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REPORT

—ON—

ALCOHOL,

ITS ACTION AND EFFECTS IN HEALTH AND DISEASE;

—BY—

A. B. PALMER, M. D., LL. D.,

PROFESSOR OF PATHOLOGY AND PRACTICE OF MEDICINE IN THE COLLEGE OF MEDICINE AND SURGERY OF THE UNIVERSITY OF MICHIGAN; AUTHOR OF "THE SCIENCE AND PRACTICE OF MEDICINE," "EPIDEMIC CHOLERA AND ALLIED DISEASES," ETC.

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REPORT OF THE COMMITTEE ON THE ACTION OF ALCOHOLIC LIQUORS IN HEALTH AND DISEASE.

BY A. B. PALMER, M. D., LL. D.

The committee designated by the President of this Society to report upon the subject of alcoholic drinks, brought to our notice at the last annual meeting, beg leave to say that they regard this matter as of the most profound interest and importance, whether considered from an economical, a social, a hygienic, or a strictly medical point of view; and considering the intimate relations of these articles to health and disease, and the very wide spread influence they exert upon these conditions, it seems to us that no subject can more appropriately occupy the attention of this Society.

The fact that there are differences of opinion and practice among us in relation to the use of alcoholics in health and disease, if such differences are found to exist, so far from affording an objection to the introduction and consideration of the subject, is a strong reason for its discussion; but it should be treated in a calm and temperate manner, and in a scientific spirit. In this spirit we shall endeavor to proceed.

The term alcoholic drinks embraces all the liquids whose chief ingredient is ethylic or common alcohol, though in some of them are contained small quantities of the other alcohols, modifying, generally intensifying, in a slight degree, their effects. But into many of the details of their composition, for the purposes of this paper, it is not necessary to enter.

As to the physical and chemical character of these liquors, it is sufficient to state that common alcohol, the product of the fermentation of organic, starchy, and saccharine substances, is

the effective material in them all, that this alcohol is a definite, fixed, stable chemical compound, preserving its identity in whatever mixture it is found, whether it be in simple fermented liquors, as beer, wine, cider, and koomis, or in distilled spirits, as whisky, brandy, rum, and gin; and though the effects are slightly modified by various ingredients found in the different liquors, the chief modifying effects are produced by the amount of water contained in each, or by the extent of dilution of the alcoholic element.

Pure, or nearly pure alcohol, when applied to a living tissue, produces a very prompt and decided physical effect, chiefly by its strong affinity for water, which it takes from such tissues, changing their physical and chemical states. These effects we shall not consider, as alcohol is never taken as a beverage, or given as a medicine, in a concentrated form. In speaking of its ordinary effects, it is presumed to be diluted more or less, generally reduced to less than fifty per cent of strength. In discussing the subject it is not deemed necessary always to specify the particular liquor in which it is used, as the essential properties of all the liquors are possessed in common. In all of them the alcohol is the article which effects the good, if good there be, or the harm, if harm results from their use. A small amount of nutrient material may be mingled with the alcohol and water in beer, wine, and koomis; and various adulterating substances, sometimes of an injurious character, may be present in any of the alcoholics; but such injurious substances are much less common than many suppose; and it is the simple alcoholic element, such as exists in *pure* liquors, that will here be considered.

In ordinary beer there is from three or four up to ten or twelve per cent of alcohol. In natural wines, the fermented juice of the grape without additions (articles we seldom get), there is from four or five to sixteen or seventeen per cent of alcohol, but in the made up wines there may be very little, or there may be as much as twenty-five per cent, or even more.

In distilled or ardent spirits the standard quantity of alcohol is fifty per cent. There may be a little more, though oftener there is less than that amount in commercial articles. It cannot be too clearly impressed that in all these liquors the alcoholic strength is the chief matter governing the intensity of

their effects, and this strength is determined by the amount of water present—by the amount of the dilution of the alcohol with this element.

The action of alcohol upon the living system may properly be considered under two heads:

First, Its physiological action, or its effects on the system otherwise in a healthy state;

Second, Its action as a therapeutic agent, or as a medicine in the treatment of various diseases and injuries, or its effects in morbid conditions.

This distinction is important to be made, but with alcohol, as with every other medicine, its essential therapeutical effects are governed, and must be judged of, largely by its physiological action. This, after some general observations, will first be described.

The different substances taken into the system and operating upon it are classified rather loosely and in a general way as foods, poisons, and medicines.

A food is a substance which, when taken into the alimentary canal, is capable of being absorbed from it, and of serving either to supply materials for the growth of the body, or for the replacement of matter which has been removed from it, and which thus effects renewal. Foods, to replace matters which have been oxidized, must themselves be oxidized. Foods by such oxidation must be at least *force generators*, and all the higher forms are *tissue formers*.

Some substances, such as inorganic salts and some organic materials, serve to influence certain actions which may result in the liberation of energy; or, acting as inhibitory or restraining agents, may check the activity of parts, and by these effects serve as *force modifiers*. The internal organs of the body are balanced and governed in their action by excitor and inhibitory nerves, and paralyzing the inhibitory, as well as stimulating the excitor nerves and functions, will increase, though generally abnormally, the action of the organs concerned. The removal of the pendulum of a clock, or the balance wheel of a watch, though adding no force, will allow the mechanism to run on more rapidly until it runs down. The paralyzing of the inhibitory nerves may give an appearance of stimulation, but in this, real and useful force is not augmented. These conditions may lead

an observer to false conclusions, giving the impression that a real sedative, operating upon inhibitory functions, is a stimulant.

