The worship of Bacchus, a great delusion / [by E.C].

THE WORSHIP OF BACCHUS A GREAT DELUSION.

PRICE 2/-

THE

WORSHIP OF BACCHUS A GREAT DELUSION.

Illustrated by

Drawings, Diagrams, Facts, and Figures.

"Stimulation is not Strength."

'A Gallon of Ale contains less Nutriment than a Penny Loaf."

LONDON:

JAMES CLARKE & CO., 13, FLEET STREET;

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1876.

THE PHYSICIAN.

"We have all been mistaken; we have called these drinks tonics when we should have called them stimulants."—SIR ASTLEY COOPER.

"Wine is neither food nor drink, but a stimulant."—DR. ABERNETHY.

THE CHEMIST.

"Alcohol, both in its nature and operations, ranks amongst the most powerful and fatal of narcotic and vegetable poisons."—DR. CHARLES A. LEE ON "MATERIA MEDICA."

"The leprous distilment, whose effect
Holds such enmity with the blood of man,
That swift as quicksilver it courses through
The natural gates and alleys of the body,
And with accursed poison it doth infect
The wholesome blood."—SHAKESPEARE.

THE STATESMAN.

"The cause of drunkenness is the drinking of intoxicating drinks."—LORD ALTHORPE.

"It is the duty of the Government to make it easy to do right and difficult to do wrong."—GLADSTONE.

THE CHRISTIAN MINISTER.

"Is it not a fearful infatuation, is it not our national madness, to spend so much wealth in shattering our nerves, exploding our characters, and ruining our souls?"—Dr. JAMES HAMILTON.

THE BIBLE.

"Wine is a mocker, strong drink is raging; whosoever is deceived thereby is not wise."—PROV. xx. 1.

"Look not thou upon the wine when it is red, when it giveth his colour in the cup, when it moveth itself aright; at the last it biteth like a serpent, and stingeth like an adder."—PROV. xxiii. 31, 32.

"Let no man put a stumbling-block or occasion to fall in his brother's way.—ROMANS xiv. 13.

Extract from "Theory and Practice of Brewing," 4th Edition.

"The brewer is in a great measure bound to conform to the will and taste of his customers, whether it be refined or vitiated—addicted to sobriety and taste, or given to wallow in the depths of dissipation; as the market is, so must be the commodity, or it will cease to be a market."—By A PROFESSOR OF BREWING.

Extract from a Lecture delivered before the Society of Arts.

"The All-Wise and Beneficent Creator has made the earth yield to man all the requirements for his existence. Whatever, therefore, man invents is not a necessity, although those who, being trained to its use, have been led artificially to *believe* it essential."—DR. RICHARDSON, M.A., F.R.S.

International Medical Congress of 1876, assembled at Philadelphia. Conclusions adopted by it with regard to the Use of Alcohol.

"Alcohol is not shown to have a definite food value by any of the usual methods of chemical analysis or physiological investigation. . . . As a medicine it is not well fitted for self-prescription by the laity, and the medical profession is not accountable for such administration, or for the enormous evils arising therefrom. The purity of alcoholic liquors is in general not as well assured as that of articles used for medicine should be. The various mixtures when used as medicine should have definite and known composition, and should not be interchanged promiscuously."—J. EWING MEARS, M.D., Secretary of Section on Medicine.

CONTENTS.

PREFACE.

SEVERAL friends have urged the writer of the following pages to place before the public, in an illustrated form that could be easily understood, the substance of remarks to which he had given utterance in public and private at various times during the past forty years, on the nature, properties, and effects of intoxicating drinks, explaining the changes and the chemical combinations that take place in the process of manufacture. He has complied with their request, hoping that his efforts will in some humble measure assist in removing a delusion which has been the means of destroying the health, happiness, and morality of a large proportion of the human race.

When a committee of "the House" was asked for, to inquire into the causes of drunkenness, Lord Althorpe quaintly replied that it did not require much consideration, as "the cause of drunkenness was the drinking of intoxicating drinks."

If the public would as frankly acknowledge this, and act upon their convictions, the evils would soon be remedied; but instead of this, whilst all acknowledge the evils of intemperance, and many deeply deplore them, they for the most part believe that the articles that produce the evils are beneficial and nutritious. The Author cannot expect that those whose habits and appetites have already gained a mastery over their judgments will examine this question frankly, but he relies upon those who are willing to study the

question with a view of arriving at the truth to give the subject their impartial consideration. He has not formed his opinions hastily; his first lecture on this subject was delivered in 1839, and his statements are the result of careful inquiry and experiment, confirmed by the experience of many practical maltsters, brewers, and analytical chemists.

The best authors on the subject of malting and brewing have been consulted, and their advice and practice confirm his opinions, that the chief object in the manufacture of intoxicating drinks is to obtain the largest amount of alcohol, and not to extract the nutritive qualities from the grain. As a member of the Society of Arts, he has had the privilege of attending several scientific lectures on the methods of malting and brewing as practised both in England and on the Continent. His position as Secretary of a Life Assurance Company for upwards of twenty years, and as a Fellow of the Statistical Society, has also given him increased facilities for obtaining reliable information as to the effects of intoxicating drinks on the health and mortality of those who freely partake of them.

The writer humbly hopes that this work may be useful not only to the general reader, but that it may also aid in their labours of love those who have time and opportunity to impart information in addresses to our various Bands of Hope and Temperance Organizations.

E. C.

Grove Villa, Walthamstow.

The Worship of Bacchus a Great Delusion.

In all ages of the world absurd and delusive customs have existed; they have been for a time popular, and practised often with a slavish fanaticism which is quite unaccountable, until by the light of truth the delusions have been exposed and the customs abandoned.

Absurd Customs.

False gods have been made and worshipped, those who made them believing in their strength and power to alleviate pain, to cure diseases, or even to convey their souls safely to another and better world. Thousands have sacrificed their wives and children to these gods, and many have thrown themselves under the car of Juggernaut, fully believing that by depriving themselves of life by this method of suicide in this world, they would secure eternal felicity in the next.

In India a vast number of Shoodras drink the water in which a Brahmin has dipped his foot. They may be seen, carrying a small quantity of water in a cup, entreating the first Brahmin they meet to put his toe into it, abstaining from food in the morning until the ceremony is over, believing that it will obtain the removal of disease and preserve their health. Their infatuation somewhat resembles that of the worshippers of Bacchus, but with this difference in the results; that no real harm is done to those who drink the water in which the toe of the Brahmin has been dipped, but those whose cups are polluted with alcohol too frequently fall victims to premature disease and death.

Customs Contrary to the Laws of Health.

It is singular how contrary many of these customs have been, and are, to the laws of health and sound reason. For example: it is the custom for Chinese ladies to nip their feet into so small a compass that they are greatly inconvenienced in walking, and rendered comparatively cripples for life; whilst many of our English ladies have only recently abandoned the habit of contracting their waists, by tight lacing, into a wasp-like shape, by the aid of bars of steel, wood, or whalebone, often to the injury of the internal organs of the body, and checking free circulation. Nor are the ladies alone in following absurd customs; many gentlemen provide themselves with boxes filled with tobacco-dust, which they persistently hand to their companions as a token of hospitality, and voluntarily

thrust their fingers into these boxes and sniff the dust up their own nostrils, although the habit is disgusting and injurious to themselves. Others, also, who are loud in their complaints about the smoke nuisance, will walk about with long clay or meerschaum pipes, and unscrupulously indulge in smoking the narcotic "weed," inhaling the noxious fumes apparently for the pleasure of puffing them out again, regardless of the feelings or comfort of others. Not only is the general public allured by these customs, but medical men, who are expected to recommend schemes for the promotion of the health of the people, are often much mistaken in their plans and opinions. Thus, a short time since, they thought that the best method of mitigating the effects of small-pox was to innoculate others with it, until it was found that this process increased the disease, instead of remedying it. And only recently has the custom been abandoned of making incisions with a lancet in the arms of individuals already weakened by illness, often "bleeding" them, until they fainted and required tonics to restore them to consciousness.

We have alluded to these absurd customs to show that the existence of a habit, however popular, is no proof of its necessity, or even its utility, and that it may be frequently practised, although attended with the most injurious and even fatal results.

This applies emphatically to the most seductive of all delusions—*the custom of drinking intoxicating liquors*—the popular belief being that they are necessary to health and social enjoyment.

Excuses Made for Drinking.

In some cases they are drank for the same reason as salt is eaten by the Arabs, as a mark of hospitality; in others to afford temporary excitement; by some they are taken to alleviate anxiety, to stifle conscience, and "drive dull care away;" whilst others suppose that because they are called strong drinks, they impart strength; that "stout" must of necessity make the drinkers of it stout, and that "spirits" enliven the spirits of those who drink them. The custom is humorously described in the following lines:—

"Some drink to make them wide awake,
And some to make them sleep;
Some drink because they merry are,
And some because they weep.

"Some drink because they 're very hot,
And some because they 're cold;
Some drink to cheer them when they're young,
And some because they 're old.

"Some drink to give them appetite,
And some to aid digestion;
Some for "doctor says it's right,"
And some without a question.

"Some drink when they a bargain make,
And some because of loss;
Some drink when they their pleasure take,
And others when they 're cross.

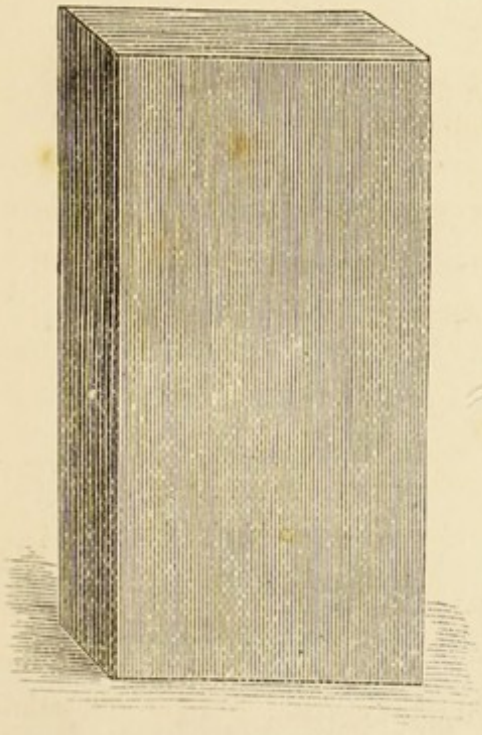
"Some drink for sake of company,
While others drink more sly;
And many drink, but never think
About the reason why."

Delusive Character of Intoxicating Liquors.

A moment's reflection will convince the impartial mind of the delusive character of intoxicating drinks. To endeavour to alleviate the ills of life by such means is only to add fuel to the flame. These drinks too often excite an appetite which it is difficult to satisfy; they are like Judas, they first kiss and then betray. As to their nutritious qualities a great misapprehension prevails. In fact, by analysis it is shown that—

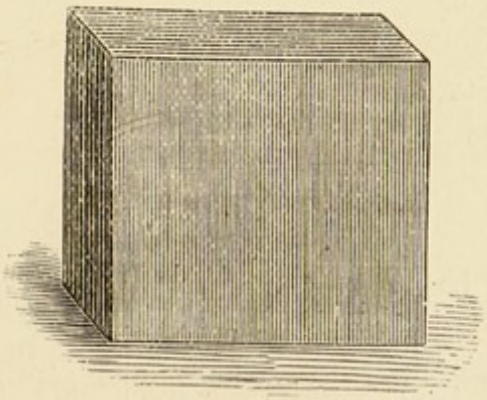
A gallon of ale contains no more nutriment than a penny loaf; a glass of wine less nutriment than can be laid on a fourpenny piece; and pure spirit contains not a particle of nutriment. It may be asked, "How can this be, when it is generally believed that these drinks impart so much strength?" We reply, that the "*stimulation and excitement they produce are mistaken for strength.*" We will endeavour to dispel the delusion, first, by *a brief explanation of the process of the manufacture of malt liquor*, and then prove the correctness of our statements by an analysis of the article in its manufactured state. The barley is first converted into malt, which is afterwards ground, mashed, brewed, and fermented; at each process the grain is reduced in quantity, while the cost of manufacture is increased. For example :—

If 2s. is spent in Barley, it will purchase 28 lbs.



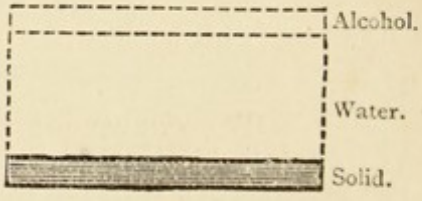
Half-bushel of Barley, 2s.

If spent in Malt, it is reduced to 13 lbs.



Peck of Malt, 2s.

If spent in Beer it is reduced to ½ lb.



Gallon of Beer, 2s.

The process of manufacture, or what may more properly be called the *process of destruction of valuable grain by malting and brewing*, is as follows :—The barley is first taken to the maltster, and placed in a cistern of water, and *water only is added*, in which it is well soaked for about forty-eight hours, which prepares it for couching, or placing it in heaps, in which state it heats, and a process of germination, or growing, commences; that is, sprouts of the future root and stalk protrude from both ends of the grain. After remaining thirty hours in this condition, it is floored, that is, spread out in thinner beds to prevent the heating process going on too rapidly, and after about twelve days' labour, Sundays included, it is then consigned to the kiln for the purpose of being dried; afterwards the buddings, or the sprits, are rubbed off, and the barley, or malt, is ready for the brewer.

There is nothing in the whole of this process to increase the nutritious quality of the barley; on the contrary, 100 lbs. of good barley, on the testimony of Dr. Ure, after malting, loses 20 lbs. of its weight, in the following proportions :—

1½	per cent.	of the barley is dissolved in the water in which it is steeped,
3	,,	dissipated in the kiln,
3	,,	by the falling of the fibrels,
12	,,	by evaporation,
½	,,	waste.
20	,,	total.

The following table, by Prout, will amply illustrate the changes which barley undergoes on its being converted into malt :—

	Parts when Barley.	Parts when Malt.
Yellow Resin ...	1	1
Gum	4	15
Sugar	5	15
Gluten	3	1
Starch	32	56
Hordein	55	12
	100	100

The conversion of barley into malt and beer is a signal instance of man's improper interference with natural laws in the manufacture of intoxicating drinks, and confirming the truth that although God hath made men upright, they have sought out many inventions.

Brewing.

It will be observed that in the making of intoxicating liquors, those vegetables only are employed that contain a large amount of saccharine matter, or starch capable of being converted into such matter, in order that the sugar may afterwards be changed into alcohol by the further process of brewing, or fermentation.

The Chief Object in Brewing is to Produce a Stimulating or Intoxicating Drink.

The object of the maltster, brewer, distiller, and publican is not to produce a feeding and nutritious beverage, but one that contains a large amount of alcohol, or in other words, one that stimulates or intoxicates. If we watch this process carefully, we notice that nothing is added in brewing to increase the nutritive qualities of beer, but every effort is made that can be to obtain the largest amount of alcohol, or intoxicating spirit, from the grain, in fact, to change the solid nutritious matter into such a form as will best develop alcohol.

For this purpose, water of a certain temperature is added to the malt, but only of sufficient heat to extract the sugary or saccharine matter from it.

The Process generally adopted to obtain Nutriment from Food.

What should we think of the housewife who would only pour tepid water upon her tea, or place a leg of mutton into warm water for a time, and then remove it, and, after a few weeks, drink the water in which it had been soaked, and destroy or give the uncooked joint to the pigs? We should say, without doubt, if a cup of good tea was wanted, boiling water must be poured upon it; or if we wanted all the nutriment we could obtain from the meat, we must cook the joint and eat it solid, and not simply soak it for a time and drink the liquor in which it had been soaked; and yet is not a process the most wasteful adopted in reference to brewing?

The opposite Process adopted in Brewing.

Is not the object to extract only so much saccharine matter from the grain as can by fermentation be changed into alcohol, whilst the nutritious part of the grain is thus destroyed or lost? We may illustrate this point by a simple experiment. We take two glasses containing two of the principal ingredients found in malt, viz., sugar and starch; the first contains 1 oz. brown, or raw, sugar; we pour half a pint of water upon it, of the same heat as that generally used for brewing, or, that poured upon malt; it

will be found that the sugar quickly dissolves and remains in solution, and is of the colour or appearance of pale ale. But if we pour half a pint of water of the same heat upon an

STARCH IN SOLUTION.

SUGAR IN SOLUTION.

ounce of starch as that poured upon the sugar, the starch will sink in a short time to the bottom of the glass, and will not dissolve. If we put boiling water upon it, it will then unite with the starch and form gruel, but not beer. The same effect will be seen if this process is adopted with malt.

In a valuable and popular encyclopædia of domestic economy, on the subject of brewing, the following passage occurs, from which much may be learned:—"We shall now point out an accident to which brewing is very liable. When the water used for the mash is of too high a temperature, the whole often thickens and becomes of a pasty nature; in this case the whole mash *is irrecoverably lost*, the liquor remaining locked up in the paste" (in other words, is rendered nutritious instead of intoxicating).

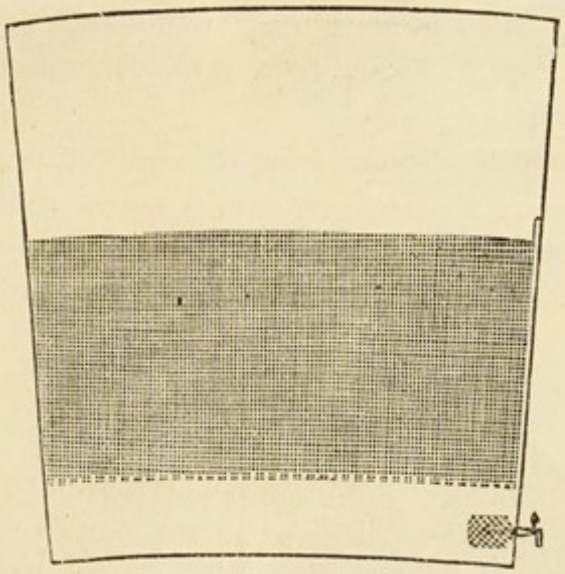
It is a fact well known to every laundress that pure starch is not acted upon by water heated below 160°, but when the heat of the water is raised to *boiling point*, or nearly so, it thickens into a glutinous mass, or stiff gluey paste. In this condition it becomes an article exceedingly useful for stiffening linen, and is commonly known by the name of starch. The *brewer* does not require this glutinous substance. What he requires is the sugar, in order to convert it into alcohol. "We should err very much," says Dr. Thomson, in the supplement to the *Encyclopædia Britannica*, "were we to suppose that the whole kernel, or starchy part of the malt, is dissolved by the hot water used in brewing; at *least* one-half of the malt still remains after the brewing is over, constituting the grains."

