exhaust the irritability and vitality of the frame. Fever is not the only result to be feared from reaction after exposure to cold; local inflammations may follow this general reaction, and some of the internal organs may labour under therefore diseased action. Excessive reaction is very apt to be induced from the want of caution in using those remedial measures which are adopted to restore the vitality of a part or system. Then a part, such as the hand, or more,
or car. Has had its vitality depressed by cold, to such an extent as to be 
deprived of its sensibility, measures 
too hastily adopted to restore circulation 
in it, are certain to produce undue 
vascular excitement; and this in a 
part, already weakened, runs on to in 
flammation, which may terminate 
in stauating of the part. Hence the 
 necessity of using great caution, lest 
any circumstance may cause the system 
at an undue degree after exposure to 
cold. An individual affected injudiciously 
by cold should be at first placed in 
an atmosphere moderately (warm), covered 
with flannel, to prevent the heat, as it 
is being generated, from being dissipated, 
fraction being employed with proper 
precaution; and all stimuli obtained 
from in the first instance, and when 
referred to, administered gradually; a very 
efficient means of restoring warmth, 
by the application of bladders, filled 
with water, to the abdomen. If part 
that is "frost-bitten," should have
Friction applied not directly by the hands of the attendant, but through the intervention of snow.

Under certain conditions cold is more liable to produce injurious effects, for example, when cold air is in motion so that fresh portions of it are brought successively in contact with the surface, or when it is accompanied with moisture under such conditions, cold offers an inferior degree of intensity may prove fatally hurtful. The animal heat is more speedily abstracted, when a cold wind is blowing, every particle of air coming in contact with the surface, preferring a demand upon the system for its own quantity of caloric, the loss of which, under the pedative effects, which it at the same time produces, is with difficulty replenished. Exposure to cold and wet, as in cases of shipwreck, more especially in winter, is attended with disastrous effects the greater according to the rapidity with which evaporation of the moisture takes place from the surface of the body.
for that immersion in sea water is preferable, under such circumstances, to being so situated, that evaporation takes place readily from the wet clothes and surface, particularly when this is greatly assisted by a high wind. The temperature of the sea in winter being always higher than that of the air... The truth of the above remarks is founded upon Dr. Currie's report of the shipwreck of the vessel, already cited; for those of the number who perished on the occasion were just those, who were seated on a portion of the wreck, which was above the surface, and it is said—'on this part the two masters, generally out of the sea, but frequently overwhelmed by the surge, and at other times exposed to heavy showers of sleet and snow, and to a high and piercing wind'. The rest, eleven in number, were more or less immersed, some to about the middle, and others as low as the shoulders, and of these, all, being picked up, survived. Moreover, it would appear from the experiments of Dr. C. that these
is less danger in being put with salt than with fresh water. He says: "it is, thinly already well known among seamen that where there is only the choice of being put with salt or fresh water, it is always safer to prefer the first." And again in allusion to the less risks incurred by immersion in salt water, than in being exposed to the air, he writes: "In all cases where men are reduced to such distress by shipwreck or otherwise, that they have it only in their power to choose between keeping the limbs constantly immersed in the sea, or of exposing them to the air; it is safer to prefer a constant immersion." Dr. Currie also came to the conclusion, from experiments made to elucidate the point "that in all changes from one medium to another of different density, though of the same temperature, there is a loss of animal heat." In cases of shipwreck it is almost invariably the rule, that those who indulge in gymnastics are the earliest to succumb to the effects of their trying position; the exhaustion, consequent
Upon the excitement produced by spirits having, as it were, already prepared the system to be influenced by the severe cold. There are certain states of the system, during which it may be said these predisposed to be personally affected by the operation of cold. If the body be exhausted by violent muscular exertion and if, added to this, it is fast feasting with its preternatural heat, by profuse perspiration, and the individual desiring the exercise, should seat himself in the open air, or plunge into a cold water; under such circumstances the result will be highly prejudicial. There are not wanting instances of this imprudence, practised in both the ways above stated. Many chest affections, as Pneumonia, Rheuma—renal disease, and to mention other inflammatory ailments, have no other origin than the folly of persons, seating themselves, after perspiring freely, it they lie during the heat of summer, in such a situation as will give them the benefit of any air. As regards the latter
Measures of refrigerating oneself, under the circumstances named, the practice and almost fatal experience of Alexander the Great, and the narrow escape he had from bringing his career of conquest to a termination by his impudent plunge into the waters of the "Typhlops", have been held up as a warning by ancient guardians to youths, who, in summer's heat, stretched, exhausted and perishing from excessive food short on the banks of some river, have eagerly prayed to be permitted to cool their bodies in its running stream. The popular impression, however, which imputes the danger of bathing, when the body is heated, to this circumstance, is erroneous. So long as the system is steadily evolving heat, even though that heat be greatly increased, and provided there be no disease of any of the internal organs, and the individual be not fatigued, nor the body factitious its heat, suddenly to plunge into cold water, for from being dangerous, is attended with a pleasing and grateful sensation, and the heat of the body, with the precautions
named, is the measure of safety, and this truth has been attended more fully directed to it by the writings of Dr. Lister of Liverpool, on the benefit derivable from the cold affusion in the hot stage of fever, and particularly in cases of scarlet fever.