But excitors, such as condiments, mustard, pepper, cinnamon, etc., increase certain actions, though they yield very little or no force by their oxidation. They stimulate the mouth and other parts of the alimentary canal, increasing the flow of digestive secretions, and often increase the appetite for food, and the power of digesting it. Food, digested and appropriated, is force, and thus the condiment may indirectly produce force. Some substances diminish action, general or special, and that leads to the diminution of all force in the system. Other substances, as the active principle of tea and coffee, or of the coca leaves, make impressions upon the system which modify actions, resulting in changes of various kinds. These cannot be regarded as foods, as they supply no appreciable force by their oxidation, nor do they furnish any appreciable amount of material for supplying the tissues. They have, however, an apparent sustaining effect greater than alcohol.

According to Prof. H. N. Martin, of Johns Hopkins University, one of the latest and most expert experimenters, and one of the most authoritative writers on physiology in this country, and whose work on the "Human Body" has received the rare distinction of being approved by our State Board of Health, a food must fulfill the following conditions:

First, It must contain the elements which it is to furnish and replace in the body, and also those elements leaving the body. Substances are of no use as foods which are not capable of oxidation under the conditions prevailing in the system, and which are not capable of construction into its tissues.

Second, Foods must be capable of being absorbed from the alimentary canal, and either by themselves, or the changes they undergo, must be capable of furnishing force, or the elements of tissues.

Third, (And this is his precise language), "Neither the substance itself, nor any of the products of its transformation in the body, must be injurious to the structure or activity of any organ. If so it is a *poison*, not a food."

A *poison* is briefly defined by the quotation from Prof. Martin in this last sentence. It is a substance which, when applied to

or taken into the body, by its peculiar qualities independent of mere mechanical properties or of large bulk, is capable of inflicting injury upon the organism, either in its functions or structure, and which when used in certain quantities, but still independent of great bulk, may produce death.

Medicines are substances given for the purpose of modifying favorably morbid actions and conditions, and are capable of producing such effects. They are generally injurious to persons in health, and are beneficial only when they produce favorable changes in diseased states. The same article may be a medicine or a poison according to the purpose and the conditions of its use. Thus, opium, prussic acid, arsenic, and corrosive sublimate are deadly poisons, but used in proper quantities, and in relation to certain morbid conditions, they are useful medicines.

Again, some articles are both medicines and foods. Of this class cod liver oil and malt are examples. Neither of these, however, has poisonous properties, in the ordinary sense of these terms.

These facts and principles seem necessary to be borne in mind for the purpose of placing alcohol where it belongs, and for understanding its proper actions.

THE PHYSIOLOGICAL EFFECTS OF ALCOHOL.

Alcohol is placed by all writers on toxicology among the poisons. No one questions that, in sufficient quantities, even when so diluted as not to produce its caustic effect, and independent of injury from bulk, it does material harm to the system, and may produce speedy death. The word *intoxication*, applied to its effects when taken in ordinary free quantities, implies its poisonous action, and it is rational to conclude that a poison is a poison still, though used in such moderate quantities that its injurious effects are not immediately and strikingly manifested.

The ordinary effects of alcoholics, as often experienced, or as superficially observed, are sufficiently familiar to all of us; but in studying their physiological and pathological actions, a more careful analysis of their phenomena is required.

In the action of a single or a few rapidly repeated doses of an alcoholic liquor, especially in one unaccustomed or but little

accustomed to its use, a striking similarity will be found to that of the common anæsthetics, chloroform and ether.

"In the phenomena induced by all of these agents, whether speedily or more slowly effected, *four* somewhat distinct stages, but shading off into each other, may be observed when their complete action is developed."—(*Richardson.*)

In carefully observing the administration of chloroform or ether, these stages will be noticed:

First, A stage of irregular and peculiar excitement, perhaps due to a physiological resistance to the invading poison. There are restless movements, a flushed face, hasty exclamations, or impetuous loquaciousness, rapidity, but unsteadiness of mental action, soon *recklessness* of expression and conduct, effects chiefly due to *paralysis of the controlling functions.* The expressions will occasionally be bright, but oftener silly, and sometimes coarse, depending much upon the habitual character of the person. There may be an increased disposition to muscular movements, but the muscular strength is not increased.

Second, Very soon comes the second stage, when there is a continuance, more or less, of this apparent excitement, but with less muscular direction or control, due to enfeeblement of regulating functions, causing irregularity of movements, with little persistency or precision; and now there is an increased condition of mental confusion. Some of the muscles may still be exerted with considerable force, but others are much weakened, and there is little control for definite objects. In this stage, though at first the anæsthetic may have been repulsive, it is often desired, and is sometimes imperatively called for and taken with avidity.

Third, Then the third stage occurs, a stage of distinct muscular failure, not only in direction but in power. Struggles now cease or become very feeble, and there is now great mental confusion. The extent of the mental impairment, as compared with the muscular, will depend much upon the natural strength and steadiness of the normal mental functions.

Fourth, At length the fourth stage supervenes, that of the complete failure of the voluntary muscular movements, with entire mental insensibility or unconsciousness. Anæsthesia is then complete. The patient breathes, but generally slowly, the circulation goes on, but often feebly, and he nearly approaches

the boundaries of death, usually, though not always, with a "return ticket," when the anæsthetic poison is not carried too far.

The ordinary anæsthetics (chloroform and ether), soon pass out of the blood and the tissues, and recovery from the different stages takes place in the inverse order of their occurrence; and this recovery is often accompanied with nausea and vomiting, and other evidences of depression.

In the case of alcohol taken into the stomach, these essential conditions occur, but more slowly and persistently. The stages of chloroform intoxication are marked by minutes, those of alcohol by hours. When a moderate quantity of any of these agents is given, only the first stage is induced, but when more is given, or the administration is continued, the subsequent stages follow.

With many the sensations, so long as sensations continue, are very agreeable; with others not so much so; they may be even distressing; but they are generally of a pleasan[illegible] character, and often their repetition is desired. The secondary effects, or those sensations which appear on the subsidence of the anæsthesia, are often quite disagreeable. Nausea and vomiting may occur, not only at this time, but sometimes during the earlier action of these agents.