To prevent solid matter escaping from the mash tub, many expedients are used to strain it; sometimes a tap enclosed in a wicker basket, or a strainer. (*See Diagram.*)

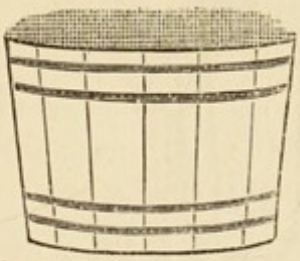
How careful the brewer is to prevent any solid getting into the "*liquor!*" *as the brewer calls it—liquor* being the brewer's term for water: "water" is a word which it is he practice never to use in a brewery—the reason is obvious.

The brewer's vocabulary gives the following meaning to words :—*Liquor*—the brewer's term for water ready to brew from ; *liquor back*—the water cistern to supply the brewery ; *liquor copper*—the copper for heating water ; *quassia*—an excellent bitter substitute for hops.

The process of brewing, then, it will be seen, consists merely of a decoction or infusion of malt and hops, by far the greater part of which is removed, in the form of grains, and is used as food for pigs, while the beer-drinker is content with drinking the liquor poured upon the grains, which has afterwards, by the process of fermentation, become of a deleterious and intoxicating character. The products, after being brewed, are distributed between man and beast. The man chooses the liquor—the intoxicating and non-nutritious portion ; and the grains—the remaining portion—are given to the pigs.

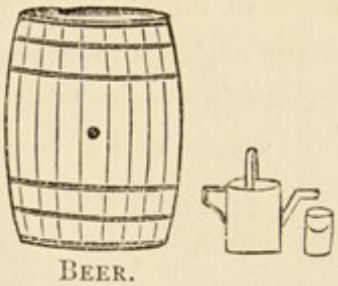


Mash Tub.



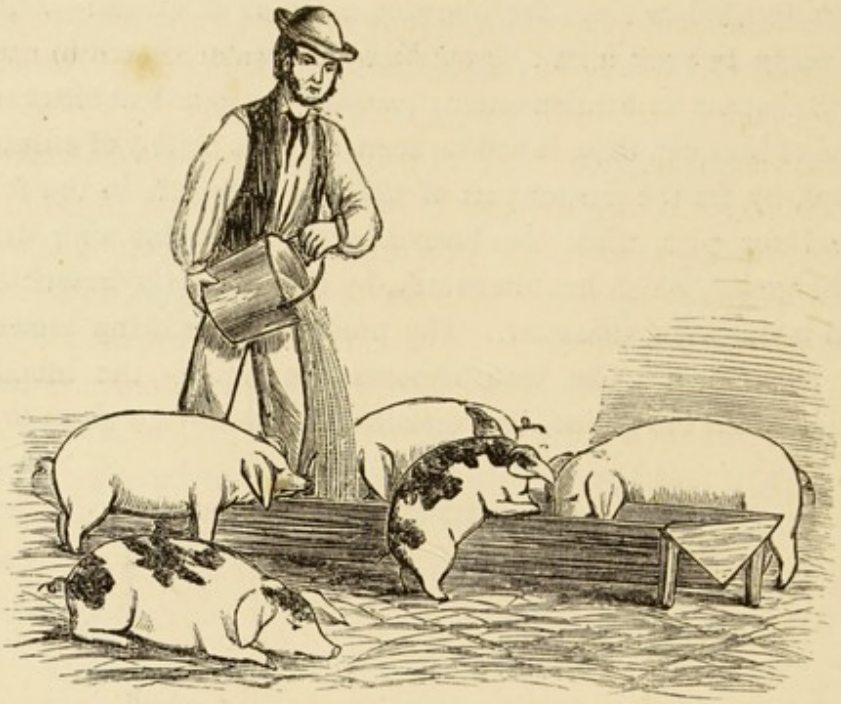
Grains.

Cooler.



Beer.

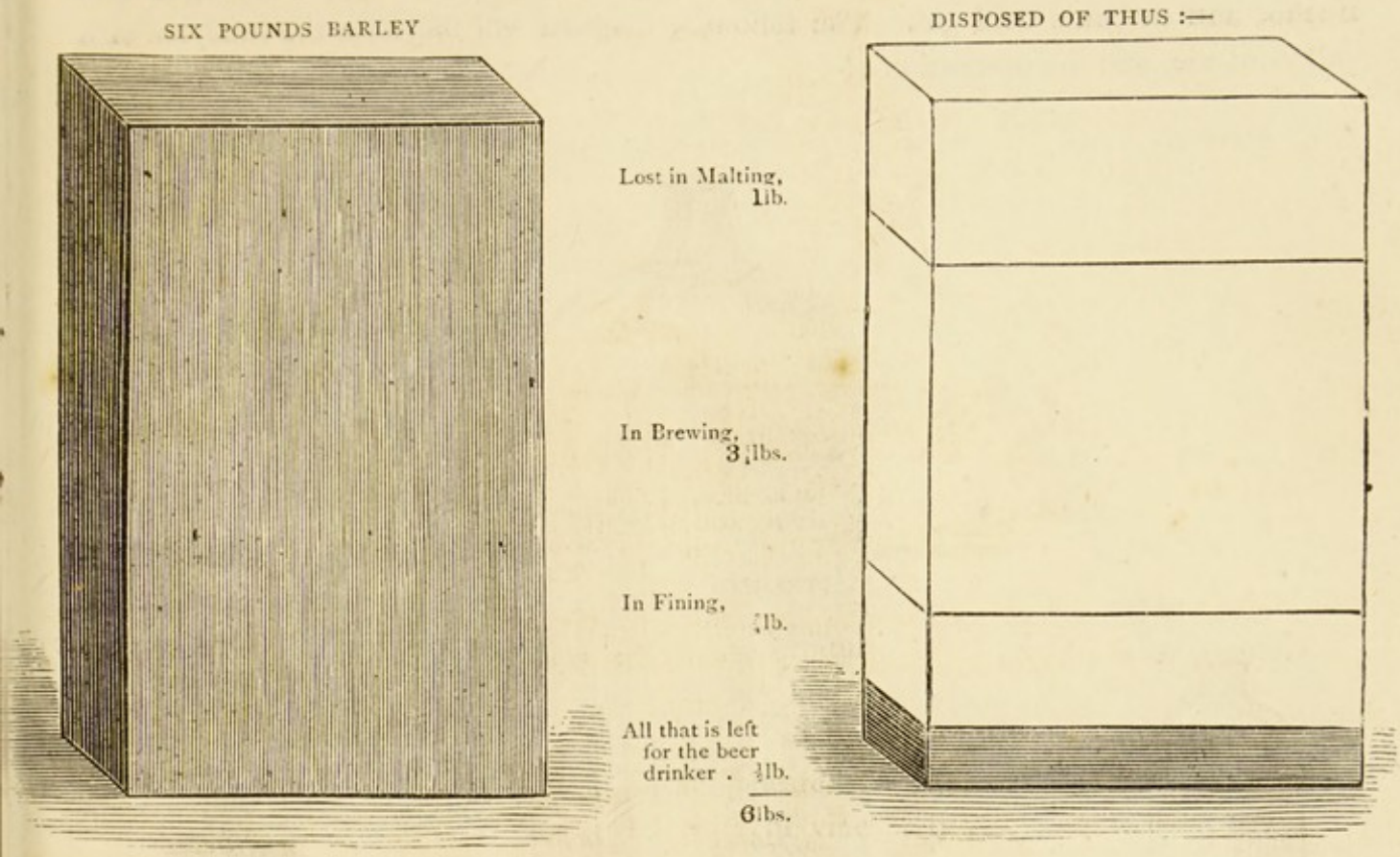
The appetites of both are fed from the same source, and of the same brewing, and whilst the pig feeds upon the nutriment left in the grains, the man drinks the liquor in which they were soaked, and is too frequently seen wallowing in the mire, or lying



stupidly drunk; and instead of standing erect, as a man with the use of his reasoning faculties, is thus brought by his dissipation below the level of the brute.

The beer drinker asks, "Is it true that only a pennyworth of nutriment is contained in a gallon of ale, for which we pay two shillings?" We reply, A bushel of barley is

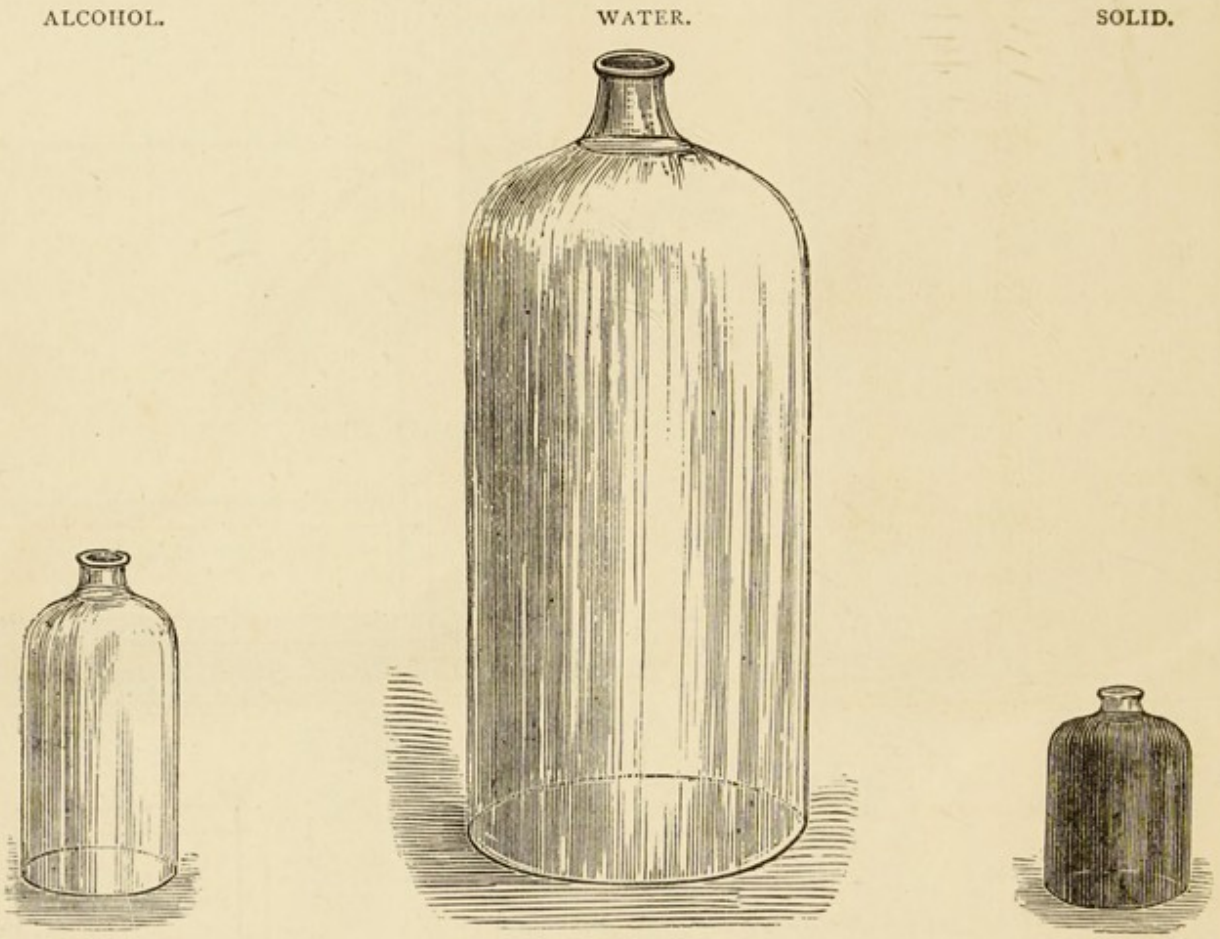
generally used to make nine gallons of ale, that is 6 lbs. of barley to the gallon. Notice the following diagram :—



When you buy it in the form of ale, the

First cost of barley is	6d.	BARLEY.
Charges for manufacture into Ale :—		
Maltster, for wetting and drying it	3d.	MALTSTER.
Government tax upon it	5d.	GOVERNMENT.
Brewer, for adding water and removing grains	4d.	BREWER.
Publican, for retailing it	5d.	PUBLICAN.
Licence, rent, &c.	1d.	LICENCE, &c.
Price of a gallon of ale	2s.	

The price is increased from 6d. to 2s. 7½ pints of water are added, and all but ½ lb. of the solid part of the barley is removed, except that portion which is changed into alcohol and carbonic acid gas. The following diagram will illustrate the analysis of a gallon of ale, and the proportion of



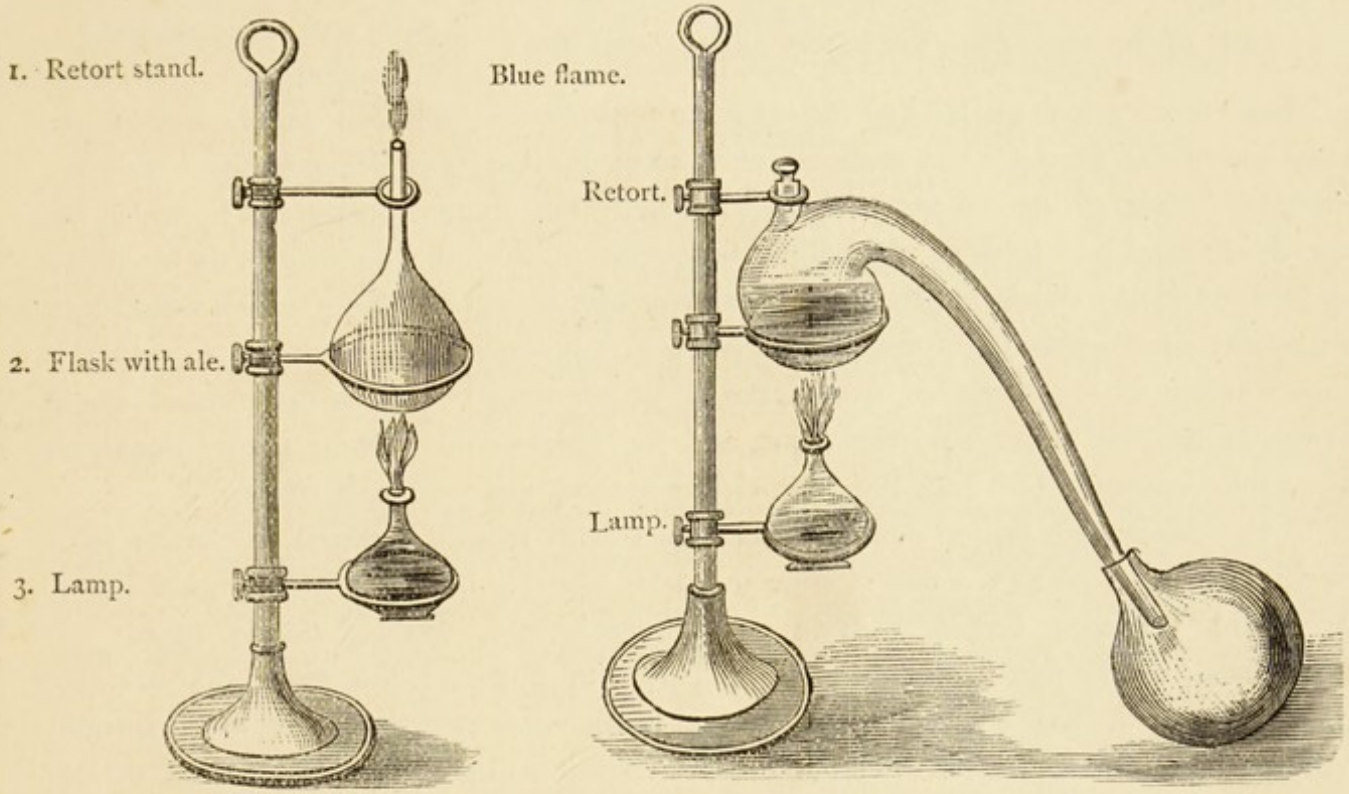
9 ozs. alcohol. 144 ozs. water. 8 ozs. solid.

The alcohol is worse than useless as an article of food, and the water you may procure without cost. If you were to have the solid matter brought to you after evaporating the alcohol and the water, it would be so nauseous that you would not eat it.

But some may ask, "What proof is there that there is alcohol in beer? It does not exist in the barley."

We proceed to another experiment to test this. We pour half a pint of ale into a flask, and place a lamp under it, to produce a gentle heat. In a few minutes the alcohol will begin to evaporate, and if lighted at the mouth of the flask it will burn with a blue flame seven or eight inches long, for several minutes. Or if we place half a pint of ale in a

retort, apply heat in the same way, placing the end of the retort in a receiver, about half an ounce of spirit will be distilled, quite colourless, which, if poured into a warm or dry saucer and lighted, will also burn with a blue spirit flame. Or, if we retain the spirit instead of



burning it, and afterwards continue the heat to the retort, allowing the water to evaporate, and catching it in the receiver, the result will be—1st, $\frac{3}{4}$ oz. alcohol; 2nd, $8\frac{1}{4}$ ozs. water; 3rd, $\frac{1}{2}$ oz. residuum.

But some may still be incredulous. If not aware of the chemical changes to which sugar is subject when water is added, and fermentation follows, they will not believe that alcohol or spirit is the necessary result of these combinations, and they ask, "How came the alcohol into the beer?" We once heard of a man in the stocks, placed there for being inebriated; his companions passing exclaimed, "Why Harry, how came you there? They can't put you in for that!" Harry replied, "I don't know whether they can or not, *but I am in.*" Just so with the alcohol, it is certain it is in the beer. We will now explain how the alcohol was produced.

If you consult Chambers' and other works on Chemistry you will find the scientific definition of the process of fermentation given thus:—"Fermentation is a process by which under the joint action of warmth, air, and moisture, sugar undergoes decom-

position, and is changed into alcohol or vinegar; the first is called the vinous fermentation, the second the acetous." The changes principally depend on a separation of the elements of the saccharine matter, and the recomposition of these elements in the following proportions :—

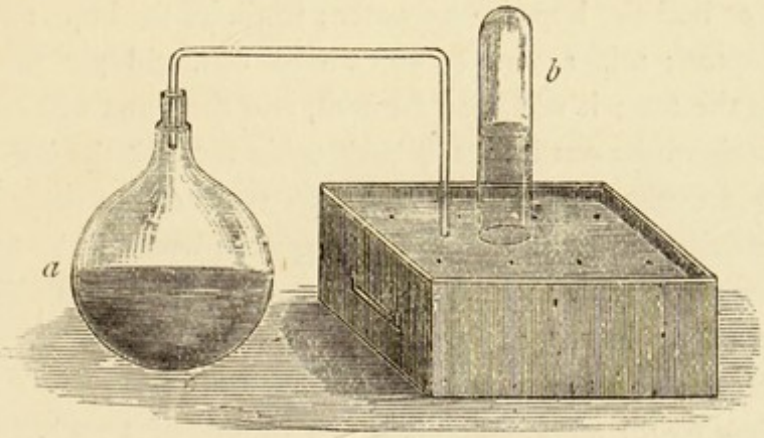
45 parts of the sugar from the barley are changed into { 22 parts carbonic acid gas. / 23 parts alcohol.

