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ALCOHOL
AND
PUBLIC HEALTH



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ALCOHOL
AND
PUBLIC HEALTH

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P R E F A C E .



IT may be thought that sufficient has been written on the subject of alcohol. There are, without doubt, many excellent works dealing with it and with the Temperance question which deserve more readers than they get. It is, however, not uncommon to meet with people who imagine that they know all about this subject, who, nevertheless, are found to be quite unaware of many most important facts, and sometimes, indeed, of the most cogent arguments, in favour of total abstinence. Not a few cherish some idea about alcohol or temperance which they do not know to be unsound or fallacious, and never read that which might alter their opinion, or never meet in conversation with any one who has thoroughly studied the subject.

This little book does not pretend to be an exhaustive treatise on alcohol. It was written to show the important relation of alcohol to public health. Most of it is a collection of facts, some of which I have reason to believe are not generally

known, but which ought to be known, and which will, I trust, convince many that there is a good deal more to be said in favour of total abstinence than in favour of drinking intoxicating liquors. I have long had the conviction that, unless the practice of total abstinence is physiologically right, it cannot be morally binding upon all. But if it be physiologically right, the force of the moral argument must be irresistible. If my presentation of the case proves convincing, and conviction produces conversion, I shall feel amply rewarded.

J. J. R.

CARLTON HOUSE,
ENFIELD, MIDDLESEX.

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ALCOHOL

AND

PUBLIC HEALTH.



CHAPTER I.

INTRODUCTORY.

I. NO one will venture to dispute the fact that the consumption of alcoholic liquors has an important influence on the public health. That influence must, therefore, be a matter deserving the most serious attention, and ought to be determined with every possible care. The expenditure on alcoholic liquors during the year 1891 amounted to no less a sum than £141,220,675. Even if the liquor which this amount represents has been evenly distributed among all the population, it could not have been taken without producing some effect for good or evil. But it is notorious that a very large part of the population, probably two-thirds, including children and adult abstainers, does not take any, and therefore the whole amount is divided among one-third of the nation. Nor is it divided equally among this moiety ; many take very little indeed, and their share goes to augment that of the others,

of whom, as is well known, many take a great excess.

2. This question may be approached in two ways. We may consider it from the point of view of its action on the unit, the individual organism; or we may consider it by its gross effect on the mass. These are the *à priori* and the *à posteriori* methods, and each has its value. If they are found to conflict, we must suspend our judgment until further investigation reveals the error; but if they corroborate and support one another, their value and importance become greatly increased.

3. We must not restrict ourselves to any narrow view of this question. While the effect of alcohol on the health of the population in the United Kingdom is of most importance to us, and that which we have greater opportunities for considering, yet much valuable information can be obtained by a comparative study of its operation in other countries, making due allowance for the diversity of other conditions present.

4. And if we would arrive at a true conclusion, we must not restrict ourselves to any particular period. The use of alcoholic beverages has been common among various races of men from very early times, although, as they are, even in the simplest forms, the result of human invention and manufacture, we are forced to the conclusion that, for an unknown period, many generations of our ancestors must have lived and loved and died without them.

5. It must be remembered, too, that the beverages in common use are very different from those

taken in ancient times. The art of distilling spirits was not known here until about the time of William the Conqueror, and it was centuries after that before the use of spirits as beverages became at all common. The ancient wines were of various kinds, some being the pure and unfermented juice of the grape, preserved either by sulphuring or inspissation ; others sour, in which some or all of the alcohol had undergone acetous fermentation. But even the most alcoholic wine did not contain more than 15 per cent. of alcohol, and many contained much less. There was no such practice as "fortification," at all events not with alcohol, though there is evidence that some other drugs were sometimes added to increase the intoxicating quality. All, or almost all, the intoxication of which we read in classical and Biblical history was produced by what we now call "natural wine," or by a kind of beer made from malted grain, or by a few other alcoholic drinks (such as mead from honey, etc.), which are of minor importance.

6. A nation such as ours is necessarily so complex, the conditions of life in our present state of civilisation are so manifold, that it becomes more difficult to ascertain the precise results of the alcohol consumed. In some respects it is impossible to determine these with strict accuracy. We are not, however, bound to give up the consideration of the question because we cannot gauge the effect of alcohol on the population by the balance or the yard measure. We may determine the direction or tendency of its influence, and we may come to some very definite

conclusions by studying its effect in some special cases by the comparative method under circumstances which are more easily known or easily determined.

7. And the case is similar with regard to the effect of alcohol on the complex organisation which we call man. We may give alcohol, and argue as to its effect by the result upon the pulse, the respiration, the nerves, or the secretions. These give us valuable indications, although we may have inadequate, incorrect, or even no ideas at all as to the way in which the result is brought about. The connection of parts is so intimate, their relation so close, that any result produced is the consequence of the action and interaction of several causes, and is therefore more or less modified. We may, however, obtain further light on the subject by tracing the effect of alcohol under the simplest conditions, and on cells and tissues in their most elementary forms. By this means we can know with greater certainty the nature of its influence on the complex structures of the human body.

8. It is only by considering the facts of the case as they present themselves that we can hope to attain practical unanimity respecting the dietetic and social use of alcoholic liquors, and to arrive at conclusions which will commend themselves to the unbiassed judgment of disinterested persons. We have had in the past opinions without number, too often based on fancies of what ought to be, rather than on the perception of what really is. I venture to think that there are some new facts, and some not generally known, which must be considered

and taken into account before any practical decision is arrived at. Our own predilections ought to be entirely dismissed. We ought to consider the matter as if we were visitors from some distant planet called on to give our opinion as to the effect of alcohol on the health and life of the people, and to state the best means of preventing the injury which has long existed as a consequence of the presence of alcohol in many of their national beverages. Is it too much to hope that sanitarians may arrive at practical conclusions with some approach to unanimity?

CHAPTER II.

THE PHYSIOLOGICAL ACTION OF ALCOHOL.

9. THE physiological action of alcohol has been the object of many investigations. Many of the published results have been contradictory, either through errors of observation or errors of method. In several cases, especially in experiments on living animals, the difficulty has arisen from the excessive quantity of alcohol administered, not only large in itself, but very large as compared with the body weight of the animal.

10. There is, of course, some difference between the action of the various fermented and distilled liquors which contain alcohol. Some of these differences arise from the other constituents, either normal or added as adulterations, but they are small in comparison with the similarity of the symptoms arising from the use of all. The most important constituent which they have in common is unquestionably ethylic alcohol (C_2H_6O), and it is to this substance they owe those properties for which they are chiefly taken. The most noticeable difference between them arises from the variable degrees of dilution of the alcohol, which exists in average beer to the extent of 10 per cent. by volume ; in light wines, from 8 to 15 per cent. ;

in port, sherry, and madeira, from 15 to 25 per cent. ; and in spirits from 50 to 70 per cent. If we can determine the action of ethylic alcohol we shall know, with slight modifications, the action of all those beverages which contain it, having regard to their alcoholic strength.

11. The first effect of a moderately diluted dose of alcohol is upon the mucous membrane of the mouth and throat. It acts as an irritant, producing a burning sensation by its action on the branches of the fifth nerve. I regard this effect as important as one of the causes of the habitual use of alcoholic liquors. There are several practices which have irritation of branches of this nerve as their *raison d'être*. It appears to be so constituted that when a habit of irritating it has been once established, there is developed in the intervals of irritation, after a variable period, a more or less painful or uneasy sensation, which is relieved for a time by a repetition of the irritation. Instances will at once suggest themselves, viz., snuff-taking, betel-chewing, tobacco-chewing, and also, I believe, smoking, hot tea-drinking, the use of condiments, etc. There are, no doubt, other reasons for indulgence in these things, but the person who has become accustomed to any of them "misses" them, sometimes very much, if they are not indulged in. Normal appetite may, indeed, be regarded as a variety of this physiological action, the difference, of course, being that appetite is a natural craving, and these others unnatural, in the sense that they only arise through the voluntary commencement of the habit.

12. One consequence of the irritation of the

nerves of the mouth, throat, and probably of the stomach also, is a reflex action on the circulation. Orfila, Percy, and others have killed animals by pouring down large doses of spirit so rapidly that it could have had no time to be absorbed in quantity sufficient to produce such an effect. Men have been known to die equally rapidly from the same cause. It appears to produce death by its action on the heart, bringing about a sudden rise of blood-pressure, and arresting the heart in diastole. In a minor degree there is increased activity of the circulation, but it has not yet been shown that the more dilute forms of alcohol have any reflex action beyond that of all sapid liquids and solids.

13. The whole effect of alcohol on the stomach and the digestive process is not yet settled beyond all controversy. There are some points, however, which are so. For instance, the chemical influence of alcohol on the digestion of starch and proteids is beyond dispute. Sir W. Roberts has shown by careful experiments (outside the body) that neither wine, beer, nor spirit has any power to promote the conversion of starch or the digestion of albumen, but that more than 5 per cent. of spirits or port, 10 per cent. of hock or claret, and 10 per cent. of beer retards these chemical processes, and the more so in proportion as the quantity is increased: that is to say, any quantity above from 1 to 2 per cent. of alcohol in the digesting mass perceptibly delayed digestion. There was one exception, that of 5 per cent. of champagne, which slightly hastened the process, but this was proved to be due to the agitation of the effervescence by the

fact that a similar result was obtained with aerated water.

14. Dr. Beaumont and others have testified to a reddening of the gastric mucous membrane and a secretion of mucus and gastric juice on the entrance of alcoholic liquids. There is no evidence that this is greater than that caused by ordinary sapid substances. The alleged increased movement of the stomach is similarly destitute of exact support. The occurrence of eructations, while it shows that alcohol in moderate quantities does not prevent the movements of the stomach, rather points to relaxation of the cardiac sphincter, by an antispasmodic power which we know that alcohol possesses. The power of checking vomiting rather tends to indicate diminished reflex movements, and the relief of uneasy sensations is due to its anæsthetic action on the nerves of the stomach. The relief given in some forms of indigestion I attribute to this benumbing property, and to a probable diminution of the intensity of reflex action on the part of the pyloric sphincter, which relaxes earlier than usual, and allows the contents of the stomach to escape ; by this action undigested matters would not remain so long in the stomach or cause so much irritation, but would be passed on to be dealt with in the rest of the digestive track, and perhaps to embarrass it. The interference of alcohol with normal sensation renders it impossible for us to accept the test of feeling as a criterion of the completeness of digestion.

15. Ogata (*Archiv für Hygiene*, 1886) has described experiments on a large dog with a gastric

fistula, which showed that alcohol in all forms of liquor retarded digestion until absorbed, and beer more so than wine, the extractive matters of the former being also injurious. Dr. Beaumont's experiments on St. Martin also point in the same direction, and they bear emphatic testimony to the analgesic effects of the drug, as on several occasions excessive irritation could be seen which the man himself was quite unconscious of. Alcohol in these cases removes the perception of indigestion without removing the pathological condition ; nay, very often while actually producing it.

16. Nearly the whole of the alcohol imbibed is absorbed by the coats of the stomach, and most of it rapidly, a small part being taken up by the lacteals. It is conveyed by the blood to the liver, and this organ bears the brunt of it, as it is more concentrated there than after it is mixed with the rest of the blood. Cirrhosis is undoubtedly one result, chiefly of spirit-drinking continued for a considerable period. It has been found that alcohol, injected into the portal vein, can produce temporary glycosuria. Enlargement of the liver is frequently observed, and fatty degeneration, especially in large beer-drinkers. This is a consequence of direct interference with the liver cells.

17. But the alterations produced in the blood, intensified as they are in the blood of the portal vein, must necessarily affect the function if not the structure of the liver. Dr. Harley's experiments long ago proved the nature of these alterations. He took two portions of fresh ox-blood, and, after adding 5 per cent. of alcohol to one, shook them up

with air repeatedly during twenty-four hours. The average result of a series of such experiments was to show a powerful influence in preventing the absorption of oxygen and the exhalation of carbonic dioxide. Schmiedeberg has also shown that alcoholised blood does not part with oxygen so readily as usual. The spectroscope reveals a change in the hæmoglobin similar to that which is produced by carbonic oxide gas. This property of alcohol is of very great importance. All the functions of the body depend for their healthy and vigorous performance on a continuous and abundant supply of oxygen and the rapid and thorough removal of the products of oxidation. All sanitarians are agreed as to the value of pure air and plenty of it. Persons engaged in occupations which take them much into the open air, other things being equal, live longer, and enjoy better health. Alcohol tends to neutralise this advantage. Blood in which alcohol is constantly present to a greater or less extent is more or less damaged thereby.

18. Dr. Prout first discovered the diminished excretion of CO_2 from alcoholic blood. He found a diminution five minutes after taking one drachm of diluted alcohol, and further diminution gradually as more was taken. His words are: "Alcohol in every state, and in every quantity, uniformly lessens, in a greater or less degree, the quantity of carbonic acid gas eliminated according to the quantity and circumstances in which it is taken." When taken on an empty stomach this effect is "almost instantaneous." The effect has been found by Perrin to be greatest three hours after taking the alcohol.