In the administration of these narcotic substances, the grades and differences of action depend upon the quantity taken, the constitution and temperament of the person, and upon other more temporary and accidental circumstances which may be present.

A quantity of chloroform or ether may be inhaled, or of alcohol imbibed, so small as to produce scarcely any perceptible effect. A little more will produce but a slight effect, while an increase will develop the whole of the advanced stages, and finally cause death. The same articles produce all these results, and the essential nature of their action is the same in all the degrees of their effects. They are narcotics throughout. All have a similarity of action easily traced.

When a glass or two of wine or of spirits and water is taken by one not much accustomed to their use, a flush of blood to the face and the general surface is observed. A flush of nervous action also occurs. There is usually an increased disposition

to motion, and for a very short time greater sensibility to some impressions, or at least a more ready response to them, is had. There is generally more rapid ideation, more agreeable feelings are commonly experienced, and a sense of fatigue, if before felt, is apt to be relieved. By the relaxation of the superficial vessels, more blood is brought to the surface, a feeling of coldness, if existing, is abated, and more warmth of the skin is often perceived. The heart, for a time at least, is usually quickened in its motion, though in the physiological condition it is seldom increased, even for the shortest time, in its actual force; and the countenance often manifests a more excited, or at least a different expression. This is the first mild stage of the alcoholic action upon a healthy system in its usual condition. The muscular strength is not increased above the normal, but, on the contrary, it is diminished, as has often been demonstrated by lifting at weights before and after the administration of ever so moderate an amount, and the muscular power is diminished in proportion as the quantity of alcohol is increased. By the relief produced by the narcotic or anæsthetic to a sense of fatigue, when such is present, the disposition to muscular action may be increased, but the power of the muscles is decreased.

In the *second* stage, when more has been taken, or when that taken has had its more full effect, the blush of the face becomes purplish, or, on the contrary, it may fade: the temperature diminishes, the action of the heart may or may not be quickened, but its force is generally *reduced*. There is now moderate failure of muscular direction, and some increased failure of muscular power, though there still may be a greater disposition to muscular exertion. There is some degree of mental confusion, though it may be slight. The regulating, restraining power is, however, markedly weakened, and there are more or less recklessness of expression and conduct, a ready excitement of feelings of either mirth or anger, and a more ready expression of such feelings; indiscreet confidence, silly sentiment, or extravagance and boasting are indulged in. There is the condition called "tipsiness," with different degrees of its manifestation.

This, in the progress of a case, shades off into the *third* stage, when a man is generally regarded as *intoxicated*, or drunk. The face may now be either pallid or purplish, the temperature

is reduced, the motion of the heart usually diminished, often in frequency, and always in force. Vascular tension is less, there is marked failure of muscular direction and powers, the tongue is thick in expression, the lips and limbs are more or less palsied, there is obscurity of intellect, with increase of irritability of temper, or of foolish sentimentality, with still greater recklessness of conduct, and a loss of the sense of propriety; and the pugnacity, brutality, violence, and criminality appear, which all of us, in this day of newspapers, hear and know enough about. This stage may terminate in sleep, with restless mutterings, or profound snoring, in semi-convulsions, or more quiet narcotism.

In the *fourth* stage, or that of *dead drunkenness*, there is the culmination or perfection of alcoholic narcotism. The anæsthetic phenomena are present. There are muscular paralysis, irregular and stertorous breathing, feeble, often intermitting heart action, great fall of temperature, sometimes to four or even five degrees below the normal, with utter insensibility and unconsciousness, and the next step is death. This is more likely to occur than from the same degree of anæsthesia or narcotism from chloroform or ether, because of its longer continuance.

In recovering from the more advanced degrees of alcoholic intoxication, very distressing conditions are generally suffered. The visions and the obliviousness which precede are followed by an awakening which is a grave reality.

I have thus minutely, and I fear tediously, traced the general acute or immediate physiological effects of alcohol, and have showed its analogy—its substantial identity—with that of chloroform and ether, in order to enable us to see more clearly to what class of agents it belongs.

If chloroform is a poison, alcohol is essentially a poison. We waive, for the present, the question of its food properties. If such properties exist, they are so slight and trivial, compared with its other actions, as not to be worthy, in this connection, of being brought into the account. If chloroform is a narcotic, alchohol is a narcotic. If chloroform is an anæsthetic, alcohol is an anæsthetic. If one is essentially a depressing agent, so is the other. Their strong resemblance no one can question. The chief difference is that the alcoholic narcosis is longer continued, and its secondary effects are more severe.

It is this narcotic or anæsthetic action of alcohol, its power to diminish sensibility or modify the feelings, rendering the individual less conscious of outward disagreeable impressions, relieving a sense of fatigue, of pain, of dragging weight, of mental depression and distress, which has led to the popular error respecting it, and the contradictory uses made of it. It is in consequence of its diminishing outward impressions and inward monitions that it is taken to warm in winter, and cool in summer, to soothe in affliction, and render insensible to reproach or the upbraidings of conscience.

It does not relieve from cold by increasing temperature, nor from heat by diminishing it. It does not relieve the sense of weakness by increasing strength, nor of exhaustion by nourishing tissues; nor does it soothe affliction by increasing nervous power or manly control, nor does it assuage the stings of reproach, or the pains of remorse, by improving the conduct or purifying the conscience. It does not *remove* evils, it *covers* them; it generally aggravates their final results. But it is this temporary covering of evils in the condition of tipsiness and moderate intoxication that has given alcohol its fascinating and delusive power over so many of our race, and led to indulgences so often destructive of all happiness and all good.