of a piece with the impudence of plunging into cold water, when the body is heated, and losing rapidly that heat, by the indiscriminate drinking of cold fluids, after great exertion. There is not a summer in which there are not several cases of death reported from this cause, which chiefly occur among labourers, who, while their bodies are cooling after perspiring greatly, take large draughts of cold fluids, and pay the penalty of their ignorance or indiscretion in sudden death. It is not very satisfactorily explained how death takes place under the last-mentioned condition. It cannot be from inflammation of the stomach, or any other viscus. In many cases of this kind, there has been no time given, before the fatal issue, for the vascular system to respond as it were, to the impression made. Death
Would seem to follow from a shock to the brain, in the same way, in short, as from concussion, and the post-mortem appearances bear out these inferences by the conclusive signs of death occurring by way of asphyxia, both cavities of the heart being found distended with blood. The remedies recommended to be made use of in such cases are warmth to the epistaxis, with the intro-
oral administration of opium, and warm
sediments. These are some of the circum-
sstances, which render the application of cold, considered both in the mode in which it is applied, and the state of the body under its influence, favourable to the produc-
tion of its morbid effects. These con-
ditions, which relate to the state of the body, which render its more susceptible of the disease under the exposure to cold, may be summed up in Dr. Cullen's words: 'the weakness of the system, and particularly, the lessened vigour of the circulation, occasioned by fasting, by evacuation, by fatigue, by a
last night's debauch, by excess in heavy
by long watching, by much study, and what has been dwelt on "at rest immediately after great exercise, by sleep, and by preceding disease; in the body or its parts being deprived of their accustomed covering, or the part of the body being exposed to cold, while the rest is kept in its usual, or a greater, warmth," there is every reason to believe that death by starvation is more directly death from cold, or as it may be better expressed, death occurring from depression of the temperature by the body, consequent upon the deficiency or total absence of the due supply of material for the combustion process.

This position has been more particularly established by the experiments of Mr. Heat upon deaths resulting from starvation. He found that Birds, when totally deprived of food and drink suffered a progressive, though slight daily diminution of temperature, and this diminution was not so much shown by a fall of their maximum heat, as by an increase in the
diurnal variation - the average diurnal variation of the heat of their bodies is about 1/2°, the average variation in the inanimate state was about 6°, gradually increasing as the animals became weaker. Moreover, the gradual rise of temperature, which should have taken place between midnight and noon was retarded, whilst the fall sub-
sequently to noon commenced much earlier. Thus in the healthy state, polluted the average of the whole day was lowered about 4½° between the first and penulti-
mate day of this condition. On the last day the production of heat diminished very rapidly, and the thermometer fell from hour to hour until death supervened, the whole loss on that day being about 25 Feb-
renheit, making the total depressions about 29½°. This depression appears to be the imme-
diate cause of death. In examining the amount of loss sustained by the different organs of the body, it was found that 93
cent. of the fall had disappeared, being all in feet, which could be removed, whilst the nervous centres scarcely exhibited
any diminution in weight. From the con-
stant coincidence between the consump-
tion of fat, and the depression of tem-
perature, joined to the fact, that the du-
nation of life under the inaniating
process evidently passed other things
being equal, with the amount of fat
previously accumulated in the body, the
inference seems irresistible, that the cal-
orifying process depended chiefly, if not
entirely, on the materials supplied by this
substance. Hence we are therefore, that the
loss of combustible materials of the system was
exhausted, the inanitated animals died
by the cooling of their bodies, consequent upon
the loss of calorifying power. And that
this is the real explanation of the fact
is shown by the results of a series of very
remarkable experiments performed by
M. Chvostat with the purpose of testing
the correctness of this view. When inani-
inated animals, whose death was impending
were subjected to artificial heat, they were
almost uniformly restored from a state
of insensibility and want of muscular
power, as a condition of comparative activity: their temperature rose, their muscular power returned, they flew about the room and took food when it was presented to them, and if the artificial assistance was sufficiently prolonged, and they were put again subjected to the starving process, most of them recovered. The practical importance of this inference, derivable from these experiments, viz. that the immediate cause of death from starvation is owing to the depression of the temperature of the body, is its relation to many of the circumstances attending on exhausting diseases. For, as has been remarked by Dr. Carpenter, it can scarcely be questioned, from the similarity of the phenomena, that mention with its consequent depression of temperature is the immediate cause of death in various diseases of exhaustion: and it seems probable that there are many cases in which the depressing cause is of a temporary nature and in which a judicious and timely application of artificial heat
Right prolong life, until it has passed off, just as artificial respiration is desirable in cases of narcotic poisoning. It is especially in those cases of fever, in which no decided lesions can be discovered after death, that this view has the strongest claims to reception and the beneficial result of the administration of alcohol in such conditions and the large amount in which it can be given with impunity may probably be accounted for on this principle. That it acts as a specific stimulus to the nervous system, cannot be doubted from its effects on the healthy body, but that it serves as a fuel to keep up the caloric-destroying process appears equally certain.