Perrin's experiments showed the following diminution of CO_2 during five hours :—

With wine containing 11 per cent. alcohol	22.44 per cent.
" " 9 " "	20.00 "
" " 6 " "	11.43 "
With Strasburg beer	17.71 "

Fyfe, Vierordt, Lehmann, Hervier and St. Layer, Böcker, E. Smith and Richardson, have all confirmed this fact. There is, indeed, no action of alcohol about which observers are more unanimous.

19. Alcohol, therefore, in all quantities interferes more or less with the purification of the blood and the oxidation of the tissues. Hence there is a check to all functions which depend on oxidation, or, if the functions are performed, the waste products are either not completely oxidised, or some portion remains unoxidised. This must either block the tissues or pass into the blood in a less oxidised form. Such a process cannot but be a cause of disease, and injurious in many diseased conditions.

20. There appears from the experiments of Dr. Parkes to be no diminution of urea, as a rule, nor has it yet been discovered in what way all the alcohol is disposed of. A considerable increase of fatty particles has been observed in the blood after alcohol by Lecanue, Perrin, and others. But aldehyde and acetic acid, the usual products of the oxidation of alcohol, have been sought for in vain.

21. The whole of the alcohol in the portal vein is not arrested in the liver. Most of it passes on in the blood to the heart, and thence to all parts of the body. The first objective effects of alcohol are those on the circulation. Dr. Parkes and Count

Wollowicz have made experiments which prove that the number of contractions of the heart is increased in proportion to the amount of alcohol taken, whether it be taken as alcohol, brandy, or wine (claret). There was also increased rapidity of each contraction. The amount of extra work performed by the heart during the alcoholic period was equal to 15·8 tons one foot high, almost 13 per cent. more than its normal work. Afterwards it showed signs of flagging, as we might expect. The volume of the pulse was also increased, and the arterioles relaxed, so that the capillaries became distended and the skin flushed. This relaxation of the smallest vessels has been demonstrated to result from the action of two drachms of rectified spirit by Drs. Nicol and Mossop, who observed that the vessels of the retina were dilated thereby.

22. This vaso-motor paralysis increases with larger quantities, and has important consequences. Some of the excitement of the nerve-centres may be due to this cause, though the diminished power of the blood to convey oxygen and carbonic dioxide must considerably reduce its nutritive power. Alcohol also, beyond doubt, exerts a direct effect upon the nervous tissue. It is not necessary, for my purpose, to describe this effect minutely in all its stages. The injury done by large doses is beyond controversy. It is the action of small and moderate doses which needs elucidation. The direct effect of alcohol on the nervous centres in increasing doses has been aptly described as one of progressive paralysis. The question arises whether this is preceded by any exaltation of function. It is notorious

that all the senses are blunted by alcohol if enough be taken ; and there must be a minimum dose below which no effect can be demonstrated. If a dose of alcohol between this minimum and the quantity which produces palpable alterations of function be administered, there are effects produced which can only be demonstrated by accurate and sensitive methods. Of these effects the individual is quite unconscious, unless some delicate work has to be performed, or some unusual strain to be endured. It is important to know whether this "latent action" of alcohol is the same in kind as that of larger doses, and differs only in degree, or whether it is different altogether.

23. In 1882 I constructed instruments to test the effect of small doses of alcohol on the sense of touch and muscular sense, and I also tested its effect on the vision. The instrument for testing the sense of touch consisted of two fixed upright points, about half an inch apart, and between these a third point, which could be moved so as to approximate to one or the other. The individual tested was unable to see the points, but placed one finger upon them, and then moved the centre point until he considered that it was midway between the two. The movement of the point was registered on a dial, also invisible. I adopted this plan in preference to the ordinary *æsthesiometer*, because it is more easy to deceive oneself with the *æsthesiometer* and to imagine that one feels two points before one actually does so. The degrees on the dial were arbitrary, but fourteen experiments on five persons showed that, whereas the average divergence from

the actual centre, before taking alcohol, was represented by 115 degrees on the dial, after taking two drachms of alcohol there were 189.8 degrees, and in no case was there any improvement. Hence the sensitiveness of the touch is clearly deteriorated by small doses of alcohol, although the persons experimented on were quite unconscious of any alteration. The nature of the experiment is also to some extent a test of the judgment or power of perception, and it does not show which link or links in the chain of sensation were chiefly affected.

24. The muscular sensibility was tested by two levers. At one end of a small bar, about a foot long, was a ring, by which the lever could be depressed. The fulcrum was near this ring, and the longer arm of the lever was graduated to millimetres. Along this a sliding weight could be moved. The other lever was exactly similar, and both were side by side. The sliding weight on one lever having been placed in a certain position, the individual pressed down this lever first, and, having estimated the weight, adjusted the weight on the other lever until he considered that both were equal, the apparatus being out of sight. The average difference between the weights in forty experiments on ten people was 6.1 millimetres before taking alcohol, and 9.1 afterwards, the doses being in one case half a drachm, in two cases one drachm, in five cases two drachms, and in one case four drachms, all diluted. There was no case of improvement; the muscular sense was deteriorated in all.

25. The sight was tested by the distance in feet at which unknown words could be read. The

average distance of thirty-four experiments was 9.375 feet before, and 8.538 after similarly small doses of alcohol. The difference is not large, but it goes to show that small quantities of alcohol do produce a deterioration of the sense-functions before the individual perceives that it has had any effect.

Dr. Richardson and Dr. Scougal have made similar experiments on the sense of hearing, which they have found to be rendered less acute.

26. But the action of alcohol on the higher centres of the brain is of even more importance. It appears to paralyse these progressively in the inverse order of their development. Kräpelin, in 1882, demonstrated its deteriorating influence by actual experiment, specially testing its effect on the rapidity of *simple reaction*, the time occupied in giving a sign upon a given signal, namely, the exhibition of a flag. The time occupied by *discriminating* between a red and a blue flag was next tested in the same way, the excess of time over that taken in the preceding experiment giving the time occupied by the mental process. Lastly, the rapidity of *decision* was tested by the time taken to choose between two signs, one of which had to be given if the flag was blue, the other if red. The excess of time over both the preceding experiments was clearly occupied by this exercise of the will-power. He found that all these processes were rendered much slower by alcohol, but it is very significant that the individual under its influence believed them to be much quicker than usual. This is a further strong proof of the per-

version of the judgment. It shows that persons under the influence of alcohol are not capable of forming a correct estimate of their powers, or of the influence of the alcohol upon them. Their testimony may be honest, but it is untrustworthy ; their feelings are not to be relied on. Münsterberg has recently repeated and confirmed these experiments, except that he finds a slight improvement at first when the alcohol is sipped, an operation which Kronecker has already pointed out as in itself a powerful stimulus to the brain, greatly increasing the pulse-rate, but ultimately increasing the intoxicating effects of alcohol.

27. The higher centres being weakened, lower centres have freer play, until they in their turn become enfeebled. The power of self-control is progressively paralysed as well as the judgment. It is notorious that men say and do after taking alcohol that which they would not have said or done before taking it. There can be no doubt that most of our muscular movements are automatic: combinations of muscles work automatically. Emotions and ideas, and associations of ideas likewise run in grooves, the result of repeated use. And just as we can perform a complicated series of accustomed movements better and more quickly when we do not pay attention to every detail, or consciously direct every muscle, so our thoughts and emotions, and the words or actions which express them, will often at a certain early stage of alcoholic paralysis flow more freely in customary channels, framed by habit, than if directed by the will. The force and direction of these ebullitions

will be determined by internal and external circumstances over which the individual has no control. Judgment and thought, such as are required for mathematical studies, or work needing the highest reasoning powers, cannot be satisfactorily done while under the influence of alcohol. Thoughts may be abundant, but they are confused, and increasingly so.

28. The muscular system next gets beyond control, and the individual who has been degraded through the stages of an impulsive youth and an emotional childhood becomes like an infant in his inability to co-ordinate his muscles. If still more be taken only the involuntary functions continue to be performed, and a further quantity will extinguish even these. There are, of course, some variations in the order in which the several functions are extinguished, but the general order cannot be better defined than as being from above downwards.

CHAPTER III.

THE PATHOLOGICAL ACTION OF ALCOHOL.

29. THE action of alcohol on the nervous system and the resulting loss of control and inco-ordination of the muscles have chiefly arrested public attention. It is the intenser degrees of this action which are popularly called drunkenness ; but in tracing the effects of smaller quantities than are sufficient nearly to abolish self-control, we have seen that the action of the drug is the same in kind, and that the process of intoxication begins with the smallest quantity.

30. But though small quantities of alcohol are insufficient entirely to paralyse self-control, yet there must be many occasions in which opposing motives or nerve-currents are almost equally balanced, in which even a very small degree of interference with the natural action of the highest centres will determine the predominance of the lower sense-centres, or animal passions, with the corresponding deterioration of character or conduct.

31. In addition to these functional alterations, it is important to know whether the long-continued use of so-called moderate amounts of alcohol has any effect in modifying the structure of the body. Small quantities taken daily for years may produce effects in course of time ; some of these may be

demonstrable after death, such as degenerations of tissue, but others may exist even though they are not obvious to the naked eye, or even to the microscope. These slow pathological changes are to be attributed to a chemical action of alcohol on the cells and tissues of the body. What evidence is there that alcohol is able to produce any such changes? Dr. Dickinson, some years ago, summarised the effects of alcohol by saying that it "replaces more actively vital materials by fat and fibrous tissue; it substitutes suppuration for new growth; it promotes caseous and earthy change; it helps time to produce the effects of age; and, in a word, is the genius of degeneration." Dr. Dickinson denied that alcohol was so common a cause of Bright's disease as was usually supposed, but Drs. Johnson, Roberts and others defended the charge, and it may be regarded as true that the kidneys are frequently affected, largely as a result of gout, which is itself produced by alcohol. The small, granular kidney is most frequently seen.

32. That diseases of the liver are caused by alcohol scarcely needs further proof. The mortality returns show that they cause six times as many deaths among innkeepers and publicans, and two and a half times as many among brewers. The following table, compiled from the tables given by Dr. Ogle in the Supplement to the 45th Annual Report of the Registrar-General, shows the comparative mortality from alcoholism in certain trades, arranged from above downwards in order of frequency, and gives the percentage compared with the number of cases among all males. All who exceed the

average are included in the table. The other columns show the comparative percentages of deaths from certain other diseases, the average among all males being brought to the same standard, namely 100.

	Alcoholism.	Liver Disease.	Gout.	Diseases of Nervous System.	Suicide.	Diseases of Urinary System.	Diseases of Circulatory System.	Phthisis.
ALL MALES.	100	100	100	100	100	100	100	100
Innkeeper	550	614	433	167	186	202	117	134
Cab and Omnibus Service	330	138	366	112	117	158	133	163
Brewer	250	231	300	121	79	134	137	152
Butcher	230	231	166	117	164	134	110	119
Commercial Traveller .	230	156	200	117	221	107	83	109
Costermonger	190	120	100	182	314	168	189	216
Baker	150	118	66	114	186	98	109	96
Painter, Plumber & Glazier	120	123	333	140	150	243	117	112
Tailor	110	123	133	121	117	109	106	129
Grocer	100	133	66	90	121	117	89	76

33. It will be seen that there are only nine instances in which the mortality is below the average among men who, as shown by their death-rate from alcoholism, are in the habit of taking a good deal. The table shows the high mortality among publicans from all these diseases, and furnishes satisfactory evidence that alcohol is a powerful factor in the production of disease. The part which it plays may often be obscure, and there are, doubtless, many other causes at work, but it seems obvious that the death-rate would, in many cases, be considerably reduced if this factor were eliminated. To take the

case of phthisis : it is not surprising that men engaged on cabs and omnibuses, and also that costermongers, should be victims of phthisis ; they are exposed to all weathers, and have scanty means of escape. But there seems no great reason why innkeepers and brewers have such a high mortality : they are not exposed to the weather more than bakers or grocers ; they are able to lie by and employ all ordinary means for recovery from catarrhal attacks, etc. It can only be the effect of alcohol to which their high mortality from consumption can be attributable.

— 34. But it would be desirable to discover in what way alcohol acts on the cells and tissues of the body so as to produce this premature decay and death, and to find out what effect, if any, is produced by moderate or small quantities. To learn this it is necessary to test the action of alcohol on the simplest structures, and even on individual cells. We have already seen that alcohol affects the red blood corpuscles, hindering the normal interchange of oxygen and carbonic acid ; this action must have an important influence on the normal growth and metabolism of the tissues, and can scarcely be imagined to be of real value in any condition of disease. But alcohol has also an important influence on the leucocytes, or white blood corpuscles. Dogiel (*Pflüger's Archiv*, vol. viii., parts 11, 12) states that ethylic alcohol rapidly causes the amœboid movements of the white blood corpuscles to cease. The same injurious influences can be seen by applying diluted alcohol to the common amœba ; its movements are rendered more sluggish, and it is not so

well able either to appropriate food or to repel the attacks of its enemies.