Thus the nutritious qualities of the sugar are converted into alcohol, and the well-known heavy gas of the brewer's vat, carbonic acid, some portion of which combines with the fermented liquor, giving it a sparkling appearance. The natural operations by which the sugar is changed into spirit or alcohol by fermentation, do not stop when this alteration has been effected; this is but the commencement of a series of changes, which would lead to its total decomposition, if nothing impeded it. "The art of brewing is to stop this change before all the sugar has disappeared. If this were not done, the alcohol would change as did the starch and the sugar, and the beer would become a sour liquid, no longer intoxicating. This sour liquor would be nothing but pure malt vinegar."

If the saccharine liquor denominated sweet wort is still exposed to the air in a temperature of about 75°, a new change will take place, a hissing noise is again heard, the liquid becomes turbid, a little gas is disengaged, floating shreds appear on the surface, which partly subside and sink to the bottom; the sweetness has disappeared, and it has become sour; in fact what was sweet wort is now vinegar. If the vinegar be kept exposed to the air, its acidity will gradually lessen, and at last disappear; its surface will become covered with a mould, and will acquire a very disagreeable odour, and become putrid. The three stages are called, 1st, the vinous fermentation; 2nd, the acetic; 3rd, the putrefactive. And the reason malt is used is chiefly because it furnishes a cheap kind of sugar, increased in quantity by the process of germination or growth artificially carried out by moisture, and laying it in heaps to heat or grow until the process of nature is stopped by drying it on the kiln. But is it possible that by just adding water of a given temperature to barley or malt, that these changes take place, and that nutritious food is changed into intoxicating spirit? We are all aware of the effect of cold water upon hay or lime, that great heat is produced. The change which takes place also in sugar by the addition of liquid is very apparent. We take some sugar, with a few grains of chlorate of potassium added, we pour a liquid (acid sulph.) upon it in a plate or saucer, and it immediately produces a brilliant flame. If the same liquid is poured upon a candle, it will extinguish it. A light, also, placed under a glass surrounded with water will soon effect great changes—will change the air from a wholesome to a poisonous atmosphere. So, by mixing the so-called marks of hospitality together

in a saucer—alcohol and salt—and igniting them, they make the countenance of a man ghastly and deathlike. Just so, when water is added to sugar and a small portion of yeast (or barm) is added. The process that follows, is, that the nutritive qualities of

the barley are changed to an alcoholic poison, which forms a very expensive and injurious article of diet. To test this, the process of fermentation may be seen by fermenting sugar. Place five parts of sugar, with about twenty of water, in a glass vessel, *a*, furnished with a bent tube, the other end of which is placed under an inverted jar, *b*, full of water; add a little



yeast to the sugar in a temperature of 60° or 70°; in a short time bubbles of gas gather round the yeast, and the liquor is soon in a brisk motion; the gas passing into the jar, *b*, is carbonic acid gas. After a few days the gas begins to abate, the impurities gradually subside, and leave the liquor clear. The changes that have taken place during this process are the disappearance of the sugar and the formation of spirit, which remains in the glass *a*, and of carbonic acid, which is collected in the glass *b*. When the weight of the spirit

and the gas are added together, they equal that of the sugar; hence it is proved that the sugar is converted into alcohol and carbonic acid gas.

In *Chambers' Practical Chemistry*, written by S. Macadam, Ph.D., F.R.S.E., and F.C.S., Lecturer to the Medical School and School of Arts, Edinburgh, it is shown that when yeast is added to sugar at 70° to 80°, true fermentation occurs, and the sugar is resolved into alcohol and carbonic acid gas.

Conditions Necessary to Fermentation.

The presence of sugar or saccharine matter—water mixed with the sugar to be fermented; the addition of yeast; the presence of air at a moderate temperature. It will be seen, therefore, that

Beer can be and is frequently made without Barley or Malt.

To understand this, we should keep in mind that the chief use of malting is to convert the starch of the grain into sugar, and thus to produce a cheap kind of it.

As a proof of this, various receipts are given in brewers' and vintners' guides, one or two of which we copy, as they are interesting in proving the foregoing statements:—"To make ale with sugar, procure a ten-gallon cask; put a pound and a half of hops into ten gallons of water, or boil the hops in the water; strain off the hops, and add 14 lbs. of sugar to the strained liquor; mix a pint of yeast with this, and put the whole into the cask through a hole in the top; it will soon ferment, and the yeast will appear through the hole in the head; as this works out let it fall back again through the hole in the head. It will require about three weeks to ferment. When the sweet of the sugar is scarcely perceptible, the cork must be driven in tight, and in four days the beer will be fit for use. Some even prefer this to beer made with malt. It is scarcely necessary to observe that the strength may be diminished or increased by using more or less sugar. It is reckoned that ten pounds of sugar is equal to a bushel of malt.

Beer made from treacle alone.—Get fourteen pounds of treacle and six ounces of hops; boil them together for two hours in eleven gallons of water; add, when cooled sufficiently, a proper quantity of yeast; let it work in a tub covered up for sixteen hours; put it into a cask to work for two or three days; then bung it down or bottle it. This beer will be fit to drink in a week, and be as strong as porter, and will only cost 1½d. per quart. If required to be only the strength of table beer *add more water*, or "liquor," as the brewers term it.

Take notice that all beer should be tapped at such a distance from the bottom as to

allow the beer to flow clear and without disturbing the sediment, and take care not to admit the fresh air and to prevent the escape of the carbonic acid gas, or the beer will soon become flat or sour.

According to certain experiments, ordered by the House of Commons, under the joint superintendence of Drs. Thompson and Ure, a quarter of malt will yield eighteen gallons of proof spirit. The annexed quantities of various sugars were found to be each equivalent to a quarter of malt, or will respectively produce eighteen gallons of proof spirits :—

Materials employed.	*Number of lbs. giving 18 gallons of proof spirit*
Best West India Sugar	175
Jamaica Raw Sugar	234
West India Molasses	275
Sugar House Treacle	295
Malt	336
Barley	396.

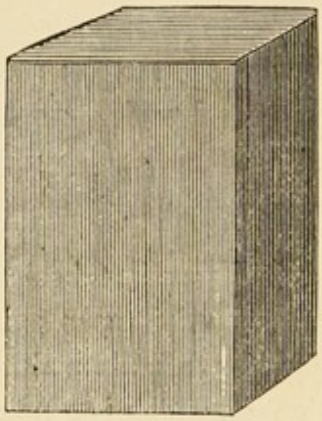
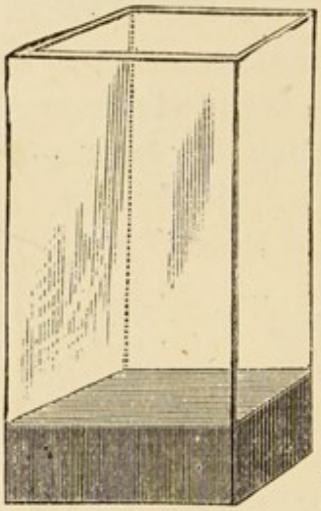
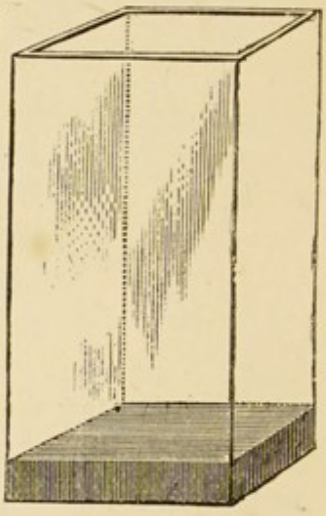
Hence it appears that while the whole of the sugar becomes spirituous, little more than half of the malt, and less than half of the barley, is turned into alcohol. "It is evident from these results that sugar forms the basis of alcohol, which is a powerful argument in favour of a saccharine extract in preference to such as is mucilaginous both for the brewery and the distillery."

This is a long recognised principle. "'As to strength in beers,' saith an old and intelligent author, 'as in wines, cider, and every fermented liquor, *the foundation of it all is sugar.*'" This is further confirmed by the Inland Revenue returns for the year ending March 31st, 1875, in which it is shown that no less than 97,321,504 pounds of sugar were used by the brewers in the United Kingdom.

As a proof of the presence of carbonic acid gas, we call attention to the following extract :—"Fermentation should not be carried on in confined rooms or vaults, as it may endanger life by an accumulation of carbonic acid gas. In breweries even of the usual construction there are on record several awful instances of its deadly effects upon certain brewers' labourers and others, who have imprudently ventured into vats without ascertaining whether they were quite clear of that noxious gas prior to their descent. If a lighted candle be lowered into a vat which has lately contained malt liquor, the light will instantly be extinguished. If, therefore, any one descends into the cellar when the lamp refuses to burn, he does so at his peril as a madman."

We next proceed to prove what we have already stated in reference to the non-nutritive qualities of a gallon of ale in proportion to the cost. We place the articles before you in

the four different stages; and, after analysis, what do we find? That the six pounds of barley is reduced to half a pound :—

Used in making a gallon of ale, Barley, 6 lbs.	Reduced by malting to $4\frac{3}{4}$ lbs.	Reduced by brewing and removal of grains to sweet wort, 1 lb.	Reduced by fermentation and fining to a gallon of ale, $\frac{1}{2}$ lb.
			
Solid parts } 6 lbs.	$4\frac{3}{4}$ lbs.	1 lb.	$\frac{1}{2}$ lb.
Water		7 pts.	7 pts. water. $\frac{1}{2}$ pt. alcohol.

Here observe that in each stage the solid matter is decreased, and in the two latter stages the loss of the barley is only replaced by the addition of water and the change of the sugar into alcohol. In order still further to prove this, if further proof were necessary, we need only refer to a lecture and discussion held at the Society of Arts on *Condensed Beer*, and such testimony we give from those interested in, and well acquainted with, the process of brewing and its results. What need we of any further evidence? Nothing could better prove the statements made by analytical chemists and temperance reformers than evidence from such a source.

Hence it is proved that a barrel (thirty-six gallons) of ale contains no less than—

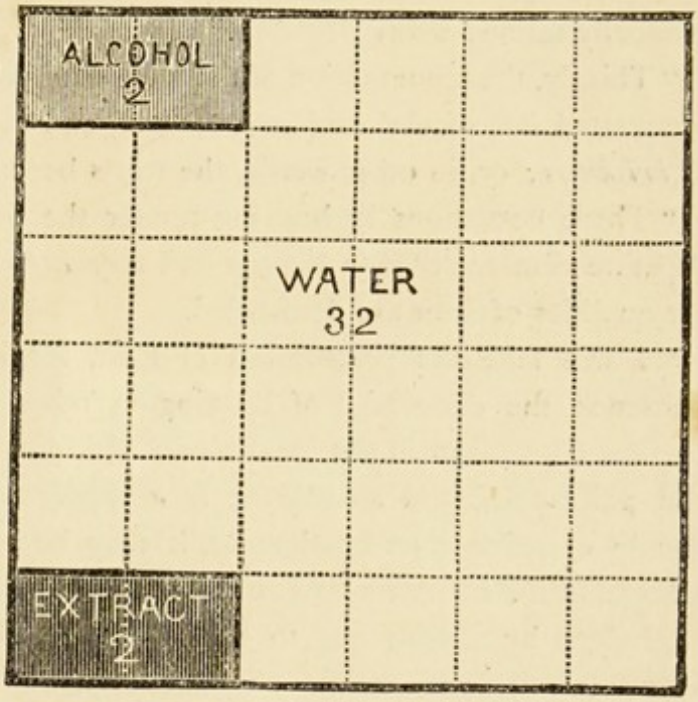
320 lbs. of water,
20 lbs. of alcohol,
Leaving only 20 lbs. of extract or semi-solid sediment.

360 lbs.

And that if this twenty pounds of alcohol and extract were retained and placed in a vessel

less than a cubic foot in size, that the water might be added more or less according to taste and requirements, and thus save the expense of transport of so much water. We had often asserted this, but we did not expect that a number of gentlemen interested in the sale and export of beer would so amusingly expose the delusion as to admit "that every valuable constituent of the original thirty-six gallons of beer could be packed in less than one-ninth of the space, because eight-ninths of the beer was composed of water," and in exporting beer to India or elsewhere, water, more or less, could be added on its arrival, according to the strength required, to save the expense of freight. A diagram will here explain the proportions of water in a barrel of ale, and the object of the discussion.

	lbs.
Alcohol	20
Water !!!	320
Extract	20
Total	360



We quote a portion of the lecture and discussion from the *Society of Arts Journal*, February 4th, 1876, for the consideration and amusement of our readers :—

Dr. Bartlett, after a few preliminary remarks, in which he stated that for the purposes of his experiments he "proceeded to the works of the Condensed Milk Company, at Aylesbury, and at various times condensed the smallest amount of beer which their apparatus would permit, namely, three barrels—108 gallons.

"I have here samples of ale and stout condensed in the months of February and March, 1874. I have also some which have remained open from that time to this, and the only difference perceptible is that it has become drier from the evaporation of moisture. But, before proceeding to enter upon the minutiæ of the process of

condensing, it may be advisable to touch briefly upon some of the salient points of brewing beer, so as to show more explicitly the great advantages which must accrue from any satisfactory process of arresting the natural tendency of beer to become acid, or otherwise unfit to drink, which is at present overcome only by brewing export beers of great alcoholic strength or with a great excess of hops, and in other respects beers not the best calculated for consumption in warm climates.

"To render the subject more intelligible, I will endeavour to explain a few of those points to which some attention must be given.

"Firstly, as regards the preparation of the malt.

"Secondly, the mashing, and the means of obtaining the extract of malt and hops, technically termed worts.

"Thirdly, the fermentation of the wort with yeast, by which a portion of the saccharine is converted *into alcohol and carbonic acid*, and the beer thus attains its *spirituous strength and briskness;* or, in other words, the worts become *drinkable beer*.

"These operations in brewing render the preparation of beer in any but a perfectly temperate climate *not only difficult* and *very expensive*, but next to impossible if any of our finer qualities of beer are demanded.

"I will take the preparation of malt, for instance; and here, at the very outset, commence the difficulties of brewing in other climates. Neither in Australia, South America, China, nor in the greater part of India, can any barley be grown fit to produce a good pale malt; and as *malting is a highly critical process*, necessitating the greatest possible experience and judgment, it may be easily imagined that there can be but little inducement for maltsters to encounter additional risks, of which they have no previous knowledge, by attempting to deal with the very inferior barley which can alone be produced in these countries. The consequence is, that whatever beer is attempted to be brewed in our warmer colonies, it is always practically from imported malt. Unfortunately for the colonial brewers, malt cannot be shipped in bulk without the certainty of being spoilt, and is, therefore, only carried in 400 gallon iron tanks, the cost of which tanks, and the freight, very largely augment the original cost.

"The great desire of all Englishmen abroad to obtain something resembling their national beverage, and at a more moderate price than two shillings or half-a-crown, the price now charged in many of our colonies for a bottle of English ale or stout, still induces the attempt to be made to overcome the difficulties of foreign brewing that have been alluded to. We could almost gauge the amount of beer so brewed by the amount of malt exported from this country, and it would then be seen how little has yet been accomplished towards brewing drinkable beers in those parts of the world.

"Allowing the colonial brewer to obtain his malt as best he can, and no matter at what expense, a second and almost insurmountable obstacle stares him in the face when he commences to ferment. I need hardly detail the progress of scientific brewing in this country in regard to this most important particular; but this must be admitted by all the more successful of our brewers, that, to the extent they have been successful in reducing the temperature during fermentation, they have been also successful in the production of sounder and better beer, particularly as regards its flavour and keeping qualities. Of such vital importance is a moderately low temperature during fermentation, that even in this country during the summer months it is not advisable to attempt to brew beers for export.

"If, then, it were attempted to carry on fermentation at some 20° above our own summer heat, as would be the case in many of our colonies, hardly a drop of sound wholesome beer could be expected to be produced.

"Among other essentials, perfectly pure clean yeast is indispensable, and it must be in that condition of healthy reproductiveness which will carry on the fermentation of the worts, so as not to produce any other change than the transformation of as much as is desired of saccharine extract into alcohol. Those other ferments, which are so frequently to be found in yeast, cause the development of lactic and acetic acids, and even the best yeast, drawn from breweries where the greatest cleanliness is maintained, is certain to become deteriorated by being kept more than a few days.

"A decomposition takes place in the yeast itself, and although some of the spores still maintain their vitality, and will reproduce alcoholic fermentation in beer worts, still, in the other portions of the yeast, false ferments of the worst possible kind are generated and reproduced in the beer, rendering it not only unsound *ab initio*, but so tainted with products of decomposition that it must be always coarse flavoured and decidedly unwholesome.

"Few persons seem to be aware *how much nauseous and unwholesome beer is consumed because no better can be obtained in the neighbourhood;* many *charges of adulteration* having no other foundation than the ill effects experienced after taking beer of this kind.

"From information which I have received from men who have travelled in various parts of the world, I am irresistibly led to the conclusion that brewing conducted under the difficulties incident to hot climates is productive of beer almost invariably objectionable, generally nauseous, and frequently injurious.

"A fresh supply of good yeast must be frequently unattainable in the colonies, such breweries as there are being so few and far apart that they have but little opportunity of exchanging their barm whenever it may be desirable; and, as it is

considerably more difficult to continue to reproduce fermentation for any length of time at the higher temperatures, it must be evident that they will suffer much more for want of supplies of fresh yeast than is ever likely to occur, even in the remotest parts of this country. If, then, as we know, this is a difficulty of great moment to some of our English breweries, I can only anticipate such augmentation of all the danger and trouble that I have spoken of to those abroad as to make it wonderful that they can brew at all.

"I have now to treat upon a point of almost equal importance; in fact, so much does the quality of beer depend upon the water with which it is brewed that I am sure that I shall have but few dissentients in claiming a superiority for the beers brewed with waters from the best English springs to any other beers, come they from what country they may. If we take Burton-on-Trent as furnishing a type of water best adapted for brewing ale, whether mild or bitter, we shall be able to note that the *peculiarity of the water consists in what some persons term its hardness;* hardness being another name for the presence of certain salts of the alkaline earths.

"It may not be considered that I shall be trespassing too much in the endeavour to show that this hardness is one of the most valuable qualities that brewing water can possess, when ales only have to be considered, and on the other hand the soft London waters have been and still are pre-eminently suitable for the extraction of the peculiar flavours of the high dried malt adapted for porter and stout. The *rationale* of the good effect of the Burton waters, by which they give their own individuality to the beers of the district, may be easily understood when we discover that the pale malts, differing from those which are high dried, yield a solution in soft water of a certain portion of their constituents. This solution, being neither gum nor dextrine, but rather of a *mucilaginous character, causes a considerable tendency to a most objectionable fermentation*, so much so, that much of the unsoundness of the cheap ales brewed with soft water may be traced to this account. But while the solution of malt is carried beyond the degree that is desirable, the over solvent properties of soft water upon hops must also be deprecated, inasmuch as the beer becomes impregnated with the harsher and coarser bitters of the resinous portion, which are quite foreign to the aroma and delicate fragrance yielded by hop oil and other portions of the extractive.