But there are stronger evidences than this similarity to the other anæsthetics,and weightier opinions than my own, to show that alcohol, in its direct action, is a depressing rather than a supporting agent. The well known original investigator, professor, and author, Dr. Sidney Ringer, of London, and his associate, Dr. Harrington Sainsbury, have recently instituted a series of exact experiments to ascertain the action of the different alcohols on the isolated heart of that physiological animal, the frog. These experiments were conducted in the most scientific and careful manner, and rendered conclusive by many repetitions, and by the use of the most delicate instruments of precision. It was found that the action of all the alcohols was essentially the same in kind, differing only in degree. All of them arrested the heart in diastole—stopped its action in a state of relaxation or paralysis. None of them increased the power of the heart at any time, or in any degree of their action. They say in their report: "The position alcohol occupies is that of a narcotic, and it is probable that its action is very similar

to that of ether. The sphygmographic experiments of Parkes and Wallowicz on man, showed clearly the accelerating effect [of alcohol] but gave no distinct indication of increased arterial pressure." The arterial pressure is well known to be the evidence of heart force. Increased frequency of pulsation is often the strongest evidence of diminished power. A very rapid, fluttering pulse usually occurs in extreme weakness.

The report of Drs. Ringer and Sainsbury closes with the following remark, announcing the most important fact which these experiments confirm, viz.; "That by their action on the cardiac tissue these drugs [the alcohols] are clearly *paralyzant*, and this appears to be the case from the outset, no stage of increased force of construction preceding."—(Practitioners [London], May, 1883, p. 350.)

Dr. Martin, of Johns Hopkins University, the author and experimenter already referred to, performed a series of experiments with alcohol upon the heart of the dog, which brought this careful observer to precisely the same conclusion as to the paralyzant and contra-stimulant effects of this article. Professor Martin states as the result of his exact and conclusive observations as follows: "Blood containing one-eighth [of one] per cent of alcohol has no immediate perceptible action on the isolated heart. Blood containing one-fourth [of one] per cent by volume, almost invariably remarkably *diminishes* within a minute *the work done by the heart.* Blood containing one-half [of one] per cent, that is, five parts in a thousand, always diminished it, and may even bring the amount pumped out of the left ventricle to so small a quantity that it is not sufficient to supply the coronary arteries."

Professor Martin estimates that an ordinary *moderate* drink of brandy or whisky containing half an ounce of pure alcohol, or an ounce of the spirit, would supply to the blood of an ordinary sized man, the proportion of two and a half parts per thousand, the quantity he found diminishing so markedly the force of the heart's action, as tested upon the dog, by instruments of precision. These and the London experiments were made nearly at the same time, and by each without the knowledge of the others, and they have not been contradicted by any other observers.

Previous to these experiments Dr. Samuel Wilkes, of Guy's

Hospital Medical School, London, one of the most acute observers and accurate and independent thinkers in the profession, from an analysis of his own personal experience, and his observations on other men, in an article in the London *Contemporary Review*, says: "If most persons analyze their sensations after imbibing any alcoholic drink, they will soon discover that to describe the effect produced upon them as *stimulating is a misnomer*; and that, consequently, the employment of the expression almost begs the whole question as to its operation and value, for there can be but little doubt that it is owing to this misapplication of the term *stimulant* to alcohol, with many conveying an idea of strength, that causes it to be so much recommended, and taken with so much satisfaction. If a person is low and a glass of wine produces a pleasurable effect, it is easy to regard it as a stimulant, and as having afforded some proportion of strength."

He adds: "Its stimulating effects may be regarded as *nil* compared with those which may be styled its *sedative* or paralyzing ones. In a word, alcohol, for all intents and purposes, may be regarded as sedative or narcotic, rather than stimulant." He classes it with opium, Indian hemp, and tobacco.

Dr. Anstie, who studied this subject with great care, and who, though holding some views with which we do not agree, is clear in his enunciation on this point, which the recent experiments ments confirm, says: "A general review of the phenomena of alcohol narcosis enables me to come to the conclusion, the importance of which appears to be very great, namely, that (as in the case of chloroform and ether), the symptoms which are so commonly described as evidences of excitement, depending on a *stimulation* of the nervous system, preliminary to the occurrence of narcosis, are, in reality, an essential part of the narcotic, that is, the *paralytic phenomena*."

Prof. Davis, who is styled the father of the American Medical Association, in substance, says that alcohol is never changed in the stomach, but is absorbed into the blood, and while there, and going to all parts of the body, its presence retards those molecular changes which constitute nutrition, disintegration, and secretion, on which the phenomena of life depend; that it retards the elimination of waste matter, impairs nerve sensibility, lessens muscular power, and lowers the temperature of

the body; and that a large part passes off speedily, unchanged, while there is no evidence whatever that such part as is retained a longer period is either assimilated or converted into any form of force.

Dr. Richardson, of London, the eminent sanitarian, experimental physiologist, and physician, and the author of numerous works, has long held similar views to these of Dr. Wilkes, or rather has had from his experiments and observations similar knowledge; and our own observations, which have continued on this subject for a long time, have, years ago, brought us to similar conclusions. There is, in our minds, no question of their correctness as applied to the ordinary physiological state.

In studying the effects of alcohol on the system, we must go beyond these acute or immediate effects in the physiological state. These acute effects show the essential nature of the article, but there are more remote effects, especially more permanant ones arising from its continued use, of much more importance than its immediate action.

In the habitual use of this article *four* stages of alcoholic change are recognized by Dr. Richardson, corresponding in many respects with the four acute stages which have been described. There is a mild *first* stage, where the indulgence is very limited, in which the condition deviates but little from the physiological state. There is a *second* stage where a change from the normal state is more perceptible, but yet where the subject of it is not regarded as a drunkard. A *third* stage where there is recognized unquestioned intemperance or inebriety; and *fourth*, where the man is a complete sot, given up to continued indulgence, is in the most debased condition, suffering from chronic and extreme alcoholism, tottering upon the verge of destruction, unfit for any useful occupation, a disgrace to himself, and a nuisance to all about him.