35. The increased liability to suppuration which is seen in those addicted to alcohol, and the sluggishness of healthy reparative action, can be reasonably explained by this interference with the protoplasm of living cells. It is interesting to observe that the protoplasm of plants is also affected by alcohol in the same way, and affords an easy method of demonstrating its effects. In January 1880 I published in the *Medical Temperance Journal* an account of some experiments on the growth of seeds under the influence of alcohol. They were suggested by the address of Professor Allman at the meeting of the British Association at Sheffield in 1879, in which he dealt with the subject of "Protoplasm," and for many reasons came to the conclusion that "there is no essential difference between the protoplasm of plants and that of animals." Among other arguments he cited the experiments of M. Claude Bernard, who found that seeds could be temporarily narcotised by chloroform or ether. The sensitive plant could have its irritability arrested in the same way; even the yeast plant could be checked in its growth. Bertholet had shown, too, that the function of chlorophyll was suspended, while the natural respiration of the plant was continued. These observations led me to experiment with alcohol in the same direction.

36. I have subjected the seeds of cress to the influence of alcohol in closed bottles containing exactly the same amount of garden mould, water, and air, and exposed to the same conditions of light

and heat. I find that, as a rule, 1 per cent. of alcohol kills the seeds, or only permits the commencement of germination. Smaller quantities, down to 100 per cent., 1 minim in 10,000 of water (over one pint), retard their normal growth in proportion to the amount present. Even one drop in a quart has sometimes seemed injurious, although the effect of the smallest quantities is only perceptible after some days by comparison with similar seeds treated with water only. In addition to retarding the growth of the seeds, alcohol hinders the development of chlorophyll, and causes the cress to be pale and etiolated in proportion to its amount. It is interesting to note that seeds in the same bottle are not all affected to the same extent. Some, in the presence of the smallest amounts of alcohol, would compare well with those with water only, and appear to flourish better than some of these latter. But, the average being taken, the injury done by the alcohol is palpable. No one will believe that there are some seeds whose "constitution is such" that they require alcohol, while others can do very well or even better without it. It is manifest that seeds, like men, have different degrees of vitality, and that alcohol lowers that vitality, though the more vigorous seeds with it in small quantities retain more vitality than some of the less vigorous have without it.

I have tried the same experiment by watering seeds in ordinary flower-pots. In this case the alcohol can easily escape, and though its deleterious effects are palpable after a few weeks, the plants being watered every other day, yet it takes a somewhat larger quantity than the smallest just

mentioned to produce any evidently harmful effect. But, on the other hand, the smallest amounts do not cause the plants to grow any better.

37. At the Bournemouth meeting of the British Medical Association (1891) I exhibited the photographs of two geranium cuttings, reproduced in the frontispiece, one watered with 1 per cent. of alcohol every other day, the other with water only. Both were from the same plant, equal at starting, and kept under the same conditions ; but after six weeks the one watered with alcohol was not half the size, etiolated, and sickly. It has been objected that other substances may affect plants injuriously and not man, and that some substances, *e.g.*, sewage, may affect man injuriously and not plants. This may be so, but that does not alter the fact that alcohol affects *both* injuriously. All I infer from the experiment is that alcohol, in its action on protoplasm, affects it in much smaller quantities than we should have supposed, and affects it injuriously in proportion to its amount.

38. The question remains whether alcohol in minute quantities does affect animal protoplasm in the same way. I have already mentioned the observations of Dogiel on its action on white blood corpuscles. Dr. Richardson (*Asclepiad*, July 1888) has described his experiments on fresh-water medusæ. He found that one part of alcohol in 1,000, 2,000, and even 4,000 of water was fatal, though in the last not so quickly as in the first. One part in 10,000 did not seem to have any effect in the course of one hour (though it might have had if the exposure had been longer), and, on gradually

increasing the amount of alcohol, it had to be raised to 1 in 1,000 before becoming fatal, and then took much longer. A kind of tolerance was produced, which Dr. Richardson attributes to a retardation of coagulation. Might it not be that the outer layers of the delicate colloidal structure were so altered or hardened by the weakest alcohol that they did not absorb the stronger quantities so readily?

39. I have endeavoured to answer this question by experiments on the water flea (*Daphnia pulex*). I have enclosed these animals in bottles containing alcohol in amounts varying from 1 per cent. to .005 per cent. (1 in 20,000 = 1 minim in a quart). I have found that while those creatures lived indefinitely if no alcohol was present, all died sooner or later in the presence of alcohol, with one or two exceptions which may be explained. These experiments I brought before the British Medical Association at Birmingham in 1890. I also detailed experiments on the hatching of the eggs of the common blow-fly. Fresh eggs, *from the same fly* and laid at the same time, were placed on blotting paper moistened with water containing from 2 to $\frac{1}{32}$ per cent. (= 1 in 3,000) of alcohol; I found that all the proportions of alcohol down to 1 in 1,500 had a decided influence in delaying the hatching of the eggs.

40. These experiments both confirm, and to a certain extent explain, the effect of alcohol in increasing the mortality of a population. They show that it reduces the vitality of the protoplasm, which is the living agent on which the normal

growth and total life of the organism depends. The effect is naturally greater on the most delicate structures, such as we find in the youngest cells. Hence the greater harm done by alcohol to children, which is generally admitted. But it must not be forgotten that cell-growth and multiplication continue throughout life, and that there are always present vast numbers of young cells equally susceptible to alcohol with those of the infant.

It may be useful to remember that one ounce of alcohol (=1 pint of beer), if mingled with the total quantity of blood, would form a mixture containing about $1\frac{1}{2}$ per cent. It is improbable that this ever takes place, but there is a wide margin above the 1 in 10,000 which is still effective for harm.

41. While alcohol seems to be injurious to the cell-protoplasm which serves to construct the bodies of plants and animals, it is far otherwise with the bacteria, which are the agents of decomposition and decay. I have proved this by adding various amounts of alcohol to weak infusions of hay, etc. After a few hours the opalescence, which results from the multiplication of *Bacillus subtilis* and other forms, is decidedly more perceptible when alcohol is present in the almost incredibly small proportion of 1 minim in a gallon of water! It increases in amount with stronger solutions up to about 1 in 4,000, and then diminishes, though with 1 per cent (after twenty-four hours) it is still perceptible. After another day or two the bottles containing these higher percentages have overtaken and passed that containing water only. Two per cent. prevents all such growth. The effect on other forms of bacilli

remains for future investigation. That this opalescence is due to multiplication of bacilli, and not to precipitation of albumen, I have proved by boiling the solution so as to kill the bacilli; then alcohol has no effect. The same result follows with other fluids, such as urine (which does not contain albumen), beef-tea, gelatine, Pasteur's fluid, etc. I have also established the presence of the bacilli by counting the colonies by plate cultivation. This showed double as many in the presence of '00125 per cent. of alcohol (1 minim to 1 gallon), and 100 times as many in the presence of '025 per cent. (1 minim to 4,000).

It may be said that alcohol serves as food to these bacilli, which therefore multiply more rapidly. This can hardly account for it, because the proportion of alcohol present is insignificant compared with the other food present. Putrefaction of meat is more rapid in the presence of these minute quantities of alcohol. It has previously been observed that the blood of an animal to which alcohol has been administered putrefies more rapidly than usual. Hence the conclusion seems irresistible that alcohol hinders the life and growth of *constructive* protoplasm, and promotes the life and growth of *destructive* protoplasm; for the latter is held in check by the presence of life, and breaks up the albumen molecule as soon as the influence of life is removed.

CHAPTER IV.

ALCOHOL AND FOOD, COLD, HEAT, AND WORK.

42. WE have now to consider the value of alcohol as a food and under special circumstances, such as cold, heat, hard work, etc.

The claim of alcohol to be a food need not detain us long. The food-value of alcohol is, of course, distinct from that of the other substances in beer and wine with which it is associated. The extractives in beer and the sugar in wine do, no doubt, possess a certain alimentary value ; but this is very small, and can never be equal to the barley, grape juice, or other materials from which they are made. The idea that is prevalent of their very nourishing properties is entirely erroneous. If alcohol itself is not a food, then the claims of beer and wine and, of course, spirits, as such, must be dismissed.

43. It may be admitted at once that when alcohol is taken it has been found impossible to recover most of it from the various secretions. Messrs. Lallemond, Perrin and Duroy, who asserted that all alcohol taken passes out of the body unchanged, were certainly mistaken. Drs. Thudichum and Dupré and Anstie have shown that it is impossible to collect from the urine, the sweat, and the breath more than a very small percentage. There

are great difficulties in carrying out such an investigation, and the exact amount which passes out through these channels when different quantities are taken has not been finally determined. This is not a matter of great importance. There are, however, one or two points which are significant. One is, that whatever the quantity may be that is not excreted, no one has yet been able to account for or trace what finally becomes of it. We should expect it to be oxidised and to form CO_2 and H_2O , as when burned. But the quantity of CO_2 is diminished. Aldehyde and acetic acid, intermediate products of its oxidation, have been sought for in the blood in vain.

44. Another point is that if alcohol is so easily oxidised one would expect it quickly to disappear altogether. But it does not. For a day or two it can be detected, and when any considerable amount has been taken it has been recovered from the brain and liver by distillation. It appears as if alcohol entered into some combination, and it may be that this is excreted with the bile and passes out with the excretion of the bowels. Research in this direction may explain its disappearance. But even if all the alcohol were burned up as a form of hydro-carbon and a source of force, it could scarcely be called a food without stretching that word unjustifiably. Its mere oxidation would not entitle it to this appellation any more than the fact that sulphur can be burned in the furnace of a steam-engine would entitle it to be called a fuel. The injury done by the sulphur to the engine is comparable with the injury done to the body by the alcohol.

Even putting the limit at $1\frac{1}{2}$ oz. before there is palpable injury, what importance is there in such an amount of alcohol *as a food*? Apart from the expense, it would be a question of about half a slice of thick bread and butter more or less. A true food must be both useful to some tissues and hurtful to none.

45. But the claim is made that alcohol is an *aliment d'épargne*, that it "saves the wear and tear of the body." Hammond found that when he took a minimum amount of food, so that he was losing weight daily, this loss was arrested by the use of alcohol. It is not alleged, I believe, that the weight previously lost was counter-balanced by the actual weight of alcohol taken. This would have been necessary in the case of a true food; but the alcohol hindered some oxidation-process by which the products of tissue-change are got rid of. It is a matter of common observation (in brewers' men, for instance) that with the use of alcoholic beverages, specially beer, there is produced a bloated condition due to the clogging of the tissues with a kind of watery fat. This condition is noticeable to a less degree in many alcohol-drinkers. After a few days of abstinence there is a great reduction of this block, and the individual gets thinner, his "condition" being greatly improved. The loss of weight under these circumstances would be retarded or arrested by alcohol, not so much because it would hinder the wear and tear of the tissues, as because it would slacken the removal of some of their waste-products. Any actual interference with the normal change or oxidation going on in

the tissue elements must, *ipso facto*, reduce their activity, and, in the case of the muscles, their working power. As we shall see hereafter, alcohol does so act, and in reducing both mental and muscular work it disentitles itself to be called a food.

46. As long ago as 1845, Dr. Davey, and, about the same time, Nasse, followed by Lichtenfels and Frohlich in 1852, demonstrated that alcohol reduces the temperature of the body. Since then Demarquay and Leconte, Richardson, Tscheschichin, Ringer, Zimmerberg, Thudichum, Felton, Parkes and Wollowicz, Binz, Seé, and others have confirmed these observations, though some have denied that the same effect is produced in those accustomed to a good deal of alcohol. In 1880 Dr. H. Branthwaite made experiments on this point, some of them in conjunction with myself, and I have since confirmed them. We found that ethylic alcohol invariably reduced the temperature more or less. Even ten or twenty minims of alcohol diluted with water will do this, and thirty minims reduced it on an average .5° F. The reduction set in ten to twenty minutes after taking the alcohol, and lasted from forty-five to sixty minutes. The effect is best seen when it is taken on an empty stomach.

47. The experience of men in cold climates confirms the above conclusions. The amount of evidence to this effect is overwhelming. Dr. John Rae, of Arctic fame, says: "In nearly all the cases of death caused by exposure to cold that I have known or heard of it was found, on inquiry, that the persons so dying had taken some alcoholic

drinks—not necessarily in large quantity—before going out into a low temperature. . . . So well is this bad effect known by people in the far North-West of America and Canada, that they will seldom take even a single glass of spirits when about to be exposed to extreme cold” (*Medical Temperance Journal*, July 1878).

48. The *Lancet*, in 1871, copied the following from a paper by Dr. McKinley, in the *Cincinnati Medical Reporter*: “A group of men, twenty-six in number, some years ago travelling over a western plain, lost their way as it became dark. The weather, already cold, became colder; they had food, clothing, an abundance of whisky, but no fire or wood to make one. One of their number, being a medical man, cautioned them against taking any whisky. He and two others who followed his advice took none, and though cold they did not suffer or freeze. Three others were very cold and suffered much, but were not frozen, taking only a little whisky. Seven others who took a good deal had their toes and fingers frost-bitten, but got over it in a few weeks. Six who took more were badly frozen, and never got over it. Four that were ‘boozy’ were frozen so badly that they died three or four weeks afterwards; and three that were dead drunk were stiff dead by daylight. All suffered just according as they took the whisky.” This gradation is very instructive, proving as it does the noxious effects of even small quantities under circumstances of extreme trial. If alcohol were ever to be useful to warm the body, it would be in small quantities when the cold is severe. But it

never can ; it lets out the heat, and allowing the warm blood to flow more freely to the surface, it produces a delusive sensation of warmth.