"No doubt can rest with any person accustomed to note the peculiarity of ales brewed with hard water of the Burton type. The latter possess a sufficiency of the delicate bitter which is found to be agreeable to almost all palates; and enough tannin of the hop is extracted to render the lighter beers more fit to keep than would otherwise be possible. Bitter beers of the Burton character leave no harsh or acrid bitterness remaining upon the

tongue after the beer is swallowed. This is exactly what denotes the difference between the ales of Burton and those of other localities using soft waters. I am not taking this for granted, merely scientifically, but it is proved beyond contradiction by the verdict of the whole world being in agreement with the theories adduced.

"Nothing need, I should imagine, be said further upon this point, than to show that the essentials most important to the production of really good wholesome beer are those which are but little likely to be found conjointly abroad, and if Englishmen must drink beer equal to English beer, they stand but little chance of being able to obtain it when brewed away from England. English beers certainly are the finest in the world, and those best adapted for export.

"*Gigantic breweries are conducted on scientific principles*, and the employés, from the laboratory to the cellars, have to acquire a special knowledge, scientific and practical, such as can alone successfully carry out the multifarious operations of the brewery.

"In contradistinction to the accumulated experience of many years, sometimes carried from father to son through successive generations, brewing abroad must generally be conducted almost entirely by means of unskilled labour. That which no practical brewer would consider himself justified in leaving to any but the most responsible hands, must inevitably be performed in most other countries by the mere day labourer.

"*Considering the long train of difficulties, disadvantages, and inherent defects* that naturally attach to any attempt at brewing abroad, it is not wonderful to find that a great part of the beer considered drinkable in other countries is beer that has been exported from this.

"Until within some thirty-five years ago, none but the *strongest, that is to say, most heavily alcoholic* or saccharine beers, were enabled to withstand the long voyage and after land-carriage, before they could reach their destination. An immense spurt was given to the export beer trade when a pale ale, not nearly so strong as that previously exported, was enabled to pass through the ordeal of its shipment, by being, in the first place, brewed with more scientific accuracy, and secondly, by the addition of a large excess of hops.

"To whatever extent this beer was rendered more wholesome and less expensive, by reason of its lesser strength, to a corresponding degree all such saving was counteracted by the expense of the additional hopping. Moreover, of late years, the price of hops has become so high that the better classes of bitter ale have had to develop their flavours from the smallest quantity of hops that would suffice to keep them. A reaction has, however, already set in, by which any great preponderance of bitterness in the beer is objected to by the more refined palates of connoisseurs. *Physicians are beginning*

to find that bitter beer may be over bitter, that the tonic properties of the hop may be too concentrated; in short, that a great deal too much bitter may be taken without drinking any unreasonable quantity of the beer.

"The draught beers, in largest demand throughout this country, are both lighter, less bitter, and consequently less expensive than those required for exportation.

"Another difference between the draught beer that is so largely consumed and beer shipped for export, is, that as soon as the first is brewed, it is immediately sent out for consumption; too rapidly, indeed, for the beer to be always in good condition; but with export beers, those brewed in one season, from October to March, are not considered fit to ship until they have passed through an entire summer in the export agent's cellars. More frequently, beer is retained for six months longer. If we give a rough estimate of two years intervening between the brewing of the beer and its consumption, we shall by no means exaggerate the loss which is liable to occur during that time. On this account, probably no article of exportation is attended with more risk than beer.

"Even after it has attained the condition that is considered most favourable, prior to its shipment, a very slight, almost imperceptible amount of fermentation must still exist in it, or it would be flat and evidently unsound, but as this working may be excited from an almost comparative inertia to the most violent effervescence, both by the rolling of the ship and the jolting of the barrels in other conveyances, and the rise in temperature to which it is subjected, it is not uncommon to find whole shipments of beer wasted, either by their becoming sour in transit, or by the bursting of the barrels or bottles in which they are contained. Supposing, however, that the beer reaches the foreign port in safety, it sometimes happens that other shipments have come in at the same time, and at the prices generally charged abroad it is not possible to clear out the stock in time to prevent its becoming deteriorated.

"Our colonists know well enough that when once beer has been landed which is not perfectly sound it must be sold at any sacrifice, consequently none but the soundest beers realise the very handsome prices which those who can afford it are still compelled to pay for good beer.

"The two chief hindrances to the export of beer have been *the heavy freight in proportion to the value of the article, and the small value of the casks or bottles when empty.*

"I will now attempt to show how the process of condensing will obviate all the difficulties which at present impede the export of beer; how it will introduce a beverage more suitable to hot climates than those which are now being shipped, and draw attention to what I think I may term the success of the process, after a somewhat lengthy series of experiments on a working scale.

"The use of the vacuum pan in condensing milk is based upon the principle, that as atmospheric pressure is removed, liquids attain a boiling point considerably below their normal one. If we take water and heat it in such a pan, removing the air by means of a suitable pump, instead of requiring a temperature of 212° before it passes into steam, water may be boiled 100° lower. In this manner we all know condensed milk is produced at a temperature of 130°, or even less, and is thereby rapidly reduced in bulk by evaporation of the water without injury to the solid components. The same system has also been employed in boiling down sugar and some other extractive matters.

"It appeared to Mr. Lockwood that beer might be condensed in the same manner as milk, for the purpose of preserving it, and rendering it available for exportation at a much less cost than at present. *Beer, however, is a very different article from milk, inasmuch as it contains a certain proportion of spirit or alcohol, varying from 7 per cent. of proof spirit in light draught ales, while the export bitter ales contain over 12 per cent., and strong beers considerably more.* If our usual system of condensing were attempted, as we had to do in our first experiments at the Aylesbury Condensed Milk Works, all the alcohol would pass off with the vapour, and be lost, unless it were conducted through a suitable condenser. This was obviated later on, when I obtained the sanction of the Commissioners of Excise to erect a vacuum pan and condenser for the purpose of perfecting many of the minute but not less important details of the operation.

"It was no little testimony to the originality of the process, that on my application to the Commissioners, they could find no precedent for granting such permission. In fact, although several persons have attempted to condense extract of malt, extract of hops, and extracts of both combined, for the purpose of being fermented into beer, no one had ever applied for the necessary permission to be allowed to condense or concentrate finished beer.

"The apparatus employed consists of a copper vacuum pan, with which is connected a condensing worm of solid tin, immersed in a tank of water. Two copper globes are attached for the collection of alcohol.

"A certain quantity of beer being drawn into the vacuum pan by a few strokes of the pump, the two under-taps are closed, and the steam permitted to enter the jacket which surrounds the pan, and the air pumps are then carefully tended so as to maintain a vacuum of twenty-five or twenty-six inches pressure, and a temperature of from 130° to 160° during the first portion of the process. Some little attention is then necessary to work at the best advantage, but *in a short space of time the whole of the alcohol comes over, and flows into the lower globe*, the connection between which and the upper is then closed. By this

means the alcohol can be collected without either breaking the vacuum or stopping the air-pump.

"When it is found that the whole of the alcohol has come over, it is removed in a proper stoppered vessel, and is found to contain all of the delicate volatile flavours of the beer. As soon as the spirit is all removed, the operation of condensing is then assimilated to that of condensing milk, and consists simply *in the removal of water* to whatever degree may be considered desirable, and in practice the beer is thereby reduced to a thick *semi-fluid state*, after which it is drawn off from the pan.

"*A barrel of beer, containing thirty-six gallons, is in this manner concentrated into a bulk of little over two gallons, and there is besides an average of more then two gallons of alcohol of proof strength. The thick fluid extract consists of all the solid matters held in solution by the original beer, together with a small proportion of water, which is purposely retained to keep these matters fluid, so as not to change in the slightest degree the natural constituents of beer, as they would inevitably occur if the condensing process were carried so far as to reduce the extract into a solid state.* Following, in this instance, the experience derived from the practical condensing of milk, in which it is found that if the milk is absolutely dried it is with difficulty re-dissolved, and never regains the whole of its former properties; so with the beer extract, we have ascertained that the fluid or semi-fluid condition into which it is reduced by Mr. Lockwood's processes enables the re-mixing with the proper proportion of water to be effected with the greatest possible ease, while the peculiarities of each kind of beer are distinctly reproduced without the alteration which reproduction from a solid extract always entails.

"When the *condensed extract* is taken from the vacuum pan, and cooled, *the alcohol* is re-mixed with it. In practice, this has been found to be desirable, but it is by no means necessary, as the thick fluid extract of beer will keep by itself, even if left in an open jar for nearly two years. I have a specimen, which has remained exposed to the air since the latter end of March, 1874. It can be put up in tin cans, similar to those used for condensed milk, but we prefer to re-mix the alcohol with the extractive matters, rather than export it separately, because it enables us to clear the solution by rendering it much more fluid. We *have then a solution of all the extracts of malt and hops which were contained in the beer before condensing;* we have the whole of the salts of the Burton waters, if the beer has been brewed in that district. *All the aromas and volatile matters which having been carried over with the alcohol are retained in it, and returned in re-mixing with the extract.* Every valuable constituent of the original beer is there present, *minus only nine-tenths of the water.* And if it were needed to prove how permanently unchangeable the condition of the finished condensed beer must be, I need only call attention to the

fact that the extractives *are dissolved in spirits of the strength of brandy*, and that the temperature to which the beer has been subjected during the process of condensing is such that without being sufficient to injure or alter the character of the beer, when re-made, in the slightest degree, yet is high enough to render inert all the fermentive germs, so long as the beer is kept in its concentrated form.

"A barrel of beer is so reduced in bulk that it can be contained in cheap cases of wood lined with tin, the exterior dimensions of which are somewhat less than a cubic foot. Now, as freight is charged by what is termed barrel bulk, in which a beer barrel is generally reckoned as nine cubic feet, it is evident that a saving of eight-ninths of the total freight in shipping beers is saved by this means.

"*When it is desired to re-make the beer, all that is required is to empty one of these tin cases, and make it up to the thirty-six gallons by the addition of water. Beer is at once produced substantially* identical in strength and flavour with that before treatment. But when re-mixed with its proportion of water, the beer is necessarily without briskness. The constituents are all there, the flavours are still retained, but I doubt whether it would be recognised in this condition as being exactly the beer we are accustomed to. It must be distinctly understood that beer received from the brewery continues to develop a very minute portion of alcohol from the saccharine matters, and in this process gives off a certain amount of carbonic acid gas. Before this gas is thrown off from the beer in the form of froth, the liquid becomes completely saturated with this gas, and *unless the beer is so saturated with carbonic acid*, it cannot possess one of its most distinctive flavours; *without which, in fact, beer would not be considered drinkable.*

"In the process of condensing we have driven out the whole of the carbonic acid gas, and we have now to restore its full equivalent. In dealing with this most important stage of the reproduction of the beer, I have had the advantage of the practical experience of Mr. Southby, *whose intimate knowledge of all the processes of brewing has been acquired as chemist and brewer to Messrs. Allsopp and Sons, and in other breweries*, and I may say his assistance has been invaluable. Treating the re-made beer as we should any other beer, which being quite sound has been 'flattened' for bottling, as is always done, we soon found that the suggestion made by Mr. Lockwood of merely adding a little uncondensed beer in its original condition is all that is required to stimulate the reproduction of carbonic acid gas to any extent that may be wished for, but a very rapid development of the gas may be given by a little yeast. Take a tin of condensed stout and make up thirty-six gallons, by the addition of water, and a little stout which has never been condensed, an excellent stout will be produced equal in all respects to the original beer.

"If the particular stout was that of Guinness, or of Messrs. Reid, or Barclay and

Perkins, the distinctive peculiarities of each of these separate brews will be as marked and easily recognisable as before they were condensed. The same may be said with regard to ales, Burton ales being clearly distinguishable from those brewed with soft water.

"The development of carbonic acid can be controlled by temperature to a considerable extent, and if it is desired to get the re-made beer into condition rapidly, a higher temperature will greatly accelerate the result when no yeast is procurable, and it is for this reason that we prefer reproducing the aëration by the addition of fresh beer.

"During the experience of the last six months, we have condensed considerable quantities of different kinds of beer, with what we deem a gratifying success. During the same period we, though but inexperienced bottlers, have bottled many grosses of these different beers. When the skill and experience which has to be devoted to the bottling branch of the beer trade is taken into account, and the inherent difficulties of dealing with comparatively small quantities at a time, we think that we have reason to be more than satisfied with what we have done.

"We have noticed that by using a small quantity of *extract* and *larger proportion of water, thinner beers, and of less alcoholic strength, can be reproduced of as sound a quality as the strongest.* Such a *beer is undoubtedly the most fit for use in tropical climates.* The beer at present procurable in those regions, as previously stated, is a very strong or very expensive bitter beer. The consequence is that such beer is only to be drunk in small quantities, and hence the very small exportation of beer that I have alluded to. *If, instead of brandy pawnee, gin slings, cocktails, juleps, and a variety of other ingeniously deleterious mixtures of strong alcohol and bad soda water*, good, sound, and pleasant beer can be cheaply sold, in which the *alcoholicity* is reduced to the most *moderate proportions*, I have little doubt but that the export of beer from this country will assume dimensions somewhat nearly related to that of its home consumption.

"It now only remains for me to discuss the question of cost involved in the process of condensing beer, and as this is one of the greatest practical importance, I will ask you to grant me your indulgence while I pass rapidly over the items. In the first place, the cost of the beer-barrel here is about twenty-five shillings, abroad they are generally of so little use that the odd five shillings may be considered as beyond their average value. Against this must be placed the cost of two shillings for the tin-lined case which holds the equivalent of the barrel of beer when condensed. Here is a saving of at least eighteen shillings per barrel, that of the freight is at least seven-eighths, besides obviating the risks of transporting beer in casks, which are so great as to add at least from 10 to 15 per cent. to the other costs incurred, but more generally it is found necessary

to make a much larger allowance for ullage, and beer which becomes sour. Not unfrequently whole cargoes are discharged from the ship perfectly worthless from the latter cause, a risk which the process of condensing entirely obviates.

"Certainly, I need have no hesitation in affirming that during the time I have put the re-made beers to the practical test of drinking them almost daily, I have found them pleasant to the palate, and more suitable from a dietetic point of view than the general average of beer.

"This new branch of trade is the more likely to be secured to our own country, as English brewers are, and probably always will be, unapproachable in the quality of the articles they produce. We need scarcely anticipate the same kind of competition from the Continent in this business as is unfortunately not to be avoided in other manufacturing industries."

DISCUSSION.

"The Chairman (Professor C. TOMLINSON, F.R.S.) said he had seen some of the experiments connected with this process, which seemed to him quite in the direction which technological chemistry had assumed during the present century. *It seemed absurd in exporting beer to export an enormous quantity of water, in many cases amounting to* 90 *per cent.*, if they could send out the essential ingredient in a concentrated form, leaving the parties abroad to add the water required to make up the quantity. The only point of difficulty which occurred to him was the addition of carbonic acid, and that, perhaps, would be explained further, for at present it was not quite clear to his mind how it could be satisfactorily accomplished.

"Mr. BRANSON thought if the extract could be shown to contain all the aromatic and nitrogenous constituents of high-class beer, means could be found to add the requisite carbonic acid.

"Dr. OVEREND DREWRY said he had examined the properties of this beer, with a view to ascertain its dietetic value. It was generally supposed that the reason why bottled beers were inadmissible in cases of weak digestion was, that they contained a large quantity of carbonic acid, but that was not so, the real evil being that they were nearly always sour, from the presence of another acid, not carbonic acid. This beer, however, was singularly free from such acidity, and when in addition it appeared that the quantity of alcohol could be regulated with the greatest nicety, he could only reiterate the statement he had already made at the Medical Society, and in which he was supported by many other physicians, that *those alcoholic beverages were most beneficial generally which contained the smallest proportion of spirit consistent with soundness.*

"Mr. F. J. BRAMWELL, F.R.S., gathered from the statement of Dr. Bartlett that about thirty-two gallons out of thirty-six were converted into vapour in the course of the process.

"Mr. SMARTT said Dr. Bartlett seemed to assume that all beer brewed in England was made from malt and hops, but it was well known that a great deal was produced from sugar.

"Dr. BARTLETT, in reply, said that several points had already been answered, and the principal one, first mentioned by the Chairman, would best be settled by opening some of the beer in bottle, when it would be found to show quite as much effervescence as was desirable. As Mr. Southby had explained, the addition of a little uncondensed beer set up a slow secondary fermentation, such as always took place in bottled beer, and, in fact, if beer for export were not flattened down as much as possible before bottling, very little of it would ever reach its destination.

"A vote of thanks having been passed to Dr. Bartlett, the proceedings were concluded by the production and tasting of some bottles of the beer made under this process, which appeared to give general satisfaction."

This quotation from the *Journal of the Society of Arts* may appear of considerable length, although much curtailed where it does not bear directly on the subject; but there are many points in it to which we call special attention, confirming the views previously stated here.

1. The natural tendency of beer to become acid.

2. The conversion of the saccharine into alcohol and carbonic acid, by which the beer obtains its "SPIRITUOUS strength," or becomes, as it is called, "drinkable beer."

3. The difficulties of producing it in climates above or below a certain temperature, by which we may infer that it was not intended as a necessary drink for the use of man; while on the other hand, the Divine Being has supplied us bountifully with water, either by gentle showers, sparkling dew drops, bubbling springs, rippling streams, or flowing fountains.

4. That many climates are admitted to be too warm even to allow of brewing.

5. That with the greatest care exercised the beer is often nauseous, unwholesome, and produces injurious effects.

6. That hard water, of the "Burton type" (which only extracts the saccharine matter afterwards changed into alcohol), is preferred for brewing, while soft water is stated to produce a solution of a most objectionable character in the opinion of the brewer, because it is rendered mucilaginous, or that kind of food which has a tendency to build up the body.

7. "That a greater part of the drinkable beer sent abroad is exported from this country."

8. That the so-called *strongest* beer is "the most heavily alcoholic"!!!

9. That bitter beer is being objected to by many physicians, because it is made too bitter, and that a reaction is setting in on this point.

10. That the freight is too heavy *in proportion to the value* of the article.

11. That it is admitted that beer contains a certain proportion of spirit, or alcohol, varying from seven to twelve per cent., and in strong beer even more.

12. That the same means to separate the alcohol from beer by the retorts (as shown on a small scale in the early part of this book) is adopted in the preparation of condensed beer by the brewers; we agree, therefore, as to results.

13. That a barrel of beer containing thirty-six gallons contains thirty-two gallons of water, and that all the remaining portions can be placed in less than a cubic foot of space.