There are no differences of opinion as to the injurious, the pathological, and the destructive effects of alcohol upon the individual, physically, mentally, morally, and socially, and upon the family and society, when its indulgence is carried to the extent of inducing these latter stages. The whole controversy, if there is room for controversy, is respecting the lesser degrees of indulgence. All that admits of any honest and intelligent difference of opinion and expression, pertains to the

matter of moderate drinking. Is there real benefit, or palpable injury? Is there safety or danger? Is there pleasure not overbalanced by suffering? Is there greater or less happiness and well being in what by many is called the "temperate use" of alcoholic drinks?

It is true that a person may take a quantity so small occasionally, or even habitually, or a moderately larger quantity at considerable intervals, as not to be seriously affected by it. There are many people who may be classed as temperate, who are not total abstainers. They may never carry the effect beyond the first degree of chronic alcoholic action. What is their condition, and how do they compare with total abstainers? Negatively, we may say, they are not stronger or more healthy. They cannot do more or endure more. They are not clearer headed, or purer hearted. We think it must be conceded by all of us that moderate drinkers are no better physically, mentally, morally, or socially, than those who totally avoid these beverages. In this country, at least, where so many are abstainers, and where there are such large opportunities of comparison, this will be admitted. If the preceding view taken of the essential action of alcohol be correct, the moderate drinkers are not in quite as good a condition as the abstainers. No doubt, many temperate drinkers are better men, physically, mentally, morally, and socially, than are many others who are total abstainers. There are those who take a very moderate quantity of wine daily with their dinner who are superior, mentally and morally, to most ordinary men who do not take any; but the former are not superior because of their wine, and the latter are not inferior because of their abstinence. The contrast, as a rule, would be greater if the abstainers took wine.

But what is the particular condition of the average moderate drinker, as affected by his indulgence? His physical and mental condition, compared with what it would be without the alcohol, must be judged of by what we have seen to be the essential effect of the article. Can a debilitating, paralyzing narcotic agent, certainly poisonous in larger quantity, really improve the physiological or ordinary healthy condition of the system? This seems contrary to reason, and is contrary to correct observation and actual experience. The fact is, alcohol, in whatever quantity, taken in the physiological state,

when perceptible effects are produced, is weakening instead of strengthening, is lowering instead of elevating.

But with the moderate drinker in course of time there comes to be, I may say inevitably, a feeling of the want of the narcotic influence whenever the accustomed dram or sip is omitted. A sense of uneasiness is felt which is relieved by the drink. With many, especially in our exciting climate, and with our fast habits, this becomes a feeling of urgent necessity, which is with difficulty resisted. The feeling is akin to that of the smoker when deprived of his accustomed cigar or pipe. When this is the case, the drinker's system is changed from the natural or physiological to an artificial—to the alcoholic state. He is constantly in a different condition from the habitual abstainer.

The surface vessels, especially of the face, are apt to be dilated, giving a reddish or bluish color to the countenance. The action of the heart is apt to be perceptibly changed. It is usually too rapid, but from modification of the innervation it may be too slow; and if no feverish excitement or irritability is induced, it is too feeble. The digestion is indifferent until the alcohol dilates the vessels of the stomach, and impresses in the accustomed mode its nerves. The mind is generally duller, until the vessels of the brain are dilated, so that more blood goes to that organ. Sensations of coldness are apt to be felt, until relieved by the soothing potion. The general sense is that of discomfort, until the peculiar sensation produced by the narcotic is experienced. An artificial state has been induced in which relief and comfort to the sensibilities arise from the wine, the beer, or the whisky and water; and that relief is to such an extent, and so common, that, losing sight of the fact that the unpleasant feelings are the result of the alcohol habit, the wisest men are often persuaded of the utility to themselves, and by parity of reasoning to others, of this moderate drinking.—(Richardson.) They often feel better and can do more work when they have their accustomed drink than when temporarily deprived of it.

But the worst is to come. Everybody knows that, in this country at least, very few stop long at this stage of moderate habitual drinking. When the indulgence goes beyond this moderation, we have chronic alcoholism of different degrees of

severity, as there are different degrees of indulgence, and differences in the powers of resistance and endurance. The effects that follow are familiar to all of us. The diseases of the stomach, the liver, the lungs, the heart, the kidneys, the brain, the whole body, we daily see. Gout, always the effect of alcohol in the individual or his ancestors—(Garrod),—neuralgias, nervousness, irritability, broken sleep, debility, inefficiency, moral perversion, indifference to obligations, malfeasance, in short, every form of physical, mental, and moral degradation follows. Some endure this state long, but an accident or a casual disease is badly borne, and the possibility not only of well living but of long living is destroyed.

Says Prof. Flint: "The toxical condition called alcoholism enters directly into the constitution of many affections, such as cirrhosis of the liver, fatty liver, epilepsy, muscular tremors, gastritis, pyrosis, and various dyspeptic disorders. Indirectly, alcoholism favors the production of nearly all diseases, by lessening the power of resisting their causes, and contributes to their fatality by impairing the ability to tolerate or overcome them."

An alcoholic patient is dreaded both by the surgeon and the physician. A fracture, an amputation, the ligation of an artery, or the removal of a tumor is apt to be followed by severe consequences; and a pneumonia, a hepatitis, a fever, the cholera, or almost any internal disease, is usually much more severe and more likely to be fatal. Such cases require different management from the same class of accidents and diseases occurring in non-alcoholized persons; and the hospital experience and conclusions in large cities, derived from such cases, embodied in books, and followed by private and country practitioners in the treatment of unalcoholized people, destroy another proportion of human life. These remarks apply to cases falling short of positive drunkenness, to the cases of habitual, steady drinking, to persons who may maintain a show of health, but who are on the verge of a crater, into which they are liable at any moment to fall. If they escape until *age approaches, their powers much sooner decay*, and they may be permitted to die of premature senility. Their chances of life are even less than those of the periodical drunkards, whose extreme excesses

attract much more attention, but whose periods of abstinence afford an opportunity for partial recuperation.