49. When alcohol is taken regularly in small quantities in cold climates, there is abundant testimony that it conduces to the outbreak of scurvy in various forms. Dr. John Rae, the Arctic traveller, is very emphatic on this point. The experience of the last Arctic expedition confirms his opinion, as the men who were exposed in sledging, and were altogether or almost free from scurvy, were four abstainers, while all the others suffered. The effect of scurvy in weakening the circulation, producing petechiæ and œdema, and causing ulcers to appear and to heal slowly, is only aggravated by alcohol, and those who take most are the most liable to it. Other things being the same, we find indeed a true gradation, a pathological result in proportion to the quantity.

50. But is alcohol useful in hot climates? Testimony is unanimous that "effects of excess in the use of alcoholic liquors are developed with far greater rapidity in tropical climates than in colder regions" (Carpenter). But this means, too, that if a certain amount will produce a certain effect in a cold climate, less will produce it in the hot climate. The effect of alcohol in India was clearly shown years ago by the Government return of the sickness and mortality of the European troops forming the Madras Army for the year 1849. This is all the more instructive because the men were divided into three classes, abstainers, temperate, and intemperate, so that it is possible to see the effect of

the strictly moderate use of alcohol. The return shows :—

	Percentage of admissions to hospital.	Deaths.	Percentage of deaths.
450 Abstainers .	130·888 .	5 .	1·111
4,318 Temperate .	141·593 .	100 .	2·315
942 Intemperate .	214·816 .	42 .	4·458

51. Although the number per cent. of cases of sickness was not much less among the abstainers, yet it is clear that the use of alcohol aggravated the diseases and caused a much higher mortality. It may, however, be reasonably objected that the numbers, especially of the abstainers, were too few to form a sound induction. I have compiled from more recent returns furnished by regiments in India, in which the total abstinence societies, now so common there, were strong, and from which comparative statistics could be obtained. It is obvious that the two classes, being in the same regiments, were living under exactly similar conditions. The figures are much larger than in the Madras return :

	Abstainers.	Non-abstainers.
	3,978	8,829
Admissions to Hospital . .	1,812 = 45·5%	8,887 = 100·6%
Invalided to the Hills . .	1·88%	3·82%
Invalided to England . .	·603%	2·93%
Deaths per 1,000	2·7	9·5

52. Dr. Carpenter cites a march of the 84th Regiment from Madras to Secunderabad (400 to 500 miles), most of the men being abstainers, while the 63rd exchanged with them, marching in the opposite direction on the same route; the 84th had no cholera or fever and lost only two men from dysentery; the 63rd lost several men out of a

strength of 400, and had so many sick that they had to borrow the spare "dhoolies" of the 84th when they met.

53. But the influence of alcohol may be further tested by its effect on bodily labour and endurance under ordinary and extraordinary circumstances. Here, again, the safest way to arrive at a correct conclusion is, not to consider individual cases or the fancies which certain persons may entertain respecting it, but to consider the results on bodies or groups of men. It is only thus that we can eliminate the differences which there undoubtedly are between individuals and perceive the real effect of the alcohol. The well-known experiment by Dr. Parkes, in which he set two gangs of men to perform work (mowing), one with beer and the other without, and then changed their drink, so that the conditions were exactly the same except as to their beverage, is a crucial one. Whichever gang abstained was able to outstrip the other, and perform their work with greater ease and comfort. The beer evidently hindered them. But it may be objected that these men would take a very considerable quantity.

54. The experiment of Dr. Parkes on the soldiers who were caused to march twenty miles a day for six days, two with alcohol, two with coffee, and two with extract of meat, is another careful test. The report was that the work was performed with far greater difficulty on the alcohol. But here, again, the amount of alcohol was considerable.

55. More satisfactory are the experiments made on large numbers over a longer period. Such experiments have been made with armies, and whether

we look to America, the West Indies, Egypt, India, Ashanti, Persia, there is the same testimony that the health and discipline of the soldiers are much better when they are not allowed, or cannot get, alcoholic liquors. Dr. Parkes made a close investigation of the circumstances attending the Ashanti expedition in 1874. In this case the amount of rum issued was strictly limited to $2\frac{1}{2}$ oz. per man, and only given after the day's march, as it was found that if given at midday its effects were clearly injurious. It came out that abstainers had less disease and less fever. Admissions per 1,000 of strength:—

	From all causes	Fevers.
Regiment . . .	770 . . .	574
Teetotalers . . .	400 . . .	400

Even after correction by Poisson's rule the abstainers at their worst were better than the others at their best. The evidence went also to show that alcohol would remove the sense of fatigue for a time, but it returned after a while with greater intensity, thus proving that the alcohol did not alter or remove the cause, but simply deadened the nervous appreciation.

56. Sir Garnet Wolseley's experience in the Red River Expedition is very instructive. The men marched some hundreds of miles through the Canadian forests in the depths of winter. No spirits were allowed during all the four months' hard and continuous labour, but no troops were healthier or more cheerful.

57. Brickmaking contests, among the civil population, between abstainers and non-abstainers, have invariably resulted in the victory of the former, so

that it may be regarded as an axiom that, other things being equal, abstainers will do more work, and do it longer with comfort, than those who take alcohol. Or to individualise the point, the same man will be likely to do, and endure more, without alcohol than with it.

58. Alcohol is unquestionably injurious in all occupations which require mental accuracy and muscular precision. The evidence of such marksmen as Dr. Carver, of the winners of the Queen's Prize, as Cameron, of billiard players, scullers, as Hanlan, pedestrians, as Weston, swimmers, as Capt. Webb, is most convincing that the best and highest vigour of body, activity of the oculomotor apparatus, and the clearness of perception are injured by even a small quantity of alcoholic liquor.

CHAPTER V.

ALCOHOL, LIFE AND HEALTH.

59. THE effects of alcohol on the longevity and health of the nation can be tested by the results of its use, comparing together abstainers and non-abstainers under as nearly as possible the same conditions.

Perhaps the most telling comparison is that furnished by the United Kingdom Temperance and General Provident Institution, a life office which was founded in 1840 for abstainers only, but afterwards admitted non-abstainers into a separate section. The expected and actual claims in each section for the last twenty-five years have been published as follows :—

YEAR.	TEMPERANCE SECTION.		GENERAL SECTION.	
	Expected Claims.	Actual Claims.	Expected Claims.	Actual Claims.
1866	100	85	180	186
1867	105	71	191	169
1868	109	95	202	179
1869	115	73	212	201
1870	120	87	223	209
5 years	549	411	1008	944
1871	127	72	234	217
1872	137	90	244	282
1873	144	118	253	246
1874	153	110	263	288
1875	162	121	274	297
years	723	511	1268	1330

YEAR.	TEMPERANCE SECTION.		GENERAL SECTION.	
	Expected Claims.	Actual Claims.	Expected Claims.	Actual Claims.
1876	168	102	279	253
1877	179	132	291	280
1878	187	117	299	317
1879	196	164	305	326
1880	203	136	311	304
5 years	933	651	1485	1480
1881	214	131	320	290
1882	225	157	327	295
1883	235	174	333	301
1884	247	196	342	283
1885	258	177	348	361
5 years	1179	835	1670	1530
1886	271	171	354	337
1887	282	219	360	363
1888	298	216	372	335
1889	307	184	378	326
1890	314	225	382	389
5 years	1472	1015	1846	1750
25 years	4856	3423	7277	7034

60. This gives a mortality in the Temperance Section of 71·49 per cent., and in the General Section 96·66 per cent., a difference in favour of the former of 26·17 per cent. There were 1,433 fewer deaths than expected in the former section, and 243 fewer in the latter, both being calculated by the same life tables. If the members of the General (non-abstaining) Section had lived on the average as long as the abstainers, there would have been only 5,130 deaths instead of 7,034, a saving of 1,904 lives. Similarly, if the abstainers had used alcohol in the same way as the others, and had died at the same rate as they, the deaths would have been 4,693 instead of 3,423, a loss of 1,270 lives.

Again, if all had been non-abstainers, the deaths would have been 11,727 ; if all had been abstainers, they would have been 8,553, a difference of 3,174 deaths. This represents the true measure of the injury done to a number of picked lives by the use of alcohol.

61. It has been objected that these statistics do not furnish any criterion of the effect of the strictly moderate use of alcohol because some of those insured in the General Section die of alcoholism, cirrhosis, etc., and are excessive drinkers. It is true that there are some drunkards and probably some who considerably exceed the limit of $1\frac{1}{2}$ oz. pure alcohol laid down by Dr. Parkes. As a physiological experiment it is open to the objection to some extent ; but yet it is obvious that excessive drinking is not very common among them, because the death claims in the General Section are below the calculated number, notwithstanding that the lives of abstainers are excluded, which would have reduced the number of percentage of claims.

62. It is extremely probable that if a number of abstainers could be compared with a number of non-abstainers, who never in their whole lives exceeded one ounce of alcohol a day, the difference would not be as great as in the present instance. But this is altogether a hypothetical and, one may almost say, impossible case. The experiment is a fair test of the effects of the moderate use of alcohol and its consequences under present social conditions. One of the inevitable results of the moderate use of alcohol is that a percentage of the drinkers will in the course of time increase the amount, and become

more or less excessive drinkers. To leave these out of the comparison would be as unfair as to leave out all persons with "dropped wrist" when comparing those who drank water with lead in it and those who did not. Excessive drinking, due partly to an increased tolerance of alcohol, partly to a growing craving for it, partly to habit and other causes, is one of the morbid consequences of the so-called moderate use of it, just as much as any other pathological change. It is one of the risks to which every moderate drinker renders himself liable.

63. It has been alleged that the difference arises from the fact that when members of the Temperance Section cease to abstain they are transferred to the General Section, and that this alteration would be brought about by failure of health among the more delicate, and hence that these would die earlier and swell the number of the General claims. The actuary of the office has stated that during the ten years 1881-90 the number so transferred was 470, while 725 were transferred the other way. But of the 470 only 44 have died, equal to about 0·94 per cent. per annum; while of the 725, 84 have died, or about 1·16 per cent. per annum. It is clear, therefore, that the transference of members will not account for the great difference in favour of the abstainers.

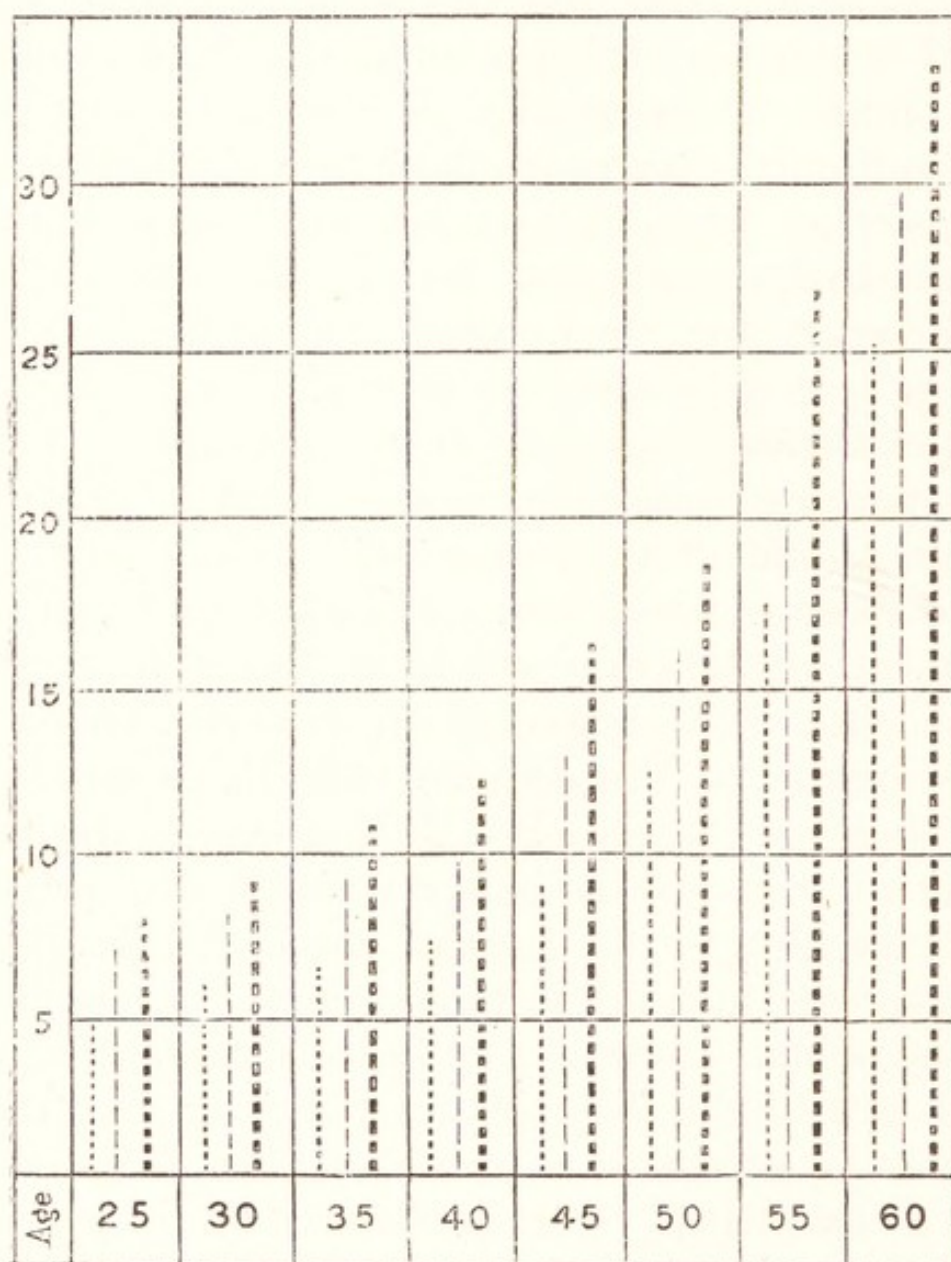
64. The same fact comes out in the experience of the Sceptre Life Office. This is a much younger and smaller office, and draws a larger number of its lives from members of one religious denomination. The majority of them are steady, good

lives. The abstainers are kept distinct. In the seven years 1884-90, the expected claims in the General Section were 679 and the actual claims $527 = 77.61$ per cent. In the Temperance Section the expected claims were 306 and the actual claims $174 = 56.86$ per cent. Here, again, some transfers from the Temperance Section took place, namely 397 in seven years, but of this number only seven died $= 0.25$ per cent. per annum. These transfers are made if information is not sent every year of continued abstinence, and as a fact many are transferred who still remain abstainers. Others cease to be abstainers for social reasons, and quite apart from the question of health.