14. All that is wanted to re-make the beer is to mix the four gallons of extract and spirit with the quantity of water required, and the strength and flavour is the same, giving it briskness by adding a little carbonic acid gas, or a few grains of rice, or a few raisins.

15. That the chemist and brewer to Messrs. Allsop and Sons, and other breweries, gave his invaluable assistance in these experiments, and therefore the authority may be relied upon as confirming the views herein stated.

16. That those beers which contain the *smallest* proportions of alcohol consistent with "soundness" *are most beneficial.*

17. That it seemed absurd in the opinion of the Chairman, in exporting beer, to export an *enormous quantity of water*, in many cases amounting to ninety per cent.

Shall we join in a hearty vote of thanks to Dr. Bartlett for the information given in his lecture on condensed beer? If in the trade, we should be ready to exclaim, "Save me from my friends!"

Further Testimony from Friends.

In a work on the Art of Brewing, by David Booth, "published under the superintendence of the Society for the Diffusion of Useful Knowledge"!! (Simpkin, Marshall, and Co.), we find the following singular admissions:—

"The tax on public brewers is beyond all ordinary bounds. Were a penny a quartern loaf levied upon the bakers, their ovens would soon be cold, and yet *we consent to pay twopence* upon every pot of porter which we drink. In proof, the following is a

statement of the expense at which any private gentleman who understands the manipulation might brew porter of as good a quality as that usually sold in London :—

Four quarters of malt at 65s. per qr.	260s.
Thirty-two lbs. hops	32s.
Colouring	5s.
	297s.
Or	£14 17s.

These materials would produce fifteen barrels of good porter, of the average London strength, at less than 20s. per barrel, which is little more than 1½d. per pot." The retail price of the porter at which the fifteen barrels are sold amounts to £36.

"Were the art of brewing," continues Mr. Booth, "generally understood, the trade of a public brewer could exist only *upon the earnings of the poor*, for all who could muster a few pounds would brew for themselves."

Mr. Booth further remarks on porter that, "while the character of the London ale is so low as to be unknown beyond the precincts of the Metropolis, that of the porter remains unrivalled. TASTES ARE ACQUIRED BY HABIT; from which cause, when in continued action, we get inured to the *strangest beverage*. The immense capitals and influence of the ten or twelve principal houses defy all competition, and whatever malt liquor they may agree to designate by the name of porter must eventually pass current with the multitude. This is no random assertion." He then states that it is not to be recorded in honour of the chemical arts, but it is nevertheless true, that many of the now indispensable ingredients and manipulations originated in the wish to deceive; hence spirits were once kept in an oak cask until they acquired a brown tinge, to give them the appearance of age. This error is now exploded, and every one *knows* that rum and brandy owe their beauty to artificial infusions. In a similar manner all ale and beer assume a lighter or a deeper dye in proportion to the quantity of malt extract which they contain.

Recipe for making colouring is then given.

For this purpose a quantity of brown sugar, moistened with water, may be put in a frying-pan to about an inch deep. This, then, should be roasted on a fire, and stirred for some time until it ignites spontaneously. The flame, after it has burnt long enough, should be extinguished by a cover, and water added to the pitch-like residue until the whole has the consistence of treacle. This colouring is afterwards to be mixed with the worts in the copper in such quantities as are required.

THE ART OF BREWING.

Practical Instructions.

"The practical instructions for brewing ale and beer, as given by different persons, are by no means uniform. The cause is obvious. The mode of manufacture, and consequently the quality, differ in every age and country; and, even in the same nation, the ale of one district has little resemblance to that of another. The London, Burton, Wiltshire, and Scotch ales, are each remarkably distinguishable; and the instructions which are privately given to young brewers take their tone from the quarter where the instructor has been bred. He who has seen only one of the modes of brewing can have no conception of their number and variety.

Of the Vinous Fermentation.

"From the moment the worts are mixed with the yeast in the fermenting tun, their gravity begins to decrease, and this decrease is termed their 'attenuation' (to reduce in consistence, or make thin). A wort, for instance, of forty pounds per barrel, shall, in a few hours, be reduced to ten by the extrication of carbonic acid, the elements of which must have previously existed in a very condensed state; for, notwithstanding this immense decrease of weight, the quantity or bulk of the liquid undergoes no perceptible alteration. All saccharine liquors, after they have been submitted to the vinous fermentation, are capable of producing a portion of alcohol by the process of distillation, and the quantity which may thus be extracted is found to be exactly proportionate to the degree of attenuation. Thus a barrel of wort that has lost forty pounds of its weight will produce twice the quantity of pure spirit which could be extracted from a barrel of wort that had lost only twenty pounds in the attenuation. This, too, is independent of the original weight of the wort, for the same extent of attenuation (suppose twenty pounds) will produce the same quantity of spirit, whether the original gravity of the wort has been thirty pounds or fifty.

"It was long a matter of contest whether alcohol exists ready formed in fermented liquors, or is produced in the process of distillation. The chemists are now generally satisfied that it is produced by the fermentation alone.

"Art 4.—For Early Hard Ale, or a mode of producing premature acidity in ale. This is nothing more than the artificial introduction of an acid flavour into new ale, to suit particular palates, which flavour must otherwise have been the effect of age: Add to a barrel from one to two gallons of common vinegar—or, rather, of

ale which has acquired a great degree of acid flavour—according to the taste of the consumer whose palate is to be accommodated."

ENTIRE BEER.

From "The Art of Brewing," by D. Booth, we extract the following passages:—"We cannot better explain the nature of the mixtures of *mild* and stale beer than by copying the information, given by a partner of one of the largest brewing firms in London, to the Committee of the House of Commons:—

"Is sour or stale beer used in your vats to your knowledge?—Every publican has two sorts of beer sent to him, and he orders a proportion of each as he wants them. The one is called mild beer, which is beer brewed and sent out exactly as it is brewed; the other is called *entire*, and that beer consists of some brewed expressly for the purpose of keeping; it likewise contains a proportion of returns from publicans; likewise a portion of the beer, the bottoms of vats, the beer that is drawn off from the pipes which convey the beer from one vat to another. Now all these beers united are put into vats; when it becomes bright it is sent out to the publicans for their *Entire* Beer.

"What proportion might the remnants form of the whole 300,000 barrels brewed by you annually?—Our return is about 20,000 barrels a year.

"Is it absolutely necessary that a publican should have some of these remnants, to mix it for the tastes of his customers?—I should think so. It has been the constant practice as long as I have known the trade.

"Is not that *hard* or *stale* beer mixed to give the porter the appearance of age at once, which formerly was allowed to be matured by time?—It must have the effect of making the beer taste older.

"Does the use of stale beer effect a quick sale?—I do not see how the publican could well please his customers unless he had the means of making his beer either stale or mild as they wish for it. The Committee will see that if the brewer had not *this vent for selling his return beer*, the price of beer must be considerably higher if he is to throw this beer away, which amounts altogether to near 20,000 barrels in one house alone."

Of Illegal Ingredients.

Although water, malt, hops, and isinglass are the only materials which can be legally employed in the manufacture of malt liquors brewed for sale, yet, as the prohibitory clause is but of modern date, and many other articles have been wont, from time immemorial, to be added to beer which are not only innoxious but occasionally

advantageous, and are still left to the discretion of the private brewer, we have judged it proper to class them together in the present chapter. In doing so, we shall distribute those which have been most commonly used into five divisions:—

(1.) Such ingredients as are intended to increase the quantity of saccharine matter, or strength of the worts, and consequently to save malt.

(2.) Such ingredients as are intended to increase the quantity of the bitter principle, and consequently to save hops.

(3.) Such ingredients as are intended to prevent the introduction of acidity, or to diminish or destroy that acidity when it is already formed.

(4.) Such ingredients as are intended to add an extraneous flavour to ale or beer, so as to accommodate it to the taste of the inhabitants of any particular district, who have been accustomed to that flavour. And

(5.) Such ingredients as are intended solely for the purpose of increasing the intoxicating quality of ale or beer, and which are, in almost all cases, of too poisonous a nature to be introduced with safety.

On the principal articles in each of these divisions we shall make a few remarks, and then leave their introduction or rejection to the judgment of the brewer.

§ 1. Of ingredients which are intended to increase the quantity of saccharine matter, or strength of the worts, to save malt.

Of all the substitutes for malt, raw grain is the principal—if, indeed, that can be called a substitute which is merely malted in a mash-tub in place of the floor.

Raw sugar or molasses will make very good beer, either alone or mixed with malt-worts.

§ 2. Of ingredients which are intended to increase the quantity of the bitter principle, and in consequence to save hops.

"A few, such as gentian and quassia, are comparatively inactive: some, like aloes and marsh trefoil, are purgative. Hops are astringent and narcotic; broom and some others are diuretics; while many, as opium, cocculus indicus, ignatia amara, tobacco, and nux vomica, are highly poisonous. Yet each of those here mentioned, and others which we have not named, have been boiled among the worts of beer, without regard to their effect on particular constitutions, or to the general safety of the individuals for whom the liquor is brewed."

§ 3. Of ingredients which are intended to prevent the introduction of acidity, or to diminish or destroy that acidity when it is already formed.

Publicans have been accused of putting common salt in the beer, to produce thirst.

"Many brewers mix salt with wheat or bean-flour, putting a handful in each cask

before cleansing, to promote the discharge of the yeast; and occasionally the same mixture of flour and salt, or flour and saltpetre, or salt prunella, is introduced into the tun to rouse a languid fermentation. * * *

"Bruised green copperas, called also salt of steel (sulphate of iron), which has always been put into porter—formerly by the brewer, and now by the publican—is ostensibly for the purpose of giving it a frothy top. It is either used alone or mixed with alum, and is technically called 'heading.' * * *

"This practice, we believe, had been originally intended to keep the beer alive during the time in which it remained in the pot. The green sulphate of iron is greedy of oxygen, and is thereby speedily converted into *brown*. It is in consequence of this dissolved salt of iron that certain porter-drinkers have uniformly asserted that there is a peculiar flavour when drinking out of a tin pot which does not exist when taken from a glass. If this be true, the effects will naturally be referred to galvanic influence."

We now know that malt extract is a mixture of starch and saccharine, and that the former is capable of being deposited by an infusion of nut-galls.

The following directions for the manufacture of beer-finings were published in a highly respectable French work:—

"Take three pounds of powdered nut-galls and four ounces of potash. Boil these for three hours in such a quantity of water as, at the end of that time, will make the weight of the whole mixture about twelve pounds. To this, when cool, add two pints of spirits of wine, and after it has settled and become clear, bottle it up for use. Five ounces of this decoction will be sufficient to fine and preserve half a tierce of beer."

§ 4. Of ingredients which are intended to add an extraneous flavour to the ale or beer.

Coriander seed, caraway seed, long pepper, capsicum. One or all of these foreign seeds are powdered, and boiled among the worts, the quantity being regulated by the degree of pungency required.

§ 5. Of ingredients which are intended solely for the purpose of increasing the intoxicating power of beer or ale.

"Hitherto we have treated of ingredients which though illegal, and, in our opinion, calculated to gratify only an acquired taste; but we have now to speak of articles that deserve no quarter—of such as are disgraceful to the brewer, because dangerous to the drinker.

"Cocculus indicus claims, on account of its *very general* use, the first place in this infernal list. Its importation into this country from the East Indies is very great, considering that few know for what other purpose it is ever used. That cocculus indicus

is a strong narcotic is doubtless, for it is on *that account alone* that it has preserved its place in the brewery. The berries were at one time thrown into the water, and used for the purpose of catching fish, which, by swallowing them, became intoxicated. We believe this practice is now prohibited."

"The extensive use of this ingredient—and we have good reason to believe that it is still used extensively—was proved to a Committee of the House of Commons, &c. &c."

"Opium is another ingredient we have reason to believe is still in use, for we have known seizures of that article in the custody of ale brewers within the last two years."

The following occurs in a practical treatise of Mr. Alexander Morrice :—

Recipe for 150 barrels.—"Use half a barrel of colouring, ¼ cwt. of cream of tartar, ¼ cwt. ground alum, 1 lb. salt of steel, and two barrels of strong finings. Mix well, &c. Your own good sense will show you how, to advantage."

Mr. Morrice enumerates the following articles as those which form part of the stock of a practical brewer :—Malt, hops, honey, sugar, molasses, stick liquorice, Spanish ditto, colouring, cocculus indicus, calamus aromaticus, quassia, gentian, coriander, capsicum, caraway-seeds, grains of paradise, ginger, salt, salt of tartar, beans (malted), oyster-shells, isinglass, and alum.

In a copy of *The Brewer*, published by Loftus, 146, Oxford Street, is an advertisement offering "Hop Powder," at 4s. per pound, one pound of which is there stated to be equal to sixty pounds of hops.

We appeal to our readers to consider, with the evidence before them of the process of manufacture, and of the various additions recommended in works on brewing, together with the changes that take place in the process of fermentation, &c., whether beer can be a nutritious article as is generally supposed.

We have endeavoured, as briefly as possible, to remove the delusion that these drinks afford nutriment to the body. If not, do they impart muscle? From a number of experiments, the following is the result of the examination of several samples of porter, which is falsely considered to be a feeding liquor :—

	Parts per 100.
Heat-giving or fat-forming	4 to 7
Acetic acid	½
Flesh or muscle-forming matter	1/10
Alcohol	5 to 7
Water	85 to 91

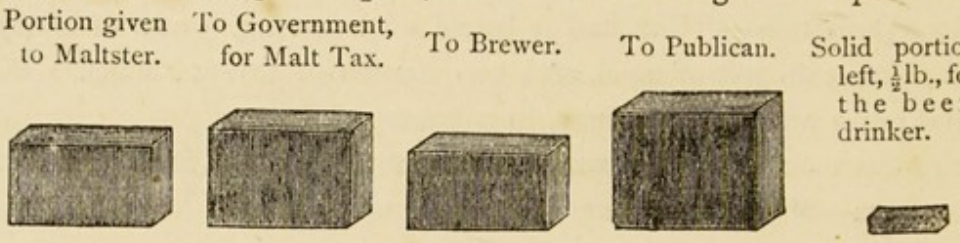
Water is the largest item. The actual value of the solid matter in beer is about equal to that of sugar; so that a man buying beer, buys the solid in it at the rate of four shillings per pound: or it might be put in the following form :—

TWO WAYS OF SPENDING TWO SHILLINGS.

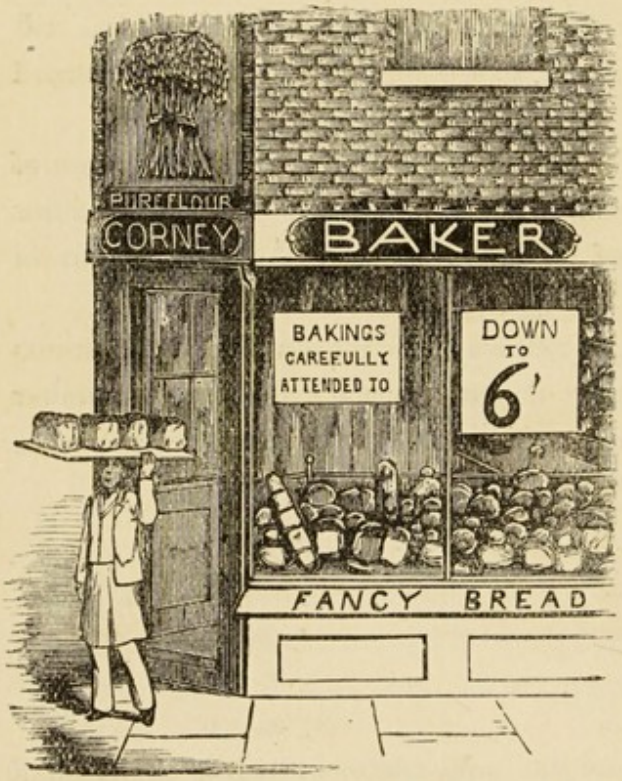
One peck of ground grain, or flour, made into loaves of bread, would weigh 17¼ lbs. ... } 2s.

A gallon of ale, costing ... ... 2s.

would only contain what is equal to ½ lb., the remainder being thus disposed of:—

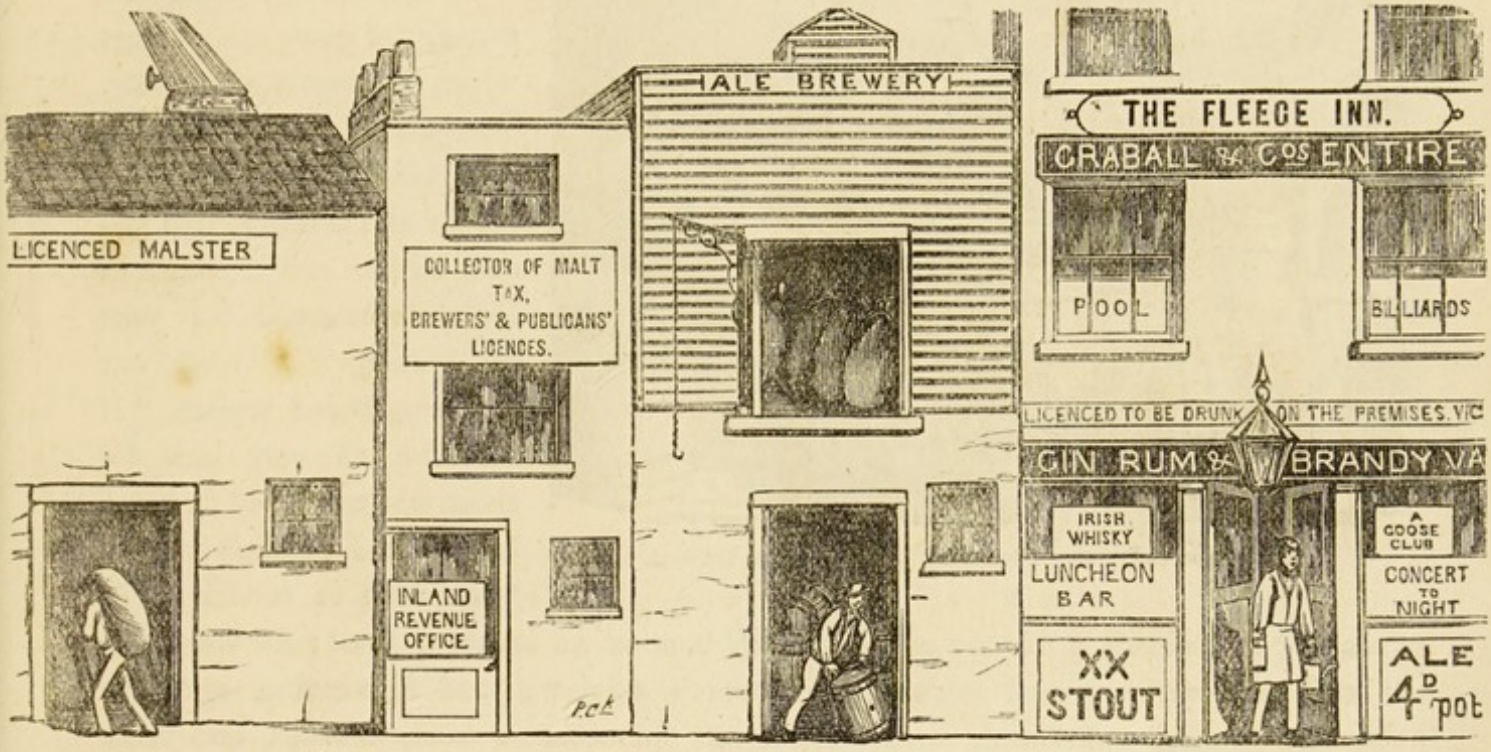


In other words, if you have two shillings to spend, there are two ways of disposing of it. In the one case, you go to the miller and say, "I have two shillings to spend; will you supply me with a peck of flour, weighing fourteen pounds?" You send it to the baker, who is able to make four quartern loaves, weighing 4 lbs. 5 oz. each, out of the peck of flour. He returns to you 17 lbs. 4 oz. of bread. You give him 1 lb. 4 oz., or its equivalent in money, for his trouble, and have left for yourself 16 lbs. of bread.