These facts are being recognized by life insurance companies, and these companies are becoming very wary of beer and wine drinkers, who maintain for a time a fair exterior.

Sir Henry Thompson, the distinguished surgeon of London, says: "Few are aware of the mischief done in England by what is regarded as the moderate use of fermented liquors."

We will not dwell upon the extreme and more terrible conditions of inebriety and alcoholism, mental, moral, or physical, lest we should be considered "sensational" or "fanatical." The evils of intemperance, however, *are* sensational, and their contemplation is apt to produce what by many is called "fanaticism." In a report to a medical society like this, there should be the statement of scientific truths, rather than appeals made to sentiment or feeling; but important truths, whether scientific or otherwise, affecting the deepest and most sacred of human interests, *are felt* by all benevolent and sensitive minds.

In considering the effects of alcohol and the relations of its use to the welfare of the race, we cannot everlook the subject of *heredity*. Every permanent condition of the organism, every habit of body or mind in the parent, has an influence greater or less upon the qualities and tendencies of the offspring. This is a fact now so generally acknowledged as to require no proof or discussion. Our instincts are chiefly the transmitted habits of our parents and ancestors; and we are to a larger extent than we often realize, the aggregate of qualities we have inherited. We can make of ourselves what we will, only within certain limitations, and our innate propensities at least, however they may be controlled, are received from our ancestors, and are apt to govern us. This is particularly true of physical conditions. Gout, as already stated, is the result of alcoholic indulgence, as it is a disease unknown among people, as the Mahommedans, who, from religious restrictions, or from other causes, have never for generations used alcohol in any form; and this abnormal state is well known to be transmitted as well as acquired. Other evil qualities and defects produced by drink, as well as by other sins that establish characteristics, are visited upon the children unto the third and fourth and later generations.

Morbid qualities of a milder character in the parents may be exaggerated and otherwise modified in the offspring. Thus, *inebriety* with its ordinary perversions in the parent may become idiocy or insanity in the child; and moderate drinking in the father, creating an appetite which in him is controlled, may produce drunkenness in the son, or even dipsomania in the son or the grandson, which may be beyond all control. Our personal observations have afforded sufficient instances of this kind, and the general testimony of those who have given attention to this subject abundantly confirms the statement.

In a report of the Medical Superintendent of our Eastern Michigan Asylum for the Insane, it is stated: "A careful analysis of several hundred persons treated shows that in about seven and one-half per cent of the males, and about eight and one-half of the females, there was a definite history of inebriety of one or both parents." It is not stated in how many cases there was drinking somewhat short of what is usually reported as inebriety in the parents. "The female children of drunkards suffer in relative frequency from the following forms of insanity: Mania, dementia, melancholia, and idiocy. * * In some instances an inebriate heredity develops in one child as depravity, in another as inebriety, in a third as hysteria, and in a fourth as insanity. * * Drunkenness produces a transient insanity, even in a healthy brain. Chronic drunkenness produces organic brain diseases, bringing in their train impairment of the memory, inactivity of the reason, a weakness of the will, and loss of the natural affections; all of which are capable of transmission from parents to their children." These statements of Dr. Hurd are fully sustained by the well known statistics of the late Dr. Howe, of Boston, and by many others.

There is a connection, often marked, in the use of the different narcotics. The alcohol habit tends to produce the opium habit, and the reverse; one may be substituted for the other, and the two are often indulged together. The same principle, to a greater or less extent, applies to the wide-spread tobacco habit, and to the less prevalent chloroform, chloral, and hasheesh habits. The indulgence in any one begets a tendency to indulge in others. The habitual use of any of them produces a constitutional narcotic state, different from the normal, and

which is always, in a greater or less degree, a deterioration. In none of its forms, and for no purpose is the narcotic habit anything but the reverse of an improvement upon nature.

The occasion will not admit of a further discussion of the subject of heredity in its relations to alcoholism and the other narcotic habits. These habits are the present bane—a crying evil of nearly the entire world, and we may well consider and teach others to consider the influence of our personal indulgence upon those that are to come after us—the habits of this generation upon those that are to come.

The question as to the oxidation of any portion of the alcohol taken into the system, and the consequent development of force by it, is not absolutely settled. Baron Liebig, who for a time held great sway in the scientific, especially the chemical world, taught that alcohol, a hydro-carbon, united with oxygen in the lungs, producing carbonic acid and water, thus becoming "respiratory food," and in so doing producing heat and perhaps other forms of force. The simplicity of this theory (for it was only theory), and the high authority of its author, caused it to be quite generally accepted, though resting upon a basis so purely speculative, and, as declared by high modern authority, "without a single experimental fact for its support." But Drs. Prout and Percy of England, Böcker, of Germany, Davis, of this country, and others, ascertained by the most direct and conclusive experiments, that less carbonic acid was given off from the lungs, and therefore less combustion of carbonaceous matter occurred in them, when alcohol was taken, than without it; and that the sum total of elimination of effete matters was diminished by the presence of this article in the system. This proved that alcohol retarded those chemical and vital changes by which nutrition, secretion, and elimination are effected. The inference from this was, that by this article, under the circumstances in which these experiments were tried—in comparative health and with an ordinary diet—the production of force was diminished and not increased. This inference was corroborated by the fact that the thermometers showed that the production of heat was diminished, and presumably other forms of force also, and that *Liebig's theory was untrue*. Numerous experiments have since proved the absorption of the alcohol from the stomach unchanged, its diffusion throughout

the body in the blood, and its passage out of the body by the lungs, by the skin, by the kidneys, and other excretions, still unchanged.