65. It may be taken as proved that if a number of people are insured as abstainers, and an equal number are insured as non-abstainers, the total years of life of the former will considerably exceed those of the latter. The expectation of life, or mean after-lifetime, will be shortened by the use of alcohol. The materials which would enable us to construct a Temperance Life Table have not yet been published. We do not know the ages at death of those who have died in the two sections, nor the number or ages of those at risk. The average age at death in the Sceptre Office has been made public. It was 51.3 in the General Section, and 44.2 in the Temperance Section; but these cannot be compared, as we do not know the average age of the living. It is probable that the average age of the abstainers is lower than that of the non-abstainers, as the Temperance movement is modern, and has spread most among the young.

66. It has been alleged that those insured in the Temperance Section have a better constitution than the non-abstainers, and live longer as a result of this, and not on account of their total abstinence. This is purely imaginary, begging the question

RATE OF MORTALITY PER 1,000.



1. Dotted line = Rechabites.
2. Thin broken line = Twenty Life Offices.
3. Thick broken line = Foresters.

altogether. There is not a particle of evidence in support of it. The lives in both sections are drawn from the same classes scattered all over the kingdom, so that exceptional circumstances neutralise one another. If there be any difference it is in favour of the strictly temperate persons, as the abstainers include some who have at some former time drunk to excess, but have reformed.

67. A similar difference in favour of abstainers is shown by the statistics of the Order of Rechabites compared with the Foresters. The Scottish Temperance Insurance Company has published the diagram on the opposite page, in which the experience of twenty leading life assurance companies is also given.

68. The eminent actuary, Mr. F. G. P. Neison, has published the results of a careful actuarial examination of the reports of the Ancient Order of Foresters, the Manchester Unity of Oddfellows, and the Independent Order of Rechabites. The Foresters and Oddfellows each supplied more than one million and a quarter years of lives for examination, the Rechabites supplied 127,269, extending over ten years. Mr. Neison gives the following table, showing the rate of mortality in each :—

AGE.	RATE OF MORTALITY PER CENT. PER ANNUM.		
	Oddfellows. 1866-70	Foresters. 1871-75	Rechabites. 1878-87
Under 25	·632	·753	·603
25	·788	·807	·509
35	1·094	1·174	·619
45	1·647	1·802	1·119
55	2·877	3·286	2·325
65	5·911	6·510	5·815

69. The next table shows the number who would survive to various ages, and proves that the abstainers have a much better prospect of long life :—

The number that would survive to AGE	OF 1,000 PERSONS ALL AGED 18.		
	Oddfellows. 1866-70	Foresters. 1871-75	Rechabites. 1878-87
25	957	950	962
30	922	915	938
35	884	873	914
40	840	828	888
45	791	776	856
50	764	714	815
55	636	641	760
60	584	552	686
65	483	453	590
70	370	335	461
75	245	218	306
80	134	118	165

70. He also gives a table showing the mean after-lifetime of the members of the same societies, as follows :—

AT AGE	THE AFTER-LIFETIME.		
	Oddfellows. 1866-70 Years.	Foresters. 1871-75 Years.	Rechabites. 1878-87 Years.
20	41'3	40'2	45'1
30	34'0	32'9	37'3
40	26'7	25'8	29'1
50	19'9	19'1	21'2
60	13'6	13'2	14'2
70	8'5	8'3	8'5
80	5'0	4'9	4'9

71. Mr. Neison states that, "at the age of 20, the expectation of life among the Rechabites is more by about four years than the experience of the Oddfellows and Foresters." But he goes on to say that the "probable lifetime" is better for comparison, and this shows, as between Foresters and Rechabites, a gain to the latter of 5'7 years at age

20. This is an enormous advantage. It would mean on the 400,000 young men (about) who every year reach the age of 20, about 2,280,000 additional years of life ; allowing 39·4 years as the mean after-lifetime of each adult at 20, it would be equal to the addition to the population of 57,360 men, with all the wealth which they could create !

72. The London Grand Division of the Sons of Temperance has had an average death-rate during the eleven years 1880-90 of 5·29 per cent., the average age at the end of 1885 being $32\frac{1}{3}$ years. The same low mortality is experienced in other parts of the world. An actuarial report on the friendly societies of Auckland during five years showed the actual as compared with the expected mortality to have been, among 8,315 abstainers (Rechabites and Sons of Temperance) 71·56 per cent., and among 49,698 non-abstainers 93·34 per cent.

73. It must not be forgotten that there are a considerable number of abstainers among the Foresters and Oddfellows ; if these were withdrawn the mortality of the rest would be seen to be greater. There are also, unfortunately, many who drink to excess, and their mortality is highest of all. These two classes tend to counterbalance each other, and hence the comparison is, to a large extent, between abstainers and moderate or medium drinkers.

74. The Collective Investigation Committee of the British Medical Association in 1888 published a series of returns furnished by several medical men

on the connection between the age at death and habits with regard to alcohol. The results obtained were that the average age at death of males over twenty-five years of age was as follows :—

122	Total abstainers	.	.	.	51·22	years.
1,529	Habitually temperate	.	.	.	62·13	„
977	Careless drinkers	.	.	.	59·67	„
547	Free drinkers	.	.	.	57·59	„
603	Habitually intemperate	.	.	.	52·03	„

The figures referring to the abstainers are evidently fallacious, partly because the number (122) is too small to furnish an average result, and considerably below (28 per 1,000) the average number of abstainers among the adult population, and partly because the average age of the living population (abstainers) is not given, but is certainly a good deal lower than the average age of non-abstainers.

75. But the other returns indicate very clearly that the effect of alcohol in shortening life is very considerable, and in proportion to the quantity taken. Drunkards lose on the average about ten years of life as compared with strictly temperate men. These returns also show that about 15 per cent. of these adult males were habitual drunkards, and 15 per cent. more were decidedly intemperate, making 30 per cent. altogether. This would indicate the number of intemperate males in the United Kingdom as about 2,000,000, or a little over ten to each public-house. This estimate may seem high and cannot pretend to be exact. But if the physiological limit of alcohol per diem be placed at $1\frac{1}{2}$ oz. (Parkes) or even 2 oz. (Anstie), there can be no doubt whatever that excess is far more common

than moderation, and the inevitable consequences follow.

76. If any further evidence is needful, it can be found in the increased mortality of licensed grocers after the passing of the Act of Parliament in 1860 by which they were allowed to sell wines and spirits, thus getting increased facility for obtaining drink. In the Appendix to the Registrar-General's 39th Annual Report, the late Dr. Farr gave the following table :—

MORTALITY PER CENT. OF GROCERS.

AGES Years	15	25	35	45	55	65	75 and upwards
1860-61	·531	·840	·923	1·280	2·053	4·334	12·488
1871	·592	1·115	1·021	1·466	2·567	5·461	13·442
Excess in 1871	·061	·275	·098	·186	·514	1·127	·954

There is no other possible cause for such an increase, and the chronic poisonous action of alcohol is established beyond a doubt.

CHAPTER VI.

MORTALITY AND SICKNESS FROM ALCOHOL.

77. SEVERAL attempts have been made to estimate the mortality due to alcohol. It is, of course, impossible to make an exact computation. There are so many ways in which alcohol affects the health and life of those that take it, and, indirectly, the life and health of others, both abstainers and non-abstainers. It is useless to look to the returns of the Registrar-General for this purpose. Comparatively seldom does the certificate attribute the death to its primary cause, even where there is no complication. But in a large number of instances the death which is certified as due to pneumonia or nephritis is as truly the result of alcohol as any inflammation arising from arsenic. Nevertheless, the deaths attributed to intemperance show a serious increase, being, in 1889, 54 per million persons living ; in 1886, 49 ; in 1881, 47 ; in 1876, 46 ; in 1871, 32 ; and in 1866, 44. The deaths from cirrhosis of the liver increased from 2,570 in 1876 to 3,300 in 1889, the proportion of females slightly increasing as compared with males, being as 101 in 1889 to 98 in 1876.

78. Dr. Norman Kerr, from the result of his own practice and that of twelve other medical men,

estimated the direct and indirect mortality from intemperance at 128,000 per annum. He has since estimated the direct mortality at 40,000, and the indirect at 80,000. Dr. Morton, in conjunction with nineteen medical friends, arrived at the conclusion that the deaths in England and Wales, wholly or partly due to alcohol, were 39,287, equal to 52,640 for the United Kingdom. As a result of his inquiry, the Harveian Society of London instituted an investigation, and found that in London, of 10,000 persons dying over twenty-four years of age, the result was as follows :—

A.—Deaths in no wise due to alcohol	8,598
B.—Deaths accelerated or partly caused by its abuse .	1,005
C.—Deaths wholly due to it	397

Of these, 7,505 were certified by private medical men; 1,183 occurred in workhouses, infirmaries, and lunatic asylums; 646 in hospitals, and 666 were certified by a coroner. These 1,402 deaths constituted almost exactly 14 per cent. of the total deaths. If this proportion still continues (and, as we have seen, there is reason to believe it has increased), the total deaths in the United Kingdom for 1889, altogether or partly caused by alcohol, were 94,416, of which 26,736 would be directly due to alcohol, and 67,680 accelerated or partly caused by it.

79. Even this appalling estimate, made after the closest scrutiny by a critical committee of medical men, does not tell all the tale. It does not include many cases in which the constitution, having been damaged by alcohol in years gone by, succumbs earlier than it otherwise would to the inroad of disease. It does not include all cases in which the

body has been starved or injured by the neglect or cruelty of drunken parents, and has thus been handicapped in the race of life. In these and many other roundabout methods alcohol destroys life, so that it appears extremely probable that 120,000 is the lowest number which can be estimated as the annual loss of life due to the presence of alcohol in our midst, and its use as a beverage. This is between one-fifth and one-sixth of the total deaths.

80. I have before referred to the report of the Collective Investigation Committee of the British Medical Association. In that inquiry, conducted over totally different ground, the deaths of intemperate males over twenty-five were 30 per cent. of the whole, while 25 per cent. more were careless drinkers, sometimes taking excess. This being the proportion among adult males, we find no difficulty in believing that about one death in seven is partly or wholly caused by alcohol, omitting for the moment those caused indirectly. All these results, arrived at in different ways, strongly confirm one another, and point to the irresistible conclusion that alcohol causes more deaths in the United Kingdom than any single disease, and justify all who are interested in the public health in devoting the most strenuous efforts to getting rid of it.

81. It must not be forgotten that these statistics of mortality from alcohol represent a great deal more than so many sudden deaths. The deaths from intemperance mean a more or less prolonged course of vicious drinking and all its attendant horrors affecting both the individual and the friends

and neighbours. Intemperance is not simply a self-regarding vice ; it is a danger and a loss to the State, and hence its causes and means demand recognition and, if possible, removal. It is necessary to realise, at least to some degree, the extent of the evil if the nation, or rather the individuals who compose it, are to be aroused to take steps to prevent it. No effectual measures are ever likely to be adopted until the intelligent portion of the public is thoroughly convinced that something must be done, and that speedily.

82. I shall briefly consider the effects of alcohol on the nation under several heads.

(A) *Sickness*.—The various forms of diseases, directly and solely due to alcohol, only need enumeration, such as delirium tremens, mania a potu, chronic alcoholism, alcoholic paralysis, and cases of true dipsomania. The extent and nature of other diseases caused or aggravated by alcohol requires further elucidation. If there be twenty cases of sickness for every death, then it would be easy to reckon up the excess of alcohol-caused disease. But this would be an exceedingly rough and fallacious method. The effect of alcohol can only be strictly determined when all other circumstances are either the same or are neutralised. The comparison of one friendly society with another is not entirely satisfactory, as they differ to some extent.

83. Some facts of this nature have already been alluded to. The London Grand Division of the Sons of Temperance was valued in 1881 on the preceding five years by professional actuaries,

Messrs. Gomme & Hatton. The following table is taken from their report :—

AMOUNT OF SICKNESS PER ANNUM FOR EACH MEMBER
AT RISK.