In the other case, you apply to the publican (we will suppose you do so with an inquiring mind), and you tell him you have two shillings to spend for food, and ask him what he charges for it in the form of ale. He offers you a gallon of ale; you look at it; you compare it with the four quartern loaves you bought the week before. You have a wife and family at home; you do not exactly see how you can give them four good meals from this gallon of ale. You say, "Can you tell me of what this is made?" He replies, "Yes, to be sure; of good malt and hops." "What amount of nutriment does

it contain, it does not seem very solid?" "About half a pound to the gallon. People don't come to me for nutriment. They come for excitement, for company, to read the news, play at skittles, dominoes, and such like." You begin to think of the two shillings' worth of meal you had from the miller, and compare it with the ale offered. You cannot conceive how it is that it costs so much in proportion to the solid matter contained in it, when the publican, wishing to relieve you of your money, if he cannot of your doubts and misgivings, replies, "You must bear in mind it costs a considerable sum to manufacture. It has to undergo a great many changes. It is not like bread. You buy two shillings' worth of flour, and the baker adds a little yeast and water to it, and in a few hours you have it returned in a solid form, ready for use, and no time lost. It is different, however, with beer. After you have purchased the barley it has to be sent to the maltster, who has, in the first place, to erect large buildings to steep it, couch it, and turn it about for nearly three weeks, working seven days per week, instead of six days; after which it has to be dried on a kiln, thus reducing its weight considerably. The

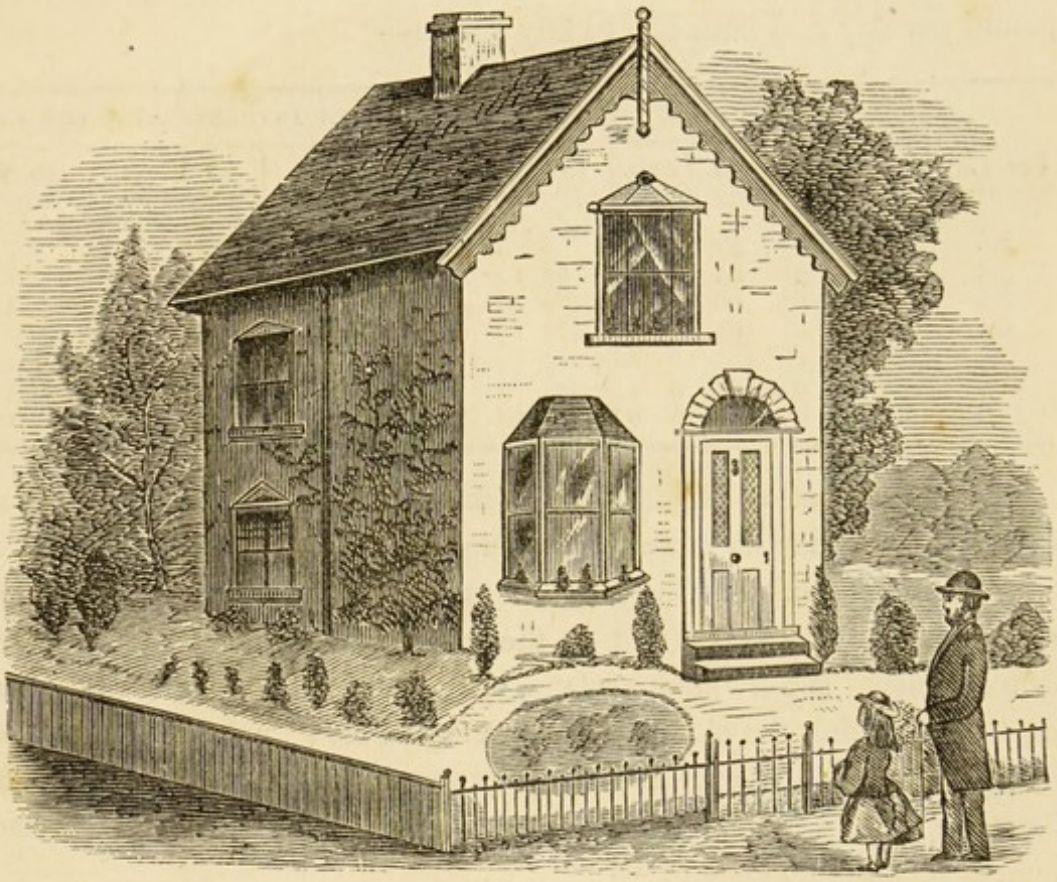


Government, too, say, in effect, that it is not a necessity, but a luxury, which entails upon the inhabitants of the country a large amount of taxes. They consequently place a heavy tax upon it, out of which they have to pay excisemen and other Inland Revenue officers. They feel also that its sale must be restricted within

certain limits; they therefore charge a license to the brewer and publican. The brewer has to erect large buildings, to employ coopers, draymen, to purchase public houses at great cost, and to subscribe heavily to hospitals and other charities, as there are so many accidents arising from the effects of the beer he supplies. And then, look at *my* expenses! I have to provide cellars to store the beer in, rooms to drink in, an attractive barmaid to serve, expensive beer engines to pump, music to attract, policemen to quiet by gratuities, license to pay, gilded sign board and glittering lamps, and several weeks to wait while it is settling and fining, and many other things which I cannot enumerate. Surely you cannot wonder, with all these charges for labour and taxation, that you only obtain half a pound of the raw material for your two shillings!" "Well," our inquiring friend replies, "It may be all very well for those who can afford it, but I believe in Franklin's maxim, 'nutriment is contained in solids, not in fluids.' I cannot afford to buy beer as an article of food; for what with the maltster's steeping and sifting, the brewer's straining and fermenting, and the publican's storing and fining, it appears to me the solid is nearly all lost, and there is but little left but alcohol and water." Even supposing we allow the water in the scale, the result is against the beer. The solid in the bread weighs even twice as much as the gallon of ale with eight pounds of water in it, and without the water more than thirty times as much. "It reminds me very much of the proverb, too often true—'The lawyer gets the oyster, and his client the shells.'"

"All I have left; and even they belong to the brewer."

To add to the comforts of the family and for obvious social considerations it is important that nutritious food or some substantial and useful articles should be the object of purchase, rather than that of alcoholic fluids. The former conduces to health, comfort, and provident habits; whilst the latter, on the contrary, simply gratifies a morbid taste, engendering disease, depravity, and destitution, leaving nothing substantial behind. Suppose, for instance, one man spends sixpence per day for beer, or £9 2s. per year, for ten years. In that time he has drunk say twenty-seven barrels of beer, and he has nothing left but the barrels, which, by-the-by, he has to send back to the brewer. Whilst, on the other hand, another man invests the sixpence per day in the purchase of a house. With this, in addition to the amount he would otherwise pay for rent, he can purchase a neat and commodious freehold cottage for himself and family, with five good rooms in it, and good garden, &c., and after the ten years have no more rent to pay during the remainder of his life.



"A freehold house—this is what I have left, and no more rent to pay."

There is a man residing near the writer who took the advice offered by the latter's respected father thirty years since. He urged him, instead of spending his sixpence per day at the public-house, to invest it, and become his own landlord. He is now in possession of three good houses of his own and £100 in the savings bank, while many of his neighbours, who still continued to spend their sixpence per day on drink, have

either died prematurely, or in their old age are in the union workhouse or in receipt of parochial relief, instead of occupying houses of their own. It may fairly be asked, even in this respect, Which are best, "solids or fluids?"

The wasteful expenditure incurred by the purchase of intoxicating drinks may be seen by the following table, showing the cost of intoxicating liquors from twopence to one pound per day and from one to fifty years:—

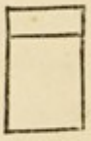
	Without Interest.						With Interest at 5 per Cent.											
Per Day.	Per Year.			In 10 Years.			10 Years.			20 Years.			30 Years.			40 Years.			50 Years.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
2d.	3	0	10	30	8	4	38	5	2	100	11	6	202	1	8	367	8	8	636	15	4
3d.	4	11	3	45	12	6	57	10	4	150	17	3	303	2	6	551	3	0	955	3	0
4d.	6	1	8	60	16	8	76	10	4	200	3	0	404	3	4	734	17	3	1,273	10	8
6d.	9	2	6	91	5	0	114	15	6	301	14	6	606	5	1	1,102	5	11	1,910	6	0
1s.	18	5	0	182	10	0	229	10	11	603	9	1	1,212	10	2	2,204	11	1	3,820	12	0
10s.	182	10	0	1,825	0	0	2,245	9	3	6,034	10	9	12,125	1	8	22,045	19	2	38,206	0	2
20s.	365	0	0	3,650	0	0	4,590	18	7	12,069	1	6	24,250	3	6	44,091	18	4	76,412	0	5

Or if invested in life assurance 6d. per day would secure to a person under 30 years of age a life policy for more than £400.

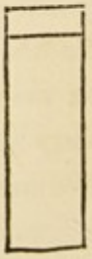
A false idea exists in the minds of many persons; they fully believe that they are not spirit-drinkers if they are not in the habit of drinking gin, rum, or brandy. "I never drink spirits!" is a frequent exclamation; "I only take a glass of wine now and then;" or, "I only drink the old English beverage, beer;" not being conscious of the fact that wine and beer each contain a large proportion of alcohol. The following diagram will illustrate this fact in a concise form, the quantities shown below each containing two ounces of absolute alcohol:—

¼ pt. of rum or brandy contains 2 ozs. alcohol,
or one-half of the whole.

½ pt. of sherry or port contains 2 ozs. alcohol,
or one-fifth of the whole.



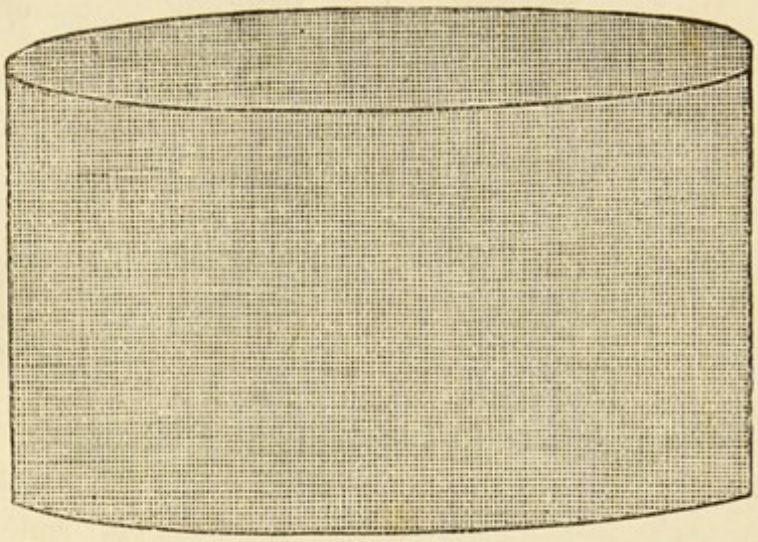
1 pt. of strong ale contains 2 ozs. alcohol,
or one-tenth of the whole.



Two pints of London porter or ale generally sold at 2d. per pint contains 2 ozs. alc
So that a person who drinks two pints of porter, a pint of strong ale, or half a pint of

port or sherry wine, drinks an equal quantity, viz., two ounces of absolute alcohol, or a quarter of a pint of proof spirits. This fact is illustrated by the following representations of the quantities of alcohol drunk and barley destroyed to produce it, exhibited in the Bethnal Green Museum.

2½ gallons of alcohol, the average quantity consumed yearly by each person in England in the form of beer and spirits.



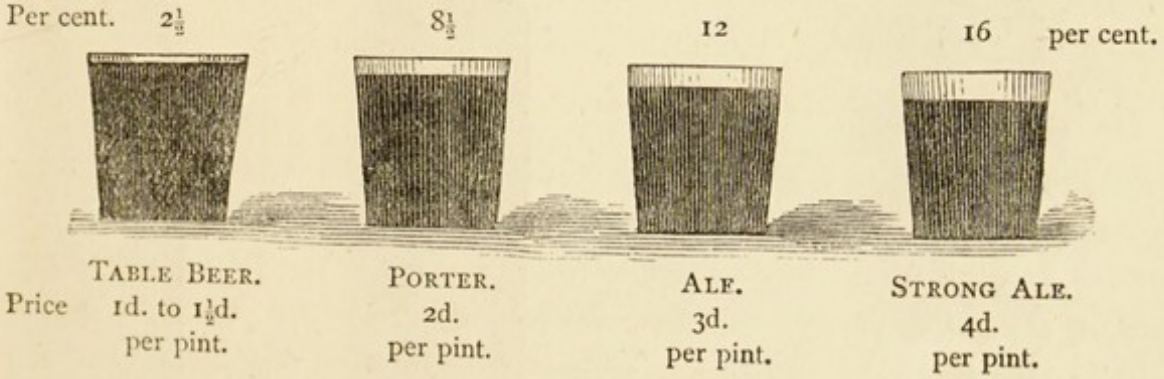
Amount of barley, 2½ bushels, destroyed in producing the yearly average consumption by each person in England.

That amount would feed a full-grown man for sixty days.

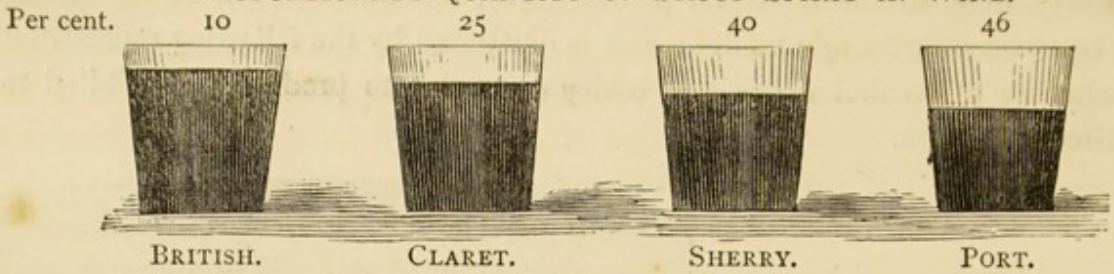
Although the whole of the alcohol drank each year in this country is not produced from barley, other liquors containing it are made by an equal waste of nutritious food.

We have stated that the chief object of the brewer and publican is to make, not a nutritious, but an alcoholic—*i.e.*, spirituous and intoxicating—liquor. It will be noticed, as one proof of this, by reference to the following diagram, that the price for which these articles are sold depends very largely upon the quantity of alcohol or proof spirit they contain, proof spirit being equal in strength to half the quantity of alcohol.

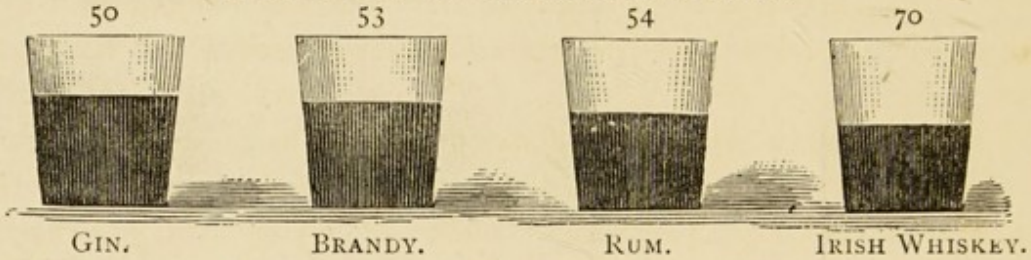
PROPORTIONATE QUANTITY OF PROOF SPIRIT IN EACH KIND OF BEER SHOWN BY THE WHITE DIVISION AT TOP OF GLASS.



PROPORTIONATE QUANTITY OF PROOF SPIRIT IN WINE.



PROPORTION OF ALCOHOL IN SPIRITS.

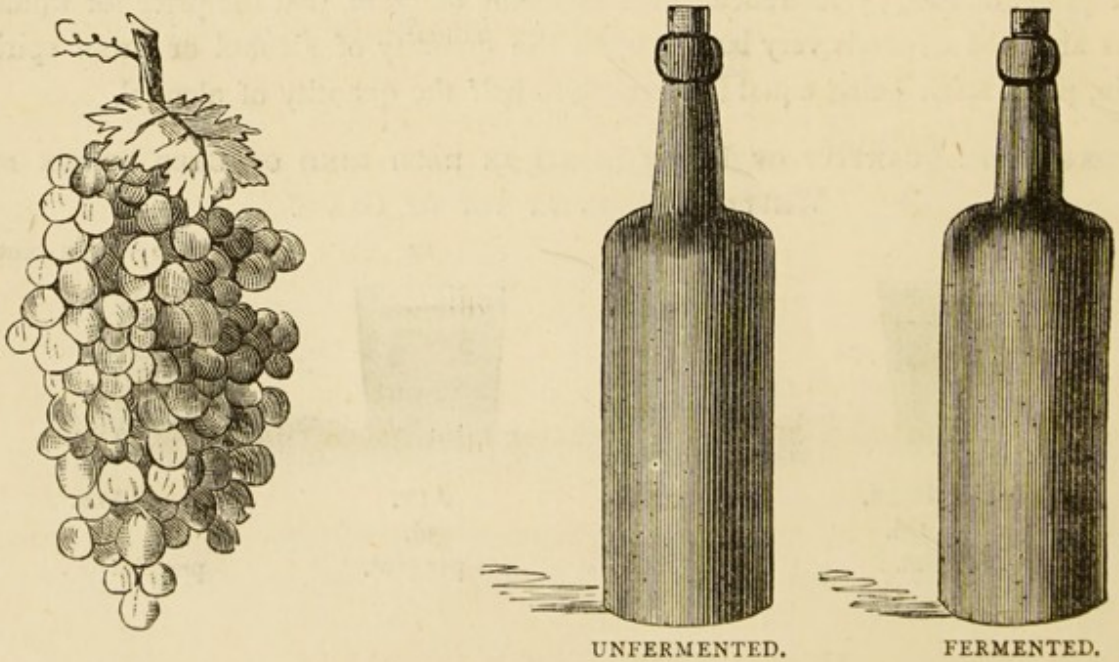


As each gallon of proof spirit is charged ten shillings duty, the price is very much greater than for the same quantity of spirit contained in beer. As to wine, we quote from the Inland Revenue returns for the year ending 31st March, 1875 :—

	Gallons.		Duty.
Wine containing less than 26 degrees of proof spirit ...	5,674,199	...	£284,037
,, ,, 26 ,, and less than 42 deg.	11,486,036	...	1,435,418
,, ,, 42 ,, or more	14,838	...	2,100

Showing that the 1st pays a duty of about 1s. per gallon.
,, 2nd ,, 2s. 6d. ,,
,, 3rd ,, 2s. 10d. ,,

With regard to wine, if made of pure grape juice, it must be obvious that all the



nutriment contained in the wine must first be in the grapes of which it is manufactured. A bunch of grapes weighing one pound and a half, costing sixpence to ninepence, is made into a pint and a half bottle of wine, and sold frequently for five shillings, or six shillings and sixpence; whilst at the same time the actual grape juice or fruit essence, unfermented, is sold by Mr. F. Wright, of Kensington, at one-fourth the price.