Lallemand, Perrin, and Duroy, of France, from a carefully conducted series of experiments, concluded that *all* the alcohol taken was eliminated without oxidation; but since then other experimenters have come to the conclusion that somewhat less was eliminated than was taken, and that an ordinary healthy man, in the course of twenty-four hours, can consume or oxidize about an ounce and a half of pure alcohol, or three ounces of spirits, if taken in divided doses, during that time. This conclusion is denied by still others, who claim that the quantity not collected during the experiments is retained for a longer time in the blood and the tissues, and passing off very slowly escapes detection. So this question is still open; but it must be admitted that if this ounce and a half is oxidized, it prevents the oxidation of a greater amount of other hydro-carbons, so that the result is as before stated, the diminution of power from the ingestion of alcohol in the physiological state. There is certainly no proof that, in this state, any form of force is enhanced by the addition of alcohol to the diet. But even if the ounce and a half is oxidized, as claimed, this would produce less heat than an equal quantity of fatty food, and its interference with such other oxidation would render its action something else than merely negative.

The fact of its interference with oxidation being established, the advocates of its use claimed that it did good by preventing waste, or destructive metamorphosis of tissues, and thus served as an indirect—a sort of adventitious or supplementary food, or as an article which obviated the necessity for as much food. Granting that it has this property, is it a desirable effect? Does it not diminish force by diminishing such molecular action; and should the molecules of the tissues, when they have performed their function and their vitality has become impaired or exhausted, be prevented from undergoing destructive metamorphosis and having their places supplied by fresh material? It is claimed, and is true, that fat is often increased in the system by the use of alcohol, but the accumulation of fat, a less vitalized material than other tissues of the body is by no, means an evidence of health or force, on the contrary it is often

an evidence of disease, and when it takes the place of normal tissues we have one of the most hopeless forms of pathological change.

But whatever may be the fact respecting its food properties, direct or indirect, its leading action, its all important and (beyond the supposed effect of the alleged oxidization of an ounce and a half in a day) its exclusive effect is to modify action and energy, and not to produce force.

From every principle, chemical and vital, and from every fact of observation and experience, we are driven to the conclusion that nothing but harm can result from the indulgence in alcoholic drinks as beverages.

THE ACTION OF ALCOHOL AS A MEDICINE.

The discussion of the therapeutic properties of alcohol takes us into another department of scientific principles and practical considerations. While the remedial effects of medicines in disease are largely determined by their essential action in health, yet the difference of condition in these respective states is such that an agent which may affect injuriously the one, may act beneficially upon the other. No one can suppose that opium, mercury, or strychnine can do other than injury to a person in health, yet their temporary actions in certain diseases are beneficial.

Alcohol, though not a stimulant in its essential action, nor an increaser of power in a healthy person, may possibly indirectly act as an increaser of force in a sick or injured one. By soothing a depressing irritation, or by relieving a severe shock, or by modifying favorably some pathological condition, thus removing or abating an injurious cause, a beneficial effect may follow. Though certainly very little and perhaps none of the alcohol taken in the ordinary or healthy state, when other food is present in the system, is oxidized, yet in certain diseased states, and in the absence of sufficient appropriated food, it is possible that some, or more of the alcohol than in the physiological state, may be oxidized, and serve to sustain the organism. Some observed facts seem to indicate that this is the case, and though not demonstrated, it is believed by many careful observers. There are many remedies which we are convinced do good in diseases, but of whose essential mode of operation we are

ignorant. Whatever the mode of operation, whether as an oxidized material supplying force, or as simply a modifier of actions or a sedative or narcotic agent quieting irritation, it has a place in the materia medica, and though on the whole, as prescribed in sickness, it may have done much more harm than good, we would not have it stricken from the list of remedies. We would, however, have it restricted to the apothecaries' shelves and the sick room, and for the most part it should be kept upon those shelves in a pure form and labeled *poison*. When prescribed, it should be with caution, in definite doses, at definite times, and properly diluted with water or with some nutritive fluid. In our judgment it should be prescribed with very much less frequency than it is in the practice of many, and with different views of its therapeutical action than have heretofore largely prevailed.

Only a portion of the indications and contra-indications for its use as a medicine can here be noticed. Those illustrative of the principles of its action will be selected. We would give it as a narcotic and soothing agent in certain conditions of suffering and shock, as we might give opium, ether, or chloroform, rather than as a direct stimulant to increase the power of the heart when failing from hemorrhage or simple exhaustion. We would not give it as a remedy for dyspepsia, at least not to be continued for any length of time in any doses of whatever size. We would particularly avoid it in those functional derangements of the liver and digestive organs commonly described as biliousness. We would also avoid it, except in some rare cases and for the most temporary purposes, in all forms of nervous disturbances of a chronic character, and not even temporarily, certainly as a rule, when opium, the bromides, valerian, and other similar agents were available. We might give it for sudden faintness, as we would dash on water or administer a slap, when neither ammonia, camphor, or ether was at hand. We might sometimes give it for pain or restlessness, when other narcotics more efficient could not be had, or where from idiosyncracy they did not agree.

In shock from injury or great suffering, it might in some cases dispute the preference with ether, chloroform, opiates, quinine, and warm coffee. We would especially avoid its use where there was to be exposure to great cold or heat. It may relieve

a sense of fatigue as may opium, coca leaves, or other narcotics, but its secondary effects render it undesirable for such purposes; and the proper remedy for fatigue is easily digested food and *rest*.

We would not prescribe it with the view of preventing or curing consumption, and scarcely ever for the relief of any particular symptoms in that disease. We would never give it in cholera, even if deprived of every other remedy.