AGES.	Sons of Temperance.	Oddfellows, M.U., Rural Towns and City Districts.	Oddfellows, M.U., Rural Districts.	Foresters.
	1875-80 Weeks.	1866-70 Weeks.	1866-70 Weeks.	1871-75 Weeks.
18-20	·41	·66	·63	·91
21-25	·54	·76	·77	·81
26-30	·52	·82	·84	·87
31-35	·66	·97	·97	1·01
36-40	1·06	1·08	1·06	1·18
41-45	·82	1·32	1·32	1·44
46-50	1·02	1·75	1·83	1·77
51-55	·97	2·35	2·45	2·48
56-60	·75	3·30	3·23	3·39
61-65	·73	5·13	4·68	5·12
66-70	Nil.	8·06	6·90	8·68
	7·48	26·20	24·68	27·66

84. The experience of the Rechabites is rather different, and is evidently dependent on some cause or causes peculiar to that order. One of these causes is that members have been admitted for years past at fifteen years of age instead of eighteen, as in the Foresters (the last two or three years the Foresters' age has been reduced to sixteen), and those at fifteen who have been members of the juvenile branch have been admitted without medical examination. From these causes the rate of sickness at age eighteen was 1·005 week in the Rechabites, and ·875 in the Foresters, a difference of ·22 week, about 1½ day. The difference decreases year by year until age thirty-four, when the Rechabites have 1·117 week and the

Foresters 1·062 week, only ·055 week less. Then the difference increases again to age forty-one, when the sickness is 1·451 and 1·326 week respectively, the difference being ·125 week. It then rapidly falls, till at age forty-nine the difference in favour of the Foresters is only ·056, and at age fifty the tide has turned and the numbers are 1·933 (Rechabites) and 1·953 (Foresters), difference ·020. It then rises considerably to age sixty-seven, when it is at its highest, 6·055 (Rechabites) and 8·102 (Foresters), difference 2·047 weeks. It then falls till, after age seventy, the comparison ceases, as the numbers at risk do not warrant it. Taking the whole of life, the total difference is largely in favour of the abstainers, being 14·119 weeks less sickness.

85. I quote these figures as they represent a singular exception to the general rule. I am aware that some time ago statistics were published of all the friendly societies and sick clubs in East Grinstead, in which there were 57 abstainers and 1,042 non-abstainers, the former having in one year 21 members ill, and the latter 188, and the results arrived at were stated by the compiler to be that drinkers had less sickness, but more severe and of greater duration when they did become ill, and more liable to a fatal result. This would be very satisfactory to the abstainers if it could be relied on, but the small number of abstainers and the short period of observation (one year only) render the results unreliable.

86. It is more satisfactory when abstainers and drinkers in the same society can be compared for a number of years. Thus, the experience of the

Foresters' Court at Streatham, London, for seven years was as follows :—

YEAR.	No. of Abstainers.	Amount of Sick Pay. £ s. d.	No. of Non-Abstainers.	Amount of Sick Pay. £ s. d.
1869	22	1 5 0	98	95 15 0
1870	25	0 14 0	111	90 6 0
1871	45	Nil.	105	68 0 0
1872	37	20 17 0	139	104 15 4
1873	44	23 8 0	131	123 17 2
1874	45	1 8 0	113	116 10 8
1875	46	8 19 0	99	110 12 4
Total 7 years.	—	56 11 0	—	709 16 6

This gives an average of 4s. 3½d. per abstainer, and 17s. 10d. per non-abstainer.

87. In the Loyal Prince Alfred Lodge of Odd-fellows, Kelvedon, Essex, from 1876 to 1880 the results were as follows :—

	Abstainers.	Non-Abstainers.
Proportional number	1	3
Sick Pay	£17 3 10	£172 17 4
Days of Sickness	205	2,287
Funeral Pay	Nil.	£20

This return shows that the drinkers had more than three times as much sickness than the abstainers in proportion to their number. But in these instances the numbers are small, and must, therefore, be received with caution ; they only have weight as they correspond with other and larger returns.

88. The army and navy present the most hopeful field for the settlement of this point, because in these services the men are under strict observation, and under practically the same conditions in other respects. The number of abstainers in the Indian army is now over 17,000, and there are considerable numbers in the army at home. There are also a

great many abstainers in the navy, almost every ship having representatives. It is, therefore, very desirable that an inquiry should be instituted, certain diseases being omitted which would unfairly handicap the non-abstainers, for there can be no dispute that total abstinence is more practised by the steadiest men in other respects, though it is also true that the fact of abstaining assists in promoting self-respect and continence, other things being equal.

89. I have before referred to the returns from the Madras European soldiers in 1849, which showed the admissions to hospital to be

450 Abstainers,	130·888	per cent. of strength.
4,318 Temperate,	141·598	„ „
942 Intemperate,	214·861	„ „

90. I have also mentioned the returns from 3,878 abstainers and 8,829 non-abstainers in the Indian army in 1885-86, showing more than twice as high a percentage of admissions to hospital among the latter. To these may be added the following from Indian army hospital returns :—

	Abstainers.	Admissions.	Non-Abstainers.	Admissions.
1878 * . 60th Rifles, 2 Batt.	273	75	294	130
1874-75 † . 65th Regiment	252	59	621	357
1874 † . 5th Fusilers, 1 Batt.	229	38	487	365
1877-78 ‡ . 54th Regiment				
25th „ 1 Batt.	791	567	1,621	1,663
92nd Highlanders				
Total . .	1,845	739	3,023	2,515

This gives the following percentages of admissions :—

Abstainers . . .	47·8 per cent.
Non-abstainers . .	83·2 „

* 5 months.

† 6 months.

‡ 12 months.

91. The table previously given, compiled from Dr. Ogle's report, also proves conclusively that alcohol not only produces its own special diseases, but renders its consumers more liable to die from other complaints, such as diseases of the nervous and circulatory systems, gout and phthisis, and even from suicide.

92. In 1872 Dr. Dickinson gave the details of diseases, verified by post-mortem examination at St. George's Hospital, of 149 traders in liquor, and of 149 men who belonged to all kinds of other trades. Comparing them as to exposure to the weather, it was found that of the alcoholic traders four-sevenths worked indoors ; of the others, three-sevenths. The average age of the liquor-traders at death was 36·8 years ; of the others, 40·6 years.

ALCOHOLIC. <i>More frequent.</i>	NON-ALCOHOLIC. <i>More frequent.</i>
Empyema.	Pneumonia, rather more.
Tubercular diseases, much more. (<i>Multiple tubercle, 61 cases.</i>)	(<i>Multiple tubercle, 44 cases.</i>)
Tubercles of brain, liver, kidneys, bowels, mesenteric glands, and peritoneum, <i>twice</i> as common.	
Atheroma and fatty degeneration of heart and arteries.	
Pericarditis less frequent, but more often suppurative.	Endocarditis and pericarditis.
Hypertrophy of heart.	
All kinds of cerebral inflamma- tion and hæmorrhages.	
Repair slow and unsafe, by ten- dency to suppuration and cel- lulitis.	Fibrinous exudation and adhe- sive inflammation.
<i>Renal changes, 82 cases, con- gested and granular kidneys.</i>	<i>Renal changes, 83 cases, lard- aceous disease.</i>

93. Dr. Dickinson summed up his paper by saying: "Alcohol causes fatty degeneration and fibroid encroachment; it engenders tubercle, encourages suppuration, and retards healing; it produces untimely atheroma, invites hæmorrhage, and anticipates age. . . . Alcohol gives an asthenic type to disease . . . it retards adhesive and plastic processes."

94. In confirmation of these observations the experience of the last Russo-Turkish war may be cited. The Turkish soldiers, though much more poorly clad and fed, recovered from wounds which proved rapidly fatal to the vodka-drinking Russian. This was so marked as to be notorious, and was noted at the time by several newspaper correspondents.

We cannot but conclude, therefore, that the disappearance of alcohol from popular use would be attended by a considerable improvement in the health of the nation.

CHAPTER VII.

HABITS OF THE AGED : INSANITY AND CRIME.

95. AS a further corroboration of the increased sickness and mortality due to alcohol, it is a noteworthy fact that abstainers actually live to extreme old age out of all proportion to their number living. I need hardly point out the very common fallacy in the argument that alcohol cannot be hurtful because some persons who take it, and who take it largely, live to old age. It is impossible to live the same life twice, first as a drinker and then as an abstainer, and to compare the result. Yet this is absolutely necessary as a basis for sound deduction from an isolated case. Taking one man alone, it is impossible to say whether he would have lived a longer or shorter time under other circumstances. It is only when those circumstances have been proved by numerous cases to shorten or lengthen the average duration of life that we are entitled to assume the probability that any individual exposed to them has been similarly affected. The very same argument, namely, cases of extreme longevity, would prove the harmlessness of bad sanitation of every kind, for in all the slums old people can be found living in defiance of all the rules of health. We must discover whether this or that tends to prolong or

shorten life, and then the wise man will adopt the one and reject the other.

96. Professor Humphry reported in 1887, on behalf of the Collective Investigation Committee of the British Medical Association, on the habits of forty-six centenarians. Of these

1 =	2.17	per cent.	took much.
6 =	13.04	„	were moderate.
24 =	52.16	„	took very little.
15 =	32.63	„	were abstainers.

Of these fifteen, no less than twelve were life abstainers.

97. In 1888 Professor Humphry reported on the habits of 824 old people over eighty years of age as regards alcohol. Of these

2.5	per cent.	took much (over 2 pints a day).
21.6	„	were moderate drinkers (1 to 2 pints).
40	„	took little (under 1 pint).
36	„	were total abstainers.

Fifteen per cent. of the whole number were life abstainers. When we remember that the Temperance reform only began as a movement in 1832, it must be acknowledged that 32 per cent. among the centenarians and 36 per cent. over eighty years old is an astonishingly high proportion for the life abstainers. No one will suppose, either, that abstainers form 36 per cent. of the population. Their high proportion among the old indicates a tendency to survive considerably beyond the average, and warrants Professor Humphry's conclusion "that abstinence from, or a spare or moderate partaking of, alcoholic drinks, as well as spare or moderate

eating, and spare or moderate meat-eating, are most compatible with health and most conducive to the prolongation of life."

It may be concluded, with practical certainty, that those who take alcohol, especially in excess, and survive to old age, do so, not in consequence of taking it, but in spite of so doing, and, though dying old, would have lived longer without it. They will, generally, be found to possess active excretory organs, by which, no doubt, alcohol can be more easily disposed of than usual.

98. (B) *Insanity*.—The extent to which alcohol produces insanity can only be approximately arrived at. The method which would best elicit the *nexus* between them would be to compare the amount of insanity among a large number of abstainers and non-abstainers under similar conditions, as we have compared their mortality and sickness, but so far I have been unable to obtain any such statistics. Even these would not tell us how often insanity might be due to alcohol indirectly, through the loss of business, worry, etc., occasioned by the intemperance of others.

99. The forty-fourth report of the Commissioners in Lunacy shows that on January 1st, 1890, there were 86,067 lunatics, idiots, and persons of unsound mind under official cognisance in England and Wales, and the number has been increasing for many years. Of the cases admitted into asylums during the year 1888, it was found that 13·8 per cent. were due to drink, either as a predisposing or an exciting cause, the average proportion for the previous ten years having been 13·3. The Com-

missioners some years ago stated that the cases due to drink indirectly were about equal to those directly caused by it, and hence about 27 per cent. must be put down to the credit of alcohol.

100. Dr. Clouston, Physician Superintendent of the Edinburgh Royal Asylum, in his annual report for the year 1889, said that the cases assigned to drink as a cause had never been so high except in 1876, namely, 25 per cent., the average for the past fifteen years being 16·4. Taking the men alone, the percentage was 36·6. Among the working men between twenty-five and sixty years of age the proportion was no less than 42·7 per cent. During both 1876 and 1888 there were increased prosperity and higher wages, consequently more drinking, and to this he attributes the result. Other statistics might be given, but they only confirm these figures.

It is perfectly certain, therefore, that from one-fourth to one-third of the lunacy of the United Kingdom is a result of the custom of drinking alcoholic liquors.

101. While there can be no doubt that alcohol causes absolute insanity, necessitating removal to an asylum, there are necessarily many degrees of damage to mental power short of the dethronement of reason. Where one man is pushed over the border-line of insanity there will be several brought much nearer to it, some almost close thereto. As Dr. Clouston has well said: "We see a certain kind of *mental degeneration of a slight type*, which results in those who habitually take an amount of alcohol which is to them excessive. . . . I am safe in saying that no man indulges for ten years in

more alcohol than is really good for him without this kind of degeneration being observed, and that although, during these ten years, *he was never once drunk.*" Some can resist this influence better than others. He says it is especially noticeable in those who use their intellectual powers constantly and vigorously, such as members of the learned professions—medicine, law, and Church.