It will be seen, that while there is a loss of nutriment in the conversion of the sugar of the grape into the alcohol of the wine, a very large amount is paid for the manufacture. True it is that a large quantity of brandy is added to suit the English taste, for the English will not drink the "light wines," as they are called, not being sufficiently intoxicating.

A quart of sherry wine will contain about 30 ozs. water, 8 ozs. alcohol, and $1\frac{1}{4}$ oz. sediment; therefore the solid in a pint of wine is paid for at the rate of more than forty shillings per pound—a very expensive method of buying food, and that, too, of a doubtful quality. We will notice the changes that take place in the process of manufacture, and it will be seen how little of the fruit of the vine is left :—

The Component Parts of the Fruit of the Vine unfermented :—	The Component Parts of the Alcoholic Liquor into which the Fruit of the Vine is changed by Fermentation :—
GLUTEN, GUM, AROMA	*alcohol.*, *acetic Acid.*, *ænanthic Ether.*, *extractive.*, *bouquet.*
ALBUMEN	A–*lbumen.*
SUGAR	S–*ugar.*
TANNIN	TA–*nnin.*
TARTARIC ACID	TARTAR–*ic acid.*
MALIC ACID	MALIC ACI–*d.*
POTASH	PO–*tash.*
LIME	LI–*me.*
SULPHUR	SUL–*phur.*
PHOSPHORUS	PHOSP–*horus.*

Explanation.—The reader will observe at the top of the table on the left hand, in capitals, the names of three constituents—gluten, gum, and aroma—which do not appear in the right-hand table. These are the constituents of the grape, which are wholly destroyed by fermentation. At the top of the right-hand table will be seen, in italics, five

constituents—alcohol, acetic acid, œnanthic ether, extractive, and bouquet—which are not constituents of the grape, and do not appear in the left table. These are entirely new products, generated at the expense of the three constituents of the left-hand table, which have been destroyed by fermentation.

Other constituents appear in both tables. The introduction of the italic letters in the right-hand table, in place of the capital letters in the left-hand table, is intended to indicate that the proportions of the constituents in which they occur have been materially diminished in the transformation of grape-juice into alcoholic liquor, only those proportions being reserved which are indicated by the capital letters.

Thus it will be seen that by a triple process of destruction, addition, and abstraction—the result of fermentation—grape-juice loses all the essential qualities of "the fruit of the vine." It should be specially noted that, in parting with its gluten and gum, and with nearly the whole of its sugar and albumen, the nutritive and life-sustaining qualities of the fluid are destroyed, for it is to these constituents that grapes owe their value as human food.

"Thus it is demonstrated that alcoholic wine is not the 'fruit of the vine.'"

Alcohol does not exist ready formed in the grape. The saccharine portion of must, or grape-juice, resides in the cells of the grapes; the fermentable matter lodges in the membranes which separate the cells. Fermentation, in reality, cannot take place until the fruit is dispossessed of its vitality. The wine-press, however, amalgamates the whole, and the sugar of the wine, by fermentation, is changed into spirit. The grapes are carefully collected, and, as soon as convenient, pressed to force out the juice. Machines made of wood are used, or, in places where from custom or cost none are to be found, men with wooden shoes trample the fruit in large tubs. The juice, when separated from the seeds and husks, is placed aside. In this way all the light-coloured wines are made. Dark or red wines are left for some time on the husks, from which the colour is produced. Dr. Druitt, a writer on wines, was sitting one day at dinner next an archbishop from the Cape, and on asking him the reason of the earthy taste in Cape wine, got the reply, "My dear sir, if you ever were at the Cape, and were to see the black fellows and their families in the vineyard at the vintage season, and how they make the wine, you would think *earthy* a very mild term indeed to be applied to it."

The fictitious preparation of wines have been thus characterised in an old song:—

"One glass of wine I got by chance,
'Twas claret when it was in France,
But now from it much wider;
I think a man might make as good
With green crabs boiled with Brazil wood,
And half a pint of cider."

The *Mechanics' Magazine* gives the following analysis of a bottle of so-called port wine, by a celebrated analyst :—

Spirits of wine or alcohol	3	ounces.
Cider	14	,,
Sugar	1½	,,
Alum	2	scruples.
Tartaric acid	1	,,
Decoction of logwood	4	ounces.

RECIPE FOR PORT WINE.—No. 2, IN WOOD.

Port wine	8	gallons.
Brandy	6	,,
Sloe juice	4	,,
Strong rough cider	45	,,

Mixed according to art, the above might be sold for fine "old crusted port." The "crust," however, would have to be put on the bottle before the wine went into it; and this can be done so cleverly that the deposit on the sides of the bottle may appear as though it had taken years to form, during which time the fine odour and flavour peculiar to a ripe wine had been developed. Crusting, according to an eminent authority, can be accomplished by means of the very substance which forms the natural "crust;" and this is cream of tartar. In the early stages of wine-making a portion of this substance separates out, and is collected and sold for various purposes. It is ground into a powder, mixed with water and gum, and smeared on the sides of the bottles, and by this means an artificial crust is formed. Sherry can be made from almost any inferior light wine.

We are not surprised at the various recipes for making port wine, seeing, by the Custom House returns, that for many years the quantity of so-called port wine drank in this country always largely exceeds the whole of the port wine shipped from Oporto to all parts of the world. This fact speaks for itself, and we commend it to port wine drinkers.

Mr. H. Williams Jones, F.R.M.S., writing upon wines, states :—

"Leaving the alcohol in wines, which can only render them stimulating and injurious, let us notice the solid matter, which alone can render them nutritious. The following table will show the proportion of solids in various specimens. The figures in brackets give the quantity of sugar included in the solid matter :—

	Total solid matter.	Parts per 100.
Fine old port	$5\frac{3}{4}$	
New port	$6\frac{3}{4}$	
Public-house port	$5\frac{1}{4}$	
Old sherry	$2\frac{1}{2}$	
Public-house sherry	$4\frac{1}{2}$	
Lachryma Christi	$23\frac{1}{2}$	(sugar 19 parts).
Visanto	$23\frac{3}{4}$	(sugar 22 parts).
St. Elie	$2\frac{1}{4}$	
Red Mont Hymet	$3\frac{1}{4}$	
White Capri	2	
St. Georger	$20\frac{1}{2}$	(sugar $17\frac{1}{2}$).
White Diasi	3	
Champagne	$12\frac{1}{2}$	(sugar $10\frac{1}{2}$).
Common claret	5	
Good claret	$2\frac{1}{4}$	
Hock (16s. per doz.) ...	$2\frac{1}{4}$	

"From the above it will be seen that the solid matter in most wines is small, and that, where a tolerable quantity is present, it consists principally of sugar. The solids not sugar, considered as foods, are almost worthless. Half a pint of what is considered the best wine in the market would not contain fifty *grains* of flesh-forming matter. Wines, therefore, are not nutritious; or, at most, are only equal in nutritive value to water with sugar in it. The odour given out by a glass of wine, termed *bouquet*, is formed by keeping in casks or bottles. As the wine becomes ripe, the odour is produced. In all wines we have alcohol, and the acid of vinegar—acetic acid—and, after a time, these two bodies unite and form a third, which is no longer like alcohol or acid. It has different properties from both, and, among others, a very powerful odour. Extremely small quantities of this compound and other similar substances (for the odour is due to many other bodies), dissolved in the wine, give the bouquet. As yet we have only considered genuine wine, or such wine mixed with alcohol. In certain Swiss and German papers, advertisements may be seen offering information how to make wine without grapes. A considerable quantity of *made-up* wine is imported as genuine. There is no need for this importation, however. The English wine-doctors are as clever as their foreign brethren, and can make wine, 'genuine as imported,' to any extent. It was known twenty years ago that we *imported* 20,000 pipes of port, and *consumed* 60,000. Everybody acquainted with the wine trade knows that 'port' is made-up stuff."

"Spécialité sherry, so largely puffed by advertisement, is stated to be quite free from any substance foreign to the grape. It contains, however, too little solid matter to be nutritious, and enough alcohol to render it a dangerous beverage. Tent wine, described on certain labels as 'an *unfermented*, sweet, luscious wine, of fine flavour,' might as well be described as fermented, since it contains alcohol stated to be 'necessary for its preservation.' This and Malaga wine are chiefly used for Sacramental purposes. They are noticed here because the labels tend to mislead; and, fermented or not, they are decidedly alcoholic. A long account of articles used in making up wine might be written. To impart colour red beetroot, Brazil wood, juice of elder-berries and bilberries, logwood, and other substances, are used. Oak sawdust, alum, and certain vegetable extracts, give a rough flavour. Orris-root, sweet-briar, orange-flower water, and special essences, impart bouquet. How often these things are used we cannot know; the dark cellars of wine merchants must keep their secrets. It is certain that wine-doctoring is carried on to a considerable extent, and that a large quantity of made-up wine is drunk as genuine.

"British wines, as elderberry, cowslip, orange, and coltsfoot, contain from eight to fourteen parts of alcohol in the hundred. Cider and perry contain from five to nine per cent. A sample of ginger wine, bearing a label, 'Walker and Walton's Ginger,' was found by the writer to have the following composition:—

Saccharine matter	140·4
Alcohol	59·7
Acetic acid	4·9
Mineral matter	2·9
Water	792·1
Total	1,000·0

The cost of this wine is one shilling and a penny, and contained twenty-five ounces. Four bottles would contain fourteen ounces of sugar and six ounces of alcohol. The value of the alcohol as a food, is nothing; the mineral matter and acetic acid, nothing; and the sugar very little. Considering the actual return for our money spent on four bottles, we get fourteen ounces of sugar at fourpence a pound, which is equal to—including the ginger flavour—say fourpence. The cost of the wine would therefore be exactly four shillings in excess of its nutritive value."

"If wine," says Dr. E. Johnson, "be productive of good, what is the nature and kind of that good? Does it nourish the body? It does not, for the life of no animal can be supported by it. Besides, it is evident from the nature, manner, and mechanism

of nutrition, that to be capable of nourishing, it must be susceptible of conversion into the solid matter of the body itself. But fluids are not capable of being transmitted into solids, but pass off by the kidneys, as everybody knows. If, indeed, the fluid contained solids suspended in it, then these solids can be assimilated to the body and so nourish it, as in broths, barley water, &c. But the fluid in which these solids were suspended must pass out of the body. If, then, wine contains some nourishment, it must depend on the solid particles suspended in it. Now, if you evaporate a glass of wine on a shallow plate, whatever solid matter it contains will be left dry upon the plate, and this will amount to about as much as may be laid on the extreme point of a penknife blade, and a portion, by no means all, of this solid matter is capable of nourishing the body, a portion about equal to one-third of the flour in a single grain of wheat! If you really drink wine for the sake of the nourishment it affords, why not eat a grain of wheat instead of drinking a glass of wine, from which grain you would derive thrice as much nourishment? Why go this expensive roundabout way to obtain so minute a portion of nutritious matter, which you might so much more readily obtain by other means? Wine, therefore, has no power to nourish the body, or, in so minute a degree as to make it wholly unworthy of notice."* Stimulants are not, in the strict sense of the word, nutritives. The popular notion that stimulants are capable of adding to the strength of the human frame has already been shown to be completely fallacious. A principal cause of this belief may be found in the erroneous ideas entertained relative to the terms stimulation and strength. A few words will suffice to explain the nature of animal stimulation. The body is endowed with certain actions and powers, which are uniformly regulated by fixed and unerring laws, the inherent capacity of which will, of course, more or less, differ in all individuals. To propel or excite these actions beyond the natural velocity which they are capable of exercising constitutes stimulation. Every unnatural excitation, however, of the animal powers is invariably followed by physical depression, corresponding with, and equal to, the unnatural exciting force which has been applied. Hence it is evident that stimulation does not impart strength; it simply urges and forces the animal powers to increased velocity, exactly as the application of the whip or the spur increases the speed of a horse. As the laws of the physical system are defined and fixed, a corresponding diminution of capacity is the necessary consequence of this extraordinary outlay of power, which is, in fact, a real waste of animal strength.

If wine is but slightly nutritive, spirits are less so. It is generally admitted that spirits are not nutritives; that if placed upon a plate and evaporated nothing would be left except a slight stain or mark. Spirits are generally produced from grain or sugar after

* See "Life, Health, and Disease," p. 268.

fermentation. The word *still* is derived from the Latin word *stillare*, to drop, because the liquor results from this process : it rises in vapour, this vapour condenses, and drops into the receiver. See the retort, in which the spirit is being distilled from the beer (page 15).

Gin is produced generally from malted barley and coarse rye, with the addition of juniper-berries.

Rum, by fermenting sugar or molasses, commonly called treacle.

Whiskey from malt ; is kiln dried with peat or turf, which imparts the smoky flavour to the spirit.

Brandy, by the distillation of wine, or its lees, or the husks of the grape from the wine presses. The colour is produced by the addition of burnt sugar.

It will be seen, therefore, that spirit, or alcohol unmixed and uncoloured, is simply a vapour condensed, containing no nutritive or solid matter ; not a food, but a poison.

As it contains no nutritive or solid matter, it cannot be in itself nutritive.

The mixture rum and milk, considered to be so strengthening, contains, according to the experiments of Dr. Smith and others, "no more nutritive value *than the milk alone.*"

The popular idea that such drinks are nutritious having been proved a delusion, we next proceed to show that instead of their being beneficial, they are positively injurious to health, that they are the actual cause of many diseases, and that their habitual use tends to shorten life. We do not propose to refer on general terms to the evil effects of these drinks upon the inhabitants of foreign nations ; of their destructive influences upon the American Indians, South Sea Islanders, natives of Africa, India, or the aboriginal tribes of Australia and elsewhere ; of their terrible influences at some of our mission stations, not only upon the morals, but upon the lives of those who have had kindled within them a raging passion for "these deadly fire-waters." We might fill a volume with evidence of this kind ; but we propose to give illustrations nearer home.

In December, 1840, the Temperance Provident Institution was established in London, for insuring the lives of total abstainers only, and in 1849 the directors reported that up to that date 135 deaths might have occurred according to the lowest average calculation, and 219 according to the highest, but that the actual deaths had been 73. In 1850, an important change was effected by admitting non-abstainers (respectable moderate drinkers) into a distinct section, placing in a corresponding section abstainers only. All the other conditions have since remained equal ; and as the profits of each section are determined by the rates of mortality, the comparative bonuses declared to the members insured in each section, on corresponding sums, furnish a clear indication of the comparative health and longevity of the respective sections. *How, then, stands the case between these two*

sections? Since 1850, five bonuses have been declared, with the following averages on the payments made :—

1855—In Temperance Section, from	35	to	73	°/₀	..	General or Moderate Drinkers' Section,	25	to	50	°/₀
1860 „	„	„	35	to	86	„ ...	„	„	„	26	to	59	„
1865 „	„	„	24	to	56	„ ...	„	„	„	17	to	52	„
1870 „	„	„	34	to	84	„ ...	„	„	„	20	to	49	„
1875 „	„	„	35	to	114	„ ...	„	„	„	20	to	64	„

This comparison is made, be it remembered, between large numbers; for, on the 31st of December, 1874, the whole life policies in the Temperance Section was 9,539, and in the General Section, 15,838; so that the advantage arising from superior numbers would lie with the members of the General Section.

Another form of exhibiting the comparative results is presented by the table subjoined, which none can fail to understand :—

	Temp. Section Claims.		Gen. Section Claims.	
	Expected.	Actual.	Expected.	Actual.
1866 ...	100	80	180	186
1867 ...	105	71	191	169
1868 ...	109	95	202	179
1869 ...	115	73	212	201
1870 ...	120	87	223	209
1871 ...	127	73	234	217
1872 ...	137	90	244	232
1873 ...	144	118	253	240
1874 ...	153	110	263	288
Total.....	1,110	797	2,002	1,971

1. In the Temperance Section during a period of nine years, the actual deaths were 313 less than the expected number—*i.e.*, out of every 100 expected to die only 72 died.

2. In the General Section, the actual deaths were only 31 short of the expected, and in three years out of the nine the actual exceeded the expected deaths. Consequently, the Temperance Section shows a superiority of 26½ per cent. on the whole nine years.

3. This difference may be made more striking still by a process of comparison. If the Temperance Section had been as the General, instead of the actual deaths being 797 they would have been 1,094, an increase of 297 deaths. But had the General Section been as the Temperance, instead of the actual deaths being 1,971, they would have been only 1,442. Thus 529 lives would have been saved. If, however, the death-rate of the General Section had obtained in each section, the number of deaths would have been 3,065—an excess of 826.

Below will be found a Statement of the Expected and Actual Claims amongst the Whole Term Policies for the last five years.

MORTALITY, 1871—75.

	TEMPERANCE.				GENERAL.			
	EXPECTED.		ACTUAL.		EXPECTED.		ACTUAL.	
	No.	Amounts.	No.	Amounts.	No.	Amounts.	No.	Amounts.
1871	127	£24,051	72	£13,065	233	£46,105	217	£40,158
1872	137	26,058	90	13,005	244	48,883	282	150,575
1873	144	28,052	118	22,860	253	51,463	246	49,840
1874	153	29,648	110	24,683	263	54,092	288	57,006
1875	162	32,010	121	24,160	273	56,907	297	57,483
5 Years.	723	£139,819	511	£97,773	1,266	£257,450	1,330	£255,062

In Department 1, Whole Life Policies in the Temperance Section, the Reversionary Bonus will range, according to the age of the Assured, from 35 to 114 per cent. on the amount of Premiums received since 1870.