We would seldom give it in typhoid or other low forms of fever, especially in non-alcoholized persons—perhaps never when food could be taken and appropriated, and when the other articles of the materia medica were at hand; and certainly never with the view of its operating as a direct and permanent stimulant of the heart's action. We would avoid it in all diseases of the liver, organic as well as functional, and also in Bright's disease, and other affections of the kidneys. It might be tried in some acute inflammations of the lungs, and in severe external inflammations, where the severity of the suffering produced decided shock and consequent depression, and in the absence of opium, quinine, the salicylates, and other remedies. Indeed, in full doses it might arrest or markedly abate an inflammation in its incipiency, but not so certainly as the other remedies just named, or as jaborandi, antipyrine, or various other articles. In the absence of ether and chloroform we might give it in free doses, sufficient to produce drunkenness, to relieve the suffering and shock of a cutting operation, or for reducing a dislocation.

In short, we would use it on the same general principle as other powerful and poisonous medicines, bearing in mind its essential physiological actions as governing its applicability, considering its limited therapeutical powers, and the mischief immediate and remote it may do; and when prescribed at all, it should be in definite quantities, with proper dilution, and with particular precautions and directions. We would never advise it to be left in the hands of the patient to be taken at his discretion, according to his feelings, or to be controlled by the whims of an ignorant nurse or attendant; and we would never sanction or allow its continuance for an indefinite period of time. The formation of an alcohol habit should be guarded against with the same precaution as that of the opium habit,

both of which, by an unguarded manner of prescribing and leaving to the discretion or rather indiscretion of the patient, have wrecked many a valuable life.

We would consider it our duty by our precept and example to discourage its use as a social indulgence, or as a frequent resort as a medicine for slight affections, or on any other than important and clearly necessary occasions. In our judgment these occasions occur but seldom.

It has already been stated that the habitual user of alcohol is in a different condition from that of an habitual abstainer, and this is particularly true in reference to the immediate effect of the alcohol itself on the system. The habitual user of opium will take quantities that would kill several persons, with only the immediate effect of relieving the miserable sensations his habit entails, and of perhaps brightening his intellect, while it would extinguish that of many others. So, to a greater or less extent, with the habitual user of tobacco and other narcotics. In a severe illness of an opium habitue, it might not be prudent to withhold his long indulged narcotic. In the case of an alcoholic habitue, affected with an acute disease, it might not be prudent to withdraw his accustomed glass of wine or spirits. At any rate, the wine or spirits will have a different effect upon him from what it would have upon one who had not formed that habit. This fact accounts in part for the common recommendation in many of our medical works of a moderate quantity of wine or spirits in the dietary of the sick. Most of the patients in the foreign hospitals, and very many in the large cities everywhere—in the places where most of our books are written—are more or less alcoholized habitually. That such a "dietary" is neither necessary, best, or, as a rule, innocent with our abstemious non-alcoholized patients, is our deliberate and positive conviction; and we doubt most decidedly its propriety in many of the hospital cases where it is prescribed. In the total abstinence hospitals in England (there are some such), though it is possible some patients might be benefited by alcohol who do not get it, yet the proportion of recoveries is much greater than in the hospitals where alcohol is freely used. A very respectable and an increasing number of practitioners in Great Britain are protesting against the prevalent use of this article in the treatment of the sick.

Though many other thoughts upon this subject press upon our minds, this paper, already grown far beyond our intentions, must be brought to a close.

The preceding view of this subject prompts us in conclusion to say, that as our scientific knowledge of alcohol advances our practice with it and our language respecting it should change.

As to its physiological effects, we have certainly in many respects been mistaken in the past. We have said it excited the vaso-motor nerves of the surface, and thus caused increased vascular action in the cutaneous circulation. We know now it depresses those nerves and causes passive dilatation of the surface vessels. We thought it increased animal heat. The thermometer shows it diminishes it. We thought that from more blood coming to the surface and sometimes causing a feeling of warmth, it would diminish the danger from exposure to cold. We find that from less heat being produced in the centres, and more being lost from the surface by the increased blood in the superficial vessels, the danger of exposure to cold under its influence is greatly increased.

We said the alcohol taken was oxidized in the lungs, and that increased heat and other forms of force were thus produced. We find it is not thus oxidized, or if at all, in so small a quantity that its effect is ordinarily much more than counterbalanced by the diminution of the oxidation of other hydro-carbons which it produces; so that under its influence heat and the other forms of force are lessened.

We thought it increased muscular strength, and it was taken to aid men in their work. We find that it diminishes muscular power, both for immediate action and with reference to endurance.

We thought as it often makes one *feel* stronger, that this was evidence that one *is* stronger. We now know that this feeling is deceptive, and is not even presumptive evidence of increased strength. We see that the drunken man while boasting of his strength falls to the ground.

We said it was a direct heart excitor. We now know it is a direct heart depressor.

We said, and nearly all the text books still say, it is a direct *cardiac stimulant*. We know from most conclusive experiments it is a direct *cardiac paralyzant*.

We thought, and we may sometimes still think, it makes us witty. We know from observation it makes men silly.

We thought it brightened the intellect and might make men wiser. We find that in the long run, at least, it dulls the intellect and makes men foolish.

Wine has been called the "milk of age," and we thought it supported advanced life. We know that the aged live longer and retain their powers better without its use.

As a medicine, or prophylactic measure, we thought it protected against epidemic diseases. We now know it invites attacks.

We thought it prevented and even cured consumption. We know it is the most frequent cause of at least one form of that disease—fibroid phthisis.

We thought, moderately used, it was good for many things. Those who have given most careful attention to the subject believe it is good for very few things.

The demonstrations of modern science have shown the truth of the ancient saying of the Wise Man: "Wine is a mocker, strong drink is raging, and whosoever is deceived thereby is not wise."