Of those conditions, which tend to fortify the system against the effects of cold, whether considered as the result of a change of climate, or the consequence of sudden vicissitudes of temperature, disorder of constitution and habit may be noticed prominently. It is needless to remark that an indivi
dual possessed of a robust frame is better enabled to adapt himself to sudden transitions of temperature from the activity of his circulatory and respiratory process, and feels less inconvenience from them. But the influence of habit is very remarkably shown in the immunity with which sudden alternations of heat and cold can be borne, and this is evidenced by the inhabitants of Russia, who, while seeking from their vapour baths, walk immediately in the snow, or plunge into cold waters, without suffering from the change, and also by the sound health, often enjoyed by those who attend furnaces, blast-furnaces, smelters &c. So doubtless of the freedom from the effects of such sudden changes of temperature, in the example first given, must be ascribed to the precaution which is taken to prevent the body losing its accumulated heat before the change to the colder temperature is made, but there will nevertheless last much remain, ascribable to the
power of habit: "for a sudden checking of the exhalation from the skin, when the secretion of sweat is most actively performed. About in one not habituated to such sudden transitions, as have been mentioned, he productive of great disturbance of the circulation, such as occurs when other important functions are suddenly suspended." Expector.

Among the measures which may be adapted to protect the body from the injurious influence of cold, the following deserve mention: warm clothing, a suitable diet, the daily use of the cold bath, and exercise. Warm clothing, of course, is useful in preventing the too speedy dissipation of the heat generated by the system, in imparting warmth, and in supplying any deficiency in the calorifying process and this is of especial importance in those of a weakly constitution whose circulation is inactive. A suitable diet, such as is nutritious, but non-stimulant, for it is maintained that the system is better able to endure cold by abstaining from
alcoholic liquors, and it is the test
mony of Sir John Richardson, founded
on his experience in his last Arctic
expedition, and cited in T. Carpentier's
"Principles of Physiology," that continued
severe cold is much better borne without
recourse to these liquors, than under the
employment of them. But there is one
article of diet, which is all but essen-
tial, it enables the system to withstand
the effects of severe cold. viz. a certain
amount of oleaginous substances and
these are of course serviceable as his her
already stated in the Paphiram they
afford to the respiratory processes, and the
provision thus made for the greater evolu-
tion of heat under a low external
temperature. It is remarked by Dr.
Watson in his lectures, that "the most
direct and certain mode of fortifying
the body against injury from accidental
exposure to cold, is afforded by the use
of the cold bath and especially of the
thower baths. Then this is regularly taken
in the morning, the surface of the body
becomes increased to a degree of cold greater than it is likely to encounter during the remainder of the day. And in laying down the rules, which should regulate the use of this tonic, he says: “It is fortunate that we have an easy criterion of the propriety of continuing this expedient. Then the sense of cold does not remain long, and is followed by a glow of warmth; the cold shiver which is pure to the good. If, however, after the bath, the person suffer headache, continue the chilly and uncomfortable, it shunt at once be given up, as useless and even dangerous.” But it must be added that those persons, who either from indulgence or fear, are very economical in the use of water, and adverse to the practice of cold bathing, are sure to take refuge under the plea that “it does not agree with them,” particularly in this the case with females. If such, sponging with cold water should be recommended, and 2 to 3 degrees, they will be persuaded to commit themselves
To a larger body of water, and should the practice of cold bathing be indulged in for even a short time, it is never likely to be deserted from such a luxury, since it becomes, for producing a moderate degree of reaction, and the surface being pervaded by a glow, arising from an increase of the circulation; it is followed by a sense of vigour, and great cheerfulness, and acts as a stimulus to exertion both of mind and body.