102. It cannot be denied that there are many persons who, either occasionally or always, exhibit an entire want of control with regard to alcohol. Some are always intoxicated, others may abstain for longer or shorter periods ; but the first taste of drink acts on them like blood on a tiger, and they are seized with an almost or altogether uncontrollable impulse to drink. This feeble resistance to the impulse to take intoxicating liquor may be hereditary or acquired. By hereditary disposition I mean a condition of the brain due to defective development or unbalanced nerve-centres, so that the individual is unable to resist the temptation to the pleasurable excitement afforded by alcohol, or by any other similar drug, which he may be led to take as a luxury or a medicine, or to resist the pressure of companions, or the temptations arising from social customs connected with drink. Will-power, or a stable condition of brain (by whatever name we may choose to designate it), is present in different individuals in the most various degrees. None can be said to have too much ; some have none at all, and, if not idiots in the ordinary meaning of the term, are certainly moral idiots. The development of self-control goes on, or may go on, during

childhood, youth, and far on in adult life. Many circumstances favour or hinder its proper development.

103. The effect of alcohol, as soon as it has any influence on the brain at all, is, as I have shown, to weaken and, if more be taken, to altogether paralyse self-control. It is obvious that such a drug cannot be frequently taken without permanently lowering the average degree of self-control of those who take it. It will not bring all down to the same level, and some may still retain more self-control than many have without it. It would be a mistake to suppose that every abstainer has more self-control than every moderate drinker. But every one has more without it than with it, so long as it is exerting its physiological influence. Its continuous use in smaller doses may produce a permanent diminution of self-control. Alcohol is only one of the influences affecting it, and it may well be that the influences which strengthen self-control are greater than the power of alcohol to weaken it. Hence there may still be progress in the right direction, both in the case of individuals and of nations. But self-control and civilisation are never promoted by alcohol ; they are retarded, if not prevented, and are less than they would have been, in proportion to the quantity consumed.

104. The tendency to yield to this ungovernable impulse to drink may be produced or predisposed to by several causes or conditions. Such are : (1) The use of alcohol (in proportion to its amount), especially by the young. (2) Congenital weakness of mind and volitional power, often inherited from a drunken

parent or parents, and often accompanied by low nutritive power ; or inherited from insane parents, or from those of similar weakness of mind. (3) Injuries to the head, sunstroke, etc. (4) Ill health produced by exhausting diseases, poverty of blood, or by other depressing causes. (5) Depressed health due to exhausting mental or bodily work, bad hygiene, etc. (6) Mental depression associated with actually commencing insanity, or alternating with it, or due to senile degeneration. (7) Mental depression due to monotony, or to the circumstances of the individual.

105. None of these conditions, inherited or acquired, nor all of them together, will create a craving for drink in an individual who has never tasted it, and is not exposed to the temptation of alcoholic customs. There is no such thing as inherited mania for alcohol (often called dipsomania), any more than there is inherited mania for opium. The feeble condition of mind and moral power may, as I have said, be produced by drink or by many other causes, single or combined, and that feeble condition will render resistance to the use of alcohol weaker and temperance more difficult, perhaps nearly or quite impossible.

106. The prevalent use of narcotic drugs such as alcohol, opium, tobacco, etc., and the difficulty of leaving them off, is to some extent due to a minor degree of this will-paralysis. The hold they get on many persons is hardly realised until some effort is made to abandon them. Even when left off for a time, they are so "missed" that the practice is often resumed again, with little or no excuse. Reason

may approve and dictate abstinence, but frequently it does not prevail.

107. Not only does inherited or acquired mental and moral weakness lead to intemperance, but intemperance unquestionably leads to congenital idiocy, imbecility, and moral weakness in the offspring. In 1856 the state of Connecticut appointed a Commission on Idiocy, which found that 76 cases out of 235, = 32·3 per cent., were children of intemperate parents.

108. Dr. Fletcher Beach states that of 430 cases whose histories were obtained 136 had intemperate parents, = 31·6 per cent., and of two other cases the grandparents were intemperate: 72 were males and 66 females; 91 were congenital and 45 acquired. In all the 47 congenital male cases the fathers were intemperate. Of the 44 congenital female cases, 42 had intemperate fathers, one an intemperate mother, and of one both parents were intemperate. Of the 25 male acquired cases, 22 had intemperate fathers, one had such a mother, and in one, though the father was sober, his father was intemperate. Of the 22 female acquired cases, 21 had intemperate fathers, and the other an intemperate paternal grandfather. The cases were also classified as to cause as follows: (1) Intemperance only, 27 cases. (2) Intemperance with fright, 16 cases. (3) Intemperance with insanity or imbecility, 15 cases. (4) Intemperance with phthisis, 22 cases. (5) Intemperance with various neuroses, 17 cases. (6) Intemperance with insanity or neuroses and phthisis, 26 cases. (7) Intemperance complicated with several predisposing causes, 15 cases. Many

cases were subject to fits, and in 35 cases from 1 to 7 children in the family had died of convulsions. There can be little doubt that intemperance of parents is a common cause of fits in the children, both directly and also indirectly through the mental worry which the intemperance of the father produces in the mother.

109. (C) *Crime*.—The amount of crime among the population is closely connected with alcohol, and with the degradation of mental and moral power which it produces. While crime must necessarily be considered and dealt with from the point of view of public morals, yet it is impossible to ignore the fact that vice and crime are intimately connected with the physical condition of the brain, and influenced by material agents such as alcohol.

110. The cases of persons charged with being drunk and disorderly vary to some extent with variations of the law, and with the vigour and directions of the police. One turn of the screw would increase them largely. Cases of drunkenness without disorder or without much disorder are rarely dealt with. The following table gives the numbers for the last five years, and the average for preceding periods of five years :—

Years.	Drunk and Disorderly.
1870-74 average	158,793
1875-79 „	196,504
1880-84 „	185,643
1885 No.	183,221
1886 „	165,456
1887 „	162,772
1888 „	166,366
1889 „	174,331
1885-89 average	170,429

111. Cases of assault are not included in these numbers, and the majority of these have their origin in drink. Pages might be filled with testimony from the most eminent judges, from governors and chaplains of gaols, from magistrates and police, to the effect that from three-fourths to nine-tenths of the indictable offences of this country are due to drink. Corroborative evidence comes from places where public-houses have been all closed, and prohibition enforced, by the immediate diminution of crime.

112. Dr. Strahan recently stated that "carefully drawn statistics of 4,000 criminals who have passed Almira Reformatory, New York, show drunkenness clearly existing in the parents of 38·7 per cent., and probably of 11·1 per cent. more. Out of 72 criminals whose ancestry Rossi was able to trace, in 20 the father was a drunkard and in 11 the mother. Mano found that on an average 41 per cent. of the criminals he examined had a drunken parent, as against 16 per cent. of normal persons. Dr. Laurent, in his recent valuable work on the *habitués* of the Paris prisons, asserts that drunkenness, as combined with some other neurotic condition, is to be found almost constantly in the parents of criminals."

113. What can be expected when it is known that in Liverpool during 1890 the number of drunkards under 10 years of age was 95 boys and 18 girls; under 12 years of age, 250 boys and 32 girls; under 14 years of age, 314 boys and 141 girls; under 16 years, 459 boys and 156 girls; under 18 years, 668 youths and 299 girls; under 21 years, 1,780 young men and 1,311 young women,—making a total of young persons all under 21 years of age of 5,488 in one year!

CHAPTER VIII.

PAUPERISM, ACCIDENTS, AND INQUESTS.

114. (D) *Poverty and Overcrowding*.—No one will seriously dispute the fact that poverty and overcrowding are prolific causes of disease and death, and that any means which can ameliorate or prevent these evils would greatly improve the public health. These evils are certainly not due to any single cause. Many and various causes combine to produce them. Some of these causes are extrinsic to the individual, others are intrinsic ; some are public, others are private ; some are easily removable, others are not. There can be no doubt whatever that the drinking customs of society and the drinking habits of the individual combine to produce and to aggravate much of the existing poverty, and thus indirectly promote disease and cause death.

115. The report of the Committee on Intemperance appointed by the Convocation of Canterbury gives abundant evidence of the connection of intemperance and pauperism from clergy and governors and chaplains of workhouses. Their testimony is that from two-thirds to 90 per cent., or even more, of the indoor pauperism is due to drink ; we shall be quite safe if we say four-fifths :

several testify that they never had an abstainer as an inmate. One says, "I could almost say that every pauper inmate of a workhouse is made directly or indirectly through intemperance. . . . I am not a teetotaler." The testimony of 130 such witnesses is given, all to the same effect. Many inmates have been in affluent circumstances, but have been brought to destitution by drink. In nearly all cases the children have belonged to intemperate parents.

116. In 1871 Drs. Parkes and Saunderson reported to the Liverpool Corporation on the sanitary condition of the town and the social condition of the people. This was on account of the high mortality, which, for the ten years 1861-1871, was never lower than 32·4 per 1,000, and rose as high as 50·7. There were many causes for this, but chief among them was the overcrowding and filthiness of many of the inhabitants. They say, "This increasing dirtiness is attributed to a great extent to increasing poverty and intemperance." The intemperance was found to "tell indiscriminately on both the regularly and irregularly employed." They gave cases of "constant employment and good wages associated with utter poverty." "Data connected with most of the houses in one of the apparently most destitute streets were submitted to us; the large wages which can be earned with comparative regularity and the amount which is spent in drink are astonishing. The unhappy people seem to know none of the comforts and few of the decencies of life, and widespread habits of drunkenness and consequent

want of food aid their wretched homes in destroying their health."

117. In 1883 Councillor A. McDougall made close inquiries into the causes of poverty in Manchester. The particulars of 254 cases were investigated, excluding epileptic and lunacy cases; of these, 120 were indoor, 100 outdoor, and the rest in the lock and vagrant wards. The cases were classified under several heads, and proved beyond doubt that 51·24 per cent. of the pauperism was caused directly by drinking habits, and strong reason was given for the belief that a large portion of the remainder was indirectly brought about by the same cause. This warrants the conclusion that at least one-half of the poverty of the nation is brought about directly or indirectly by drink. The two to three millions thus reduced to poverty pull down and degrade almost as many more, many of them sober and virtuous.

118. Mr. Charles Booth has recently stated, as the result of his inquiries, that drink is the cause of 25 per cent. of pauperism. This excludes a large proportion of cases for which drink is indirectly responsible. Even many who take to drink as a result of misfortune are prevented from rising by their drinking habits. Mr. Booth's estimate is the veriest minimum, but is sufficiently appalling.

There is little doubt that poverty and intemperance act and react on one another as cause and effect, but there is far more evidence of intemperance causing poverty than *vice versa*.

119. Intemperance is by no means confined to the poor and working class; it is, indeed, question-

able whether there is actually more among the so-called lower classes, in proportion to their numbers, than among those of a higher social position. The former have less opportunity to conceal it, and care less to do so. Certain it is that a very large number of the most highly educated, and members of all professions, are victims of it. The Collective Investigation Committee on the connection of disease with habits of intemperance (British Medical Association) reported on the relative frequency of minor and major drinking habits among males over twenty-five of different occupations as follows :—

Ratio for all occupations	as 1 : 0·78
Professional occupations—	
Ministers of religion (47)	as 1 : 0·09
Scholastic occupations (29)	as 1 : 0·38
Officers in the Army and Navy (28)	as 1 : 0·47
Medical men (41)	as 1 : 0·57
Lawyers (31)	as 1 : 0·93
Artisans	as 1 : 0·66
Labourers	as 1 : 0·71
Driving occupations	as 1 : 0·80
Independent	as 1 : 0·83
Mercantile occupations	as 1 : 0·84
Tradesmen	as 1 : 0·87
Miscellaneous occupations	as 1 : 0·91
Licensed victuallers	as 1 : 3·81

This table shows that the proportion of excessive drinkers to abstainers and moderate drinkers is not so great among artisans and labourers as among persons of independent means and tradesmen, while those with the special education, both general and physiological, of medical men furnish one excessive drinker out of three. Even the

education and restraints of the clergy do not entirely prevent or banish intemperance.

120. If good sanitation were an effective means of preventing intemperance, there ought to be very little in healthy houses. Some years ago I made inquiries among several blocks of model dwellings in various parts of London, with the result that 4 per cent. of the adult population living in them was reported as notoriously addicted to the excessive use of alcohol. This is manifestly the veriest minimum, and there can be little doubt that the total number would form a larger percentage than that. But these are all selected tenants and living under some supervision in healthy tenements. Were the whole of the slums of our large cities replaced by such buildings, the habits of the population would soon render many of them as filthy as their present dwellings.

It has been found over and over again that if the dwellers in the slums can be induced to abstain from drink they soon improve in personal cleanliness, are better clothed, their rooms become better furnished, and before long they become so dissatisfied with their unsanitary surroundings that they move out of them into healthier dwellings. All this is an immense gain to public health, and shows how vast is the indirect effect of alcohol for harm.

121. The poorest districts of our large towns are those which are advertised by public-house vendors as "good drinking neighbourhoods," and in them the number of liquor shops always abounds. It is in such districts that the infant mortality is so very

high, and this is largely due to intemperance, directly or indirectly. One cause of this infant mortality is the suffocation of children in bed by overlying. In 1889 no less than 1,409 children were thus destroyed in England alone, 1,388 of them being under one year old, 20 under two, and 1 under three. It is notorious that the great majority of these cases occur on Saturday and Sunday nights after sleep has been rendered heavier by intoxicating drink.