There are certain conditions of the mind, in which the body enjoys an immunity from injury from cold, as in passions engaging a close attention to one object; in that state of the body in which sensibility is greatly diminished, as in麻木ness "hellen." The following passage, from Dr. Currie's "work, already cited, well illustrates the influence, which conditions of the mind exert in preserving the body from the morbid effects of exposure to cold. "The power of the body in preserving its heat under the impressions of cold, and the change of temperature,
and of medice, poems in some measure regulated by the condition of the mind. That fear increases the influence of Cold and of many other poisonous powers will not be doubted, but the state of the mind to which I allude, is that of vigorous attention to other objects. This, it is well known, will to a certain degree, steady or indeed prevent the sensation of Cold, and what does this, I apprehend, prevent or at least weakens its physical action. The astronomer intent on the objects of his sublime science, it is said, neither feels nor is injured by the damp or the chilliness of the night; and in some species of madness, where the ideas of imagination are too rigid to admit the impressions of sense, Cold is resisted with extraordinary energy. I have seen a young woman, one of the greatest delicacy of frame, struck with madness be all night on a cold floor with hardly the covering that decency requires. When the water was frozen on the table beside her, and the milk she was to feed on
was a mass of ice.

It is not solely by the abstraction of an undue amount of caloric from the body, that cold acts in producing disease. Undoubtedly the rapid and great diminution of temperature of the body, lowers its vital energy (robbing it of that principle), which is needful for the mutual actions of all its parts, and which it has been attempted to be shown by Dr. Carpenter in the theory which he has put forth of the relation of the "physical forces to vital force," has the most important bearing towards organized matter, as presenting the dynamical material, through the influence of which, it assumes the phase of a living plant, or an active animal—but the injurious effect of cold, must be to a great extent referred to the intensity and duration of the "sensation of cold," as is remarked by Dr. Athers. "The effects of cold depend not so much, on the degree of cold that is applied to the body, nor even on the degree to which the body is
actually cooled, as on the rapidity of the change, and probably on the intensity of the sensation, thus excited. And again, the degree of effect of any cold applied to the living body has always been observed to be greater, as the sensation it excited is the more intense and the more lasting. To consider cold as a cause of disease, and to write of the several affections, which may be traced to its effects, both as a predisposing and exciting cause, is a subject of such reach, as to far outstretch the limits of this paper, even supposing the writer were qualified which he is not, to consider its operations in that light, for purpose, but thus much may be said, that there are two surfaces, or organs (which are more especially to use a figure), called upon to interpret the measure of its effects upon the surface of the body. In the first place, the mucous surface of the respiratory passages; and in the second place, and in an exceeding few number of instances, the kidneys. And this disposition of greater tendency.
of these organs, now mentioned, to take on morbid actions, on the exposure of the surface to cold — on its "receiving a chill" — has some relation to that complementary one in function, which we know to subsist in an especial manner between the skin, the lungs, and the kidneys. However, there is perhaps no disease towards which cold may not stand in the relation of the predisposing or exciting cause — and the old and very young, particularly experience its morbid effects, so that the degree of the greatest fall of the temperature during the winter months in any year being known, the periods of the greatest mortality will be found, generally, to correspond with it. Unless there has existed an epidemic to modify this.

Cold is valuable as a therapeutic agent, but its use requires great discrimination and care. From its allaying vascular excitement, it is of great benefit in inflammations. In inflammation of the brain and its membranes
it is a remedy of great power. It would appear from the writings of Dr. Curie to be of no less value in fevers, in their hot stage, and the conditions which indicate its employment are an increase of the animal temperature heat above 98°, a uniform increase of temperature over the whole body, and a dry state of the skin over the whole surface. Should the skin be moist, or should a tendency to perspiration thus itself, or the patient feel a sense of chilliness, in such circumstances, the employment of cold is strongly contraindicated. In some convulsive diseases as Chorea, Thysanosis, the employment of cold, especially when used in the way of the cold bath, is attended with improvement, by increasing the tone of the system. But there are great doubts of the propriety of employing it in tetanus; the relaxation, which often follows its use, is usually of very short duration, and the sudden shock, experienced on the first impression of the cold water, will often excite an exacerbation of the spasm.
and immediate death has been the result in a few instances. In haemorrhagic affections a judicious use of cold is often of great service. As cold sponging in epistaxis and haemoptysis, iced fluids taken into the stomach in haematemesis, enemata and injections for vagiemia of cold liquids in haemorrhage from the bowels, menorrhagia, and flooding after delivery.

The action of cold as a tonic has already been considered, but it may be added, that the daily application of cold to the surface, by the plunge or shower bath, and of a degree not intense, nor of a duration too protracted, and steadily persevered in, is a second tonic remedy in invigorating the system in cases of debility, and combined with the generaltonics, fresh air, exercise &c, tends greatly to preserve the body in health and vigour.

D. E. Stowe