122. (E) *Accidents and Inquests.*—The foregoing suffocation of infants would come under this heading, though it is a grim misnomer as applied to those drink-caused deaths. It is impossible to adduce any statistics of the number of accidents caused by alcohol. The coroners' inquests furnish evidence that it is a real and frequent cause, and, on the other hand, the fact that several Accident Insurance offices allow a reduction of premium to abstainers, or a greater bonus, is a corroboration. This reduction is rendered possible, not only by their having fewer accidents, but because, as the secretary of one office writes, "the abstainers recover more speedily from the effects of accidents."

123. The number of inquests held in 1889 in England was 29,079, and there were 15,025 accidents causing death, most, if not all, of these being included in the number of inquests. Dr. Lankester, late coroner for Central Middlesex, in one of his reports said: "Injuries by falls from ladders and scaffolds, etc., . . . often happen from habits of intoxication. . . . In the group of 'run over' accidents a large number are due to drunken-

ness. This does not always appear from the verdict, as juries are exceedingly indisposed to return verdicts of deaths by 'drunkenness' unless the evidence is very strong indeed. In many of these cases the injury is frequently slight, but where a habit of drinking exists it brings on delirium tremens, of which the injured person dies."

124. Dr. Wynn Westcott, Deputy Coroner for Middlesex, gave this year (1891) an analysis of 1,000 consecutive inquests held by him in London. After excluding all deaths under 12, and all cases of violence, there remained 303 cases of sudden and unexpected natural death. Of these, 88, or 29 per cent., were attributed by the medical witnesses to the excessive use of alcoholic drinks. *Post-mortem* examinations disclosed fatty degeneration of the heart in 77 cases, of which 33, or 43 per cent., were chronic inebriates.

These, then, are some of the chief ways in which alcohol injures the public health and increases the mortality. It has been objected that these serious evils result from the excessive use of alcohol, and that there is a great and continuous improvement which we may view with satisfaction and expect to continue.

125. It would be wrong to deny that there has been any improvement during the last fifty years. Many social customs which promoted drinking have, undoubtedly, been abolished; large numbers of the people have become abstainers or have grown up under the influence of the Band of Hope movement without having tasted intoxicating liquors. It has been estimated that there are from four to five

millions of adult and juvenile abstainers, not reckoning children too young to join a society. This has unquestionably diminished the consumption of alcohol. But, notwithstanding this, the 34th Report of the Inland Revenue Commissioners (1891) shows that there has been an increase in the amount of alcohol consumed as beer, wine, and spirits. The following table shows this clearly, being the quantities consumed *per head* of the population:—

YEARS.	British and Foreign Spirits. Gallons.	Foreign Wines. Gallons.	Beer. Barrels.
1852	1·096	0·231	0·610
1862	0·821	0·334	0·661
1872	1·126	0·526	0·884
1882	1·044	0·406	0·766
1885	0·949	0·379	0·746
1886	0·929	0·359	0·739
1887	0·905	0·366	0·747
1888	0·911	0·358	0·744
1889	0·946	0·372	0·788
1890	1·003	0·390	0·817

126. The highest point during the last forty years was reached in 1872, during a period of great commercial prosperity. Since then there has been some reduction, but during the last three or four years a gradual increase, so that we are now consuming, *per head*, as compared with forty years ago, almost as much spirits, nearly 70 per cent. more wine, and 34 per cent. more beer. If all the abstainers at each period could be deducted, it would show a still greater increase. Hence it is clear that the *present generation drinks more than the past*. As there is also a considerable extension of moderation in certain

quarters among those who drink, the conclusion is inevitable that there is a considerable increase of excessive drinking among the remainder of the population, and this takes the form of "nipping" in an immense number of cases. There is evidence that this has not been without effect on the vitality of the population. Comparing the annual death-rates at twelve age-periods in two groups of years, 1851-60 and 1881-85, males and females separately, we find that while the total mortality has decreased, the difference is almost entirely due to a diminution among children and young persons under 35. Above that age, while the mortality of females has also decreased up to age 55, that of males shows a marked increase.

127.	DEATHS TO 1,000 LIVING.			
	1851-60	1881-85	1851-60	1881-85
AGE.	Males.		Females.	
All Ages.	23·1	20·4	21·4	18·2
0	72·7	59·6	63·0	50·5
5	8·5	5·8	8·4	5·6
10	4·9	3·2	5·1	3·3
15	6·7	4·6	7·4	4·7
20	8·8	6·0	8·6	5·9
25	9·6	8·2	10·0	7·9
35	12·5	12·7	12·2	10·9
45	18·0	19·4	15·3	15·2
55	31·0	33·6	27·1	27·8
65	65·5	68·8	58·9	59·5
75	146·7	144·6	134·5	129·4
85	308·2	296·4	288·9	267·8

128. What can be the cause of an increase of mortality among men of middle age affecting females to a much less extent, and not till ten to

twenty years later? There have been great amelioration in the hours of work, improved industrial methods, factory inspection, and greater comforts, besides improved sanitation. Dr. Ogle has given tables of comparative mortality in three decennia from several causes. Taking the years 1851-61 and 1871-81, we find increase in the cases of cancer, but more affecting females than males. Phthisis: almost stationary in males, except from 35 to 45, when there is a slight increase; females, considerable decrease at all ages. Diseases of nervous system: males, increasing after 25; females, increasing after 35, but to a less extent. Diseases of the circulatory system and dropsy: males, increasing after 25, and considerably after 35; females, increasing a little at 25, more after 35, but not more than half the increase of males. Diseases of the respiratory system: males, increasing after 25, and more so after 35; females, increasing a little at 25, more after 35, and the difference from males' increase less. Diseases of the digestive system: males, increasing after 35, but not to any great extent; females, diminution except from 45 to 55 and 65 to 75, when there is a slight increase. Diseases of the urinary system: males, increase at all ages, especially after 25; females the same.

It is, therefore, chiefly in diseases affecting the nervous, circulatory, and respiratory systems, and also in phthisis, that we find the male increase. This may be reasonably attributed to the effect of alcohol, and perhaps, to some slight extent, to that of tobacco, as the chief causes. For though there has been more drinking among

women, the increase of drink has been more among men.

It would be possible to show by the returns of workhouse and prison surgeons that the reduction or stoppage, even sudden, of rations of liquor is not only not prejudicial to the inmates, but conduces to their health, their order, their equanimity, and their general comfort.

We have seen that the abstaining portion of the population, wherever it can be fairly compared with the drinkers, although alike in every other respect but this habit, has improved in several respects.

We have seen that the use of alcohol cannot be divided from its abuse by any practical method, and it is the prolific source of disease and death, besides other evils, some of which indirectly injure the public health. To advise the continued moderate use of alcohol in the face of the experience of centuries of the risk and results of that advice seems to me to be little short of criminal, having regard to the inevitable consequences. To say that "if" only a little were taken there would be no harm done is to beg the question and to be utterly unpractical. The evils of drink are so enormous that the public health officers, who seek out the causes of diseases in order to *prevent* them, should make it the object of their chief opposition, causing as it does more disease and death than any other removable cause, perhaps more than all such causes put together. The task of removing it may seem appalling, but no really united effort has yet been made: the medical profession has spoken with contradictory voice or with bated breath. Is it not time

for a determined attempt to denounce the common use of a drug which is so deceptive and ruinous, and declare that total abstinence from alcohol is the safest and best course, as it is acknowledged to be from opium, chloroform, *et hoc genus omne*?

CHAPTER IX.

OBJECTIONS TO TOTAL ABSTINENCE.

129. MANY objections have been urged to the universal practice of total abstinence. They would probably have been urged in vain if alcoholic liquors had been nauseous, although it seems clear that even unpleasant alcoholic drinks may establish a desire for themselves after a short apprenticeship. An illustration of this is furnished by the use of wines flavoured with resin, which are commonly taken in Greece and elsewhere. These are to our taste abominable, resembling varnish. It is indeed doubtful if any alcoholic liquors would be taken at first unless they were sweet, or but for the tyranny of fashion and custom. The taste is an acquired one, and only the very weakest liquors are at first relished. Stronger beverages follow.

130. It can scarcely be denied that presumption is entirely in favour of abstinence. The fact that all the rest of animate creation is adapted to perform all its functions in the most perfect manner without alcohol, and does not take any, is a strong argument that man is not a real exception to the rule. The fact that man, having at length discovered how to manufacture intoxicating drinks, takes them, likes them, and thinks he needs them,

is counterbalanced by the fact that lower animals can be taught to like them and crave for them in the same way, although they are at first repugnant to their taste, and they do not need them either in a state of nature or under the conditions of civilisation.

131. It is also perfectly well known that there are several other drugs, in the class of narcotics, for which the desire and apparent need can be just as easily acquired by use. All who have not been enthralled by the chain of these drugs need nothing to convince them that they are better without them, that they do not add to the value of human life and work, but rather diminish it. The presumption, therefore, is overwhelming that any similar notion with regard to alcohol is simply a consequence of changes wrought by previous doses, and has no substantial foundation.

132. It has been suggested by Sir J. Paget and others, that the fact of the universal prevalence of the use of alcohol is a proof of its value if not of its necessity. Some have even said that the fact that in the absence of alcohol other narcotics are used shows a deep necessity for something of the kind. But surely this argument is very superficial, and in part defeats itself. For the drugs used are not all similar in their effect. Some are narcotic, as opium and tobacco; some exciting, as haschisch; some pure nervine stimulants, as tea and coffee. The use of one or more can, therefore, only show what we knew before—that the vertebrate nervous system is so constituted that these drugs leave it in an altered and uneasy condition (whether there be reaction or

no), so that a repetition of the action of the drug is desired.

133. No one in his senses can suppose that there was any real necessity for the use of tobacco, for example, only a comparatively modern introduction; but all the other drugs were at first unknown, and in all probability countless millions lived and died without them. It is not correct to say that all men take some form of narcotic. Tea and coffee are not narcotics, unless in poisonous doses, which are not taken; they are true stimulants, for good or evil. Excluding these, there are millions of the human race who take no narcotic. But there are none who cannot become slaves to any if they are appropriately introduced. A true sense of our dignity would lead us rather to seek to expel all such habits than to condone them or to excuse one by another.

134. But it is said that the most civilised nations use alcohol, which must have had its share in promoting such civilisation and in enabling such nations to conquer others. This is reading history backwards, and is a fallacy of the first water. There is a complete *non sequitur*. Some of the most conquering nations in the history of the world have been the most sober. The Mohammedan nations in their prime were, beyond question, abstainers. This line of reasoning ignores all the differences of race, climate and custom to fix on one minor habit which is not generally applicable, and not coextensive with the nation or nations in question. There can be no doubt that drunken habits have been common in the Anglo-Saxon race, but no one will argue that the more drink the more

civilisation. Every one knows that alcoholic drinks have not been universally taken even by the men, and it must not be forgotten that women have at all times been far more sober, and to a large extent abstinent, so that the *vis* and vitality of the race have been to a very great extent preserved in spite of the bad habits of the male sex.

And it cannot be denied that the progress of the nation in civilisation and prosperity has been far greater since the use of alcoholic liquors has declined, and customs such as the taking of beer for breakfast have been abandoned.

135. It is a great mistake to compare races which differ in so many points as, say, the English and the Turks. A true conclusion can only be arrived at by comparing drinking and abstaining people of the same nation and under similar circumstances.

136. The main argument to be relied on in favour of abstinence from alcohol is that its physiological action diminishes the power of self-control, and there is no safe line which can be drawn for all persons under all circumstances. Hence it is absolutely certain that under present conditions, and conditions which are not likely to alter for a very long time, if ever, universal "moderate drinking" is impossible. Excess will and must occur if a population uses alcohol. The amount of that excess may vary, and the number addicted to it; but there is only one way to prevent it, and that is by total abstinence—a way which is not only safe, but, as I have shown in previous chapters, both beneficial to the individual and the nation. In an alcohol-drinking nation the average of self-control

(*i.e.*, of temperance) is inevitably lowered. Not that all drinkers have less temperance (*i.e.*, less self-control) than all abstainers,—certainly not. But the amount of self-control of each drinker must be more or less diminished by the physiological action of the alcohol, and the consequences of that lowered self-control (which is often only temporary) may and do continue for ever.

137. It, therefore, becomes a serious question whether it be not far better that the rising generation should grow up without the formation of the alcohol habit. Few will deny that it is. But if so, it is desirable to get rid of the customs which gradually draw the young into the vortex of drink. It is above all the duty of the medical profession as the custodians of the public health, both of body and mind, to declare the truth without fear and with no uncertain sound, and to set such an example as will prove the depth and sincerity of their conviction.

138. The medicinal use of alcohol is quite distinct from its use as a beverage. If alcohol were never used save in medicine, prescribed and dispensed as opium and other poisons, there would be no drink question to face. It may or may not be useful as a drug, but it is certainly dangerous for self-administration. Its value has probably been over-rated. Few realise how easy it is to do without it, because few have attempted to do so entirely. Alcohol is, however, not given now in many cases for which it would once have been prescribed as a matter of course. Let us restore alcohol to the shelves of the apothecary, and determine its right to

remain there afterwards. The mischievous notion ought to be expelled that it is good for almost all diseases and a means of preventing most. It is regarded as the best of all strengthening agents, and it is this notion which rivets the chain on the neck of the nation. The medical profession can do much to dispel this idea and restore true liberty.

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