In Department 9, Whole Life Policies in the General Section, the Reversionary Bonus will range from 20 to 64 per cent.

The following Table contains examples of the Bonus Additions on ordinary Whole Life Policies for £1,000 in the Temperance and the General Sections for the past five years :—

Date of Policy.	Age at Entrance.	Premiums Paid, 1871—1875.			Bonus added to each £1,000 in Temperance Section. (Dep. 1.)			Bonus added to each £1,000 in General Section. (Dep. 9.)		
		£	s.	d.	£	s.	d.	£	s.	d.
1871	15	83	2	6	76	14	0	43	10	0
Do.	20	93	6	8	80	16	0	46	1	0
Do.	25	106	9	2	85	16	0	48	17	0
Do.	30	122	1	8	90	8	0	51	9	0
Do.	35	138	19	2	94	18	0	54	1	0
Do.	40	162	5	10	100	12	0	57	3	0
Do.	45	188	10	10	107	10	0	61	0	0
Do.	50	226	5	0	118	3	0	67	6	0
Do.	55	284	3	4	136	10	0	77	10	0

At the Annual Meeting, a question was asked by one of the members: "How is this, that the bonus is so large in the Temperance Section as compared to that of the General Section?" The following reply of Mr. Hardy, the Actuary, was plain and straightforward:—"The bonus is a matter of fact. I cannot help people dying. *Those who don't drink don't die so fast.*" It would be well if this sentence had a prominent place in large type accompanied with the above tables on the walls of our literary institutions, museums, public educational institutes, and British association meetings—*Those who don't drink don't die so fast.* Another company announce in bold type that

"TOTAL ABSTAINERS ARE ASSURED IN A DISTINCT SECTION, TO SECURE TO THEM THE FULL BENEFITS OF THE GREATER LONGEVITY TO WHICH THEIR PRINCIPLES CONTRIBUTE."

Another company also charges total abstainers a reduced premium, and in their prospectus it is broadly stated "that the wisdom of this step is clearly becoming more apparent, the experiment having proved greatly in favour of abstainers."

"The *Commercial World*, a London paper, in commenting upon the report of an Assurance Company taking Temperance lives as a distinct branch of their business, remarks:—"The lesson they teach appears to be that more life, at least, greater length of days, is to be got out of abstinence from alcoholic stimulants (other things being equal, which is here assumed) than out of their moderate use. For it must be borne in mind that the comparison is between the results of abstinence, on the one hand, and the moderate use on the other. The excessive use is not in question. Life, in the objective sense, consists of a bundle or aggregate of habits; and these statistics, as it seems to us, prove, as nearly as may be to demonstration, that the non-use of alcoholic liquors (and the mode of living commonly associated therewith) is, in an aggregate of cases, most favourable to longevity.

Nor is this to be wondered at, when we find Sir James Paget, in his recently-published chemical lectures, saying:—"Be rather afraid of operating on those, of whatever class, who think they need stimulants before they work, who cannot dine till after wine and bitters, who always have sherry on the sideboard, or are always sipping brandy and water, or are rather proud that because they can eat so little they must often take some wine."

Many persons, who pass for highly respectable people, and who mean no harm, are thus daily damaging their health, and making themselves unfit to bear any of the storms of life.

In the *Assurance Age*, under the head of "Intemperance *v.* Life Insurance," Dr. Homer O. Hitchcock, President of the Michigan State Board of Health, read a

paper before the Sanitary Convention at Baltimore, setting forth the evils resulting from alcoholic drinks. Among other things, he said :—"Drunkards are the earliest victims of epidemics. In Warsaw, ninety per cent. of deaths from cholera were of persons addicted to the habitual use of intoxicating drinks. Six-tenths of the insanity in England is attributed to alcohol. The vital statistics of most of the United States show a mortality of seven to sixteen per cent. traceable to this source. In New York fifty-six dollars a year for each inhabitant is spent for alcoholic drinks. This sin does not inflict half the harm upon him who sins as upon the inheritors of his blood. Life is shortened twenty-eight per cent. by its use, diminishing the average duration of the lives of those who use it sixteen to eighteen years. What do the 49,000 deaths annually caused by alcohol cost the nation? The average cost of burial cannot be less than ten dollars per caput, giving the sum of 490,000 dollars. These 49,000 persons should have had, according to a table of working years (calculated from life tables by Edward Jarvis, and published in the Fifth Annual Report of the Massachusetts State Board of Health), 37·46 years of effective life. From the best data obtainable, we have been led to conclude that alcohol shortens the lives of those who use it habitually or excessively twenty-eight per cent. As this per centage pertains to the whole life, including both the developing and the effective periods, it follows that these 49,000 persons have each lost to the nation twenty-eight per cent. of 37·46 years, or 16·08 years of effective life, giving a total of 784,000 years. These figures are much below the actual loss, according to the expectancies of intemperate persons given above; for, according to those expectancies, the average loss of effective life is twenty-three years, within a small fraction. On this basis, the annual loss of the nation of effective life from alcohol is 1,127,000 years. If each effective year of life is valued at 150 dollars, the nation loses on the first calculation 117,600,000 dollars, and on the second 169,050,000 dollars. English actuaries, from careful observation and calculations, estimate that for every death there are two persons constantly sick. We may, therefore, calculate that for these 49,000 deaths from alcohol, there are 98,000 constantly sick from the same cause. Thus, in a single year, 98,000 years of effective life are lost to the State, which, valued at 150 dollars per year, gives a loss of 14,700,000 dollars. The cost of this sickness, at the very lowest estimate, cannot be less than 150 dollars per year, or a total of 14,700,000 dollars."

We call attention to the fact that Assurance Companies are so convinced by experience of the great risk of assuring the lives of those who retail alcoholic drinks, that it is the practice of many to decline any proposal from this class. Other companies charge an extra rate, varying from ten shillings and sixpence to twenty-five shillings per cent. per annum on the premium, according to the circumstances, whether wholly or partially engaged in

the trade. Thus, if the usual premium to assure the life of a person, say at thirty years of age, is £2 10s. for £100, the premium required to assure a publican would be from £3 1s. 6d. to £3 15s., or, in other words, the same premium that would assure the life of a farmer, builder, or other tradesman for £100, would only assure the publican for £65 to £70. We extract the following from the *Insurance Guide.* "The mortality of the inn and beershop keepers is in excess of the mortality of all other classes. Thus, for instance, during the year, at a given age—

Out of every	1,000 farmers	12	died.
,,	1,000 shoemakers	15	,,
,,	1,000 weavers	15	,,
,,	1,000 blacksmiths	16	,,
,,	1,000 tailors and carpenters ...	17	,,
,,	1,000 miners	20	,,
,,	1,000 bakers	21	,,
,,	1,000 butchers	23	,,
,,	1,000 inn and beershop keepers...	28	,,

The general mortality, at the same age, among the whole population of England being eighteen per 1,000."

An actuary writes: "We have had eleven deaths from delirium tremens—men who were only moderate drinkers when they were assured, and whose average expectancy was thirty-two years; but their average duration of life was only seven years and two months from the time they were assured. The per centage on total mortality, eighty-four."

Dr. RICHARDSON, F.R.S., in his lecture at the Society of Arts, January 21st, 1876, on "Unhealthy Trades," gives the following result, in which the mortality of all males in England, in stages of ten years' duration, extending from fifteen to seventy-five years, is shown, reduced to 100 as a standard at each stage, as compared with those of publicans:—

Deaths of Males, aged fifteen years and upwards, and at seven groups of ages, in the years 1861, 1862, and 1871, engaged as Publicans, to 100 deaths of Males of all occupations at the same ages during the corresponding period:—

Occupation	All Ages.	15	25	35	45	55	65	75
All Males in England aged 15 years and upwards	100	100	100	100	100	100	100	100
Publicans	138	129	147	157	154	134	112	131

From this table we learn that whilst at age twenty-five of a given number of the male population of England 100 died, from the same number of publicans 147 died; or at age thirty-five 157 publicans died.

About twenty years since, on hearing a statement made that the mortality amongst publicans was very great, as compared to that of other trades, in order to test the accuracy of the assertion, notes were taken of the respective occupiers of the ten nearest public-houses within a radius of one mile from my then residence; and the result furnished overwhelming evidence of the truth of the above statement. It was as follows:—No. 1, landlord dead, his widow the landlady; No. 2, ditto; No. 3, ditto; No. 4, first landlord dead, widow married again; No. 5, landlord dead, son keeping the house (since dead); No. 6, a widow landlady; No. 7, ditto; No. 8, ditto; No. 9, the widow of the former landlord married again, her second husband soon after committed suicide; No. 10, a young widow then landlady, the husband having died prematurely of delirium tremens. These facts need no comment. Further evidence is given in the *Leicester Daily Post*, in a correspondence with respect to the mortality of licensed victuallers in that town, where there is a trade society of 230 members, amongst whom there were eleven deaths during the past year, or nearly 50 per 1,000 of adults; whilst the death-rate of the town of Leicester, infants included, was only $25\frac{1}{4}$ per 1,000. The average mortality of these publicans proved to be a great deal more than double that of the members of the ordinary benefit societies in Leicester.

Their trade is unquestionably an unhealthy one. Read the evidence of Dr. William Farr, F.R.S., Chief Superintendent of the General Register Office, Somerset House. In his annual report he says:—"The numerous, useful, and as a body respectable men, who supply the community with drinks, food, and entertainment in inns, are shown *to suffer more from fatal diseases than the members of any other known class.* They might themselves institute a strict inquiry into its causes; but there can be little doubt that the deaths will be found due to delirium tremens, and the many diseases induced or aggravated by excessive drinking. It seems to be well established that by drinking small doses of alcoholic liquors, not only spirits, the most fatal of all poisons, but wine and beer at frequent intervals, without food, is invariably prejudicial. When this is carried on from morning till late hours in the night, few stomachs, few brains, can stand it. This habit of indulgence is a slow suicide. The many deaths of publicans appear to prove this. Other trades indulge in the publican's practice to some extent, and to that extent share the same fate."

Not only are these drinks injurious to the body, but they also produce a state of mind frequently more terrible than death itself—*insanity.* In the *Insurance Guide and*

Handbook (being a guide to the principles and practices of life assurance), in reference to insanity and its causes, we find that the drinking of intoxicating liquors stands at the head of the list. Of 1,000 patients, insanity was found, according to an eminent authority, to be traceable to the following causes relatively :—

Drunkenness	110!!!
Consequence of disease	100
Epilepsy	78
Ambition	73
Excessive labour	73
Born idiots	71
Misfortune	69
Old age...	69
Chagrin...	54
Love and disappointment	47
Accidents	39
Religious enthusiasm	29
Unnatural practices	27
Political events	26
Poisonous effluvia	17
Ill usage	12
Crimes and remorse	9
Feigned insanity	5
Malformation of brain	4
Other and unknown causes	88
Total	1,000

Doubtless many of the other cases attributed to disease, misfortune, crime, and other causes, were attributable also indirectly to drink. Insanity from any cause is a terrible calamity, but it is still more terrible when produced from a preventible cause.

Alcoholism !!! Under this title the Registrar-General deals with two important causes of death, viz., delirium and intemperance. The deaths from these combined causes are stated to be very numerous.

In the "Insurance Cyclopædia," under the head of *delirium tremens*, we find that the deaths from this cause each year for ten years have been as follow :—

Year.	Number of deaths.	Year.	Number of deaths.
1858	424	1863	471
1859	545	1864	592
1860	457	1865	612
1861	415	1866	487
1862	471	1867	369

Mr. Mann, in his medical statistics of life assurance, after giving statistics of early deaths, asks: "May it not be inferred from these observations that of those assured lives in whom drinking habits have been formed, either before or after acceptance, only a few survive beyond fifty years of age?"

We also call attention to the effects of drink on hospital practice and expenses, and in doing so to urge the importance of discouraging the use of stimulants in hospitals.

Drink and Hospital Expenses.

A matter deserving more attention than it receives was mentioned the other day by the board of management of the Belfast Royal Hospital, in their annual report for 1875. This report states:—"Your board deeply lament that a large increase is to be observed in the number of patients admitted to the hospital labouring under the effects of drink. The following is a summary:—381 *cases of poisoning by alcohol*, requiring the stomach-pump; 31 cases of submersion—in almost every instance drunkenness was the cause; 31 cases of delirium tremens; 216 patients brought to the hospital in a state of intoxication suffering from severe injuries received while in that condition. This large number (nearly double that of last year) is generally of a very noisy and troublesome class; and your board regret to say that, as several of these cases come to the institution suffering from *broken heads, legs*, and other *severe bodily injuries* received in their drunken brawls, recovery being tedious, a heavy expenditure is thus thrown on the charity for cases not deserving of the least public sympathy. The general opinion in town is now largely in favour of the fines imposed for drunkenness being handed over to this charity to aid in reducing this increased expenditure."

Whilst referring to hospitals, the following statistics, showing the advantage of total abstinence, will be interesting:—

Colonel Blewett, who commanded the 65th regiment in India, gives an important return, which institutes a comparison between the abstainers and non-abstainers of his regiment. This return shows the number of total and non-abstainers admitted into hospital, tried by court-martial, &c., from October 1, 1874, to March 31, 1875. The numbers present at

head-quarters in any month out of the six have averaged 900 men, and the total abstainers 260. During the six months the statistics have been as follows :—

	Number.	Proportion per 100.		Number.	Proportion per 100.
NON-ABSTAINERS	900	... —	ABSTAINERS	260	... —
Died	5	... —	Died	*none*	... —
In hospital	357	... 40	In hospital	59	... 23
Defaulters	347	... 38	Defaulters	20	... 8
Tried by court-martial ...	18	... 2	Tried by court-martial ...	3	... 1
Promoted	18	... 2	Promoted	5	... 2
Reduced	12	... 1½	Reduced	*none*	... —
Good conduct badges ...	79	... 8½	Good conduct badges ...	25	... 10
Forfeited	39	... 4½	Forfeited	*none*	... —
Amount deposited in rupees in Regimental Savings Bank	3,711	Per Man. ... 8/1	Amount deposited in rupees in Regimental Savings Bank	3,788	Per Man. ... 29/-
Amount withdrawn	4,414	... 9/9	Amount withdrawn... ...	2,698	... 25/-

It will be noticed here that during the six months not one total abstainer died, that there were 17 per 100 less men of the abstainers in the hospital, that there were 30 per 100 less defaulters, only half the number tried by court-martial, that *no* total abstainer was reduced in rank, that the total abstainers gained more good-conduct badges, and that not one total abstainer forfeited his good-conduct badge, whilst thirty-nine non-abstainers forfeited theirs; that the total abstainers deposited in the savings bank more than *three* times as much as the non-abstainers, and withdrew less than they deposited, whilst the non-abstainers drew out in the six months more than they deposited.

The above facts prove that the mortality of the total abstainers was less, that both their health and their conduct was better than the non-abstainers, and that the abstainers were more provident, as it regards their savings. Colonel Blewett concludes with the following words :—"I do not hesitate to say that were this principle and habit of totally abstaining the rule and not the exception, crime would be comparatively unknown, and the roll of other offences insignificant."

TWO AND A HALF YEARS' EXPERIENCE OF THE DISUSE OF INTOXICATING DRINKS IN THE WREXHAM WORKHOUSE.

For the benefit of those who think that intoxicating drinks are necessary for the poor in our workhouses, we quote the following statement from Mr. L. Ralph, Master of the Workhouse, dated May 27, 1875, which will be read with interest :—"We first com-

menced the total abstinence plan of treating diseases in September, 1872, and since that time have continued the practice with the most gratifying results; and although the Wrexham Workhouse is the receptacle of the outcasts of poor humanity from a population of 50,000 people, and some hundreds of public-houses in the whole union, yet we keep the number of sick at a minimum per cent., and the death-rate is quite as low as other workhouses of similar dimensions where large sums are spent on alcohol. The tone of the house has most wonderfully improved, both morally and socially; it is a very rare case for me to take any one before a magistrate, or use any punishment for disorderly conduct in the house. The discontent formerly manifested amongst the sick, because one was having beer while another had not, has entirely disappeared with the cause. Formerly cases have occurred where inmates have pretended sickness for the purpose of getting a 'drop of something' from the medical officer, and although he has used every means at his disposal for detecting them, he has on more than one occasion been deceived; such cases have also disappeared with the cause. We have had several cases brought in with delirium tremens, and I have found from experience that such persons recover sooner without the use of intoxicating drinks than with. In some instances cases have come in with slight ailments, and when they have found that 'no drink' is to be had, they have taken their discharge. Some time ago we had a very bad case of erysipelas, and the doctor hardly knew what to do, for he had never heard of a case being treated without port wine; we persevered, however, and to the medical officer's delight the case soon recovered. A few weeks ago typhoid fever broke out at Llai; seven cases were down in one family; they were treated by the district doctor, and had as much wine as they could take; they were in a most wretched condition when I went to see them, with Mr. Hugh Davis, Sanitary Inspector, and as bad as could be; one was all but dead. We removed them to the workhouse hospital with great care, and although they cried out much for wine we persevered with our new milk treatment and plenty of beef-tea, and every case recovered, and has gone out again. We have had two or three cases of reclaimed drunkards leaving the workhouse, and becoming respectable members of society. With respect to the financial portion, I have only to add that we formerly spent £120 yearly in alcoholic stimulants, but now our expense in that branch is *nil;* we have, however, spent about £20 a year more in eggs and milk, so our clear saving to the rate-payers is about £100 per annum. The medical officer, Dr. Davies, is, I believe, so convinced of the uselessness of stimulants, that he does not intend again to prescribe their use in this workhouse."

These facts are extraordinary, except to those who are convinced of the mistake which the medical profession continue to perpetuate by prescribing alcohol as a medicine.

J. Broomhall, Esq., J.P., of Penge, has forwarded copies of the letter to his brother magistrates and ex-officio Guardians of the Poor in Croydon Union, and Dr. Carpenter, one of the guardians, in returning the letter, says, "I quite agree with every word of it; timulants are very rarely required in the treatment of disease."

We would also call special attention to:—Replies to Enquiries issued by the Committee of "The Convocation of the Province of Canterbury, appointed to consider and report on the prevalence of Intemperance, the evils which result therefrom, and the remedies which may be applied." The following question was addressed to Governors and Chaplains of Prisons throughout Great Britain:—

"How far do you consider the health of prisoners to be affected by total abstinence from intoxicating drinks?"

The replies show most emphatically that there is no danger in the disuse, but actual benefits resulting from the withdrawal of intoxicating liquors.

Testimony of Governors and Chaplains of Prisons.

960. "I do not think the health of the prisoners is at all injuriously affected. I think it is much improved. Instances have frequently occurred of persons, previously inveterate drunkards, who, after their incarceration for a short time in prison—deprived of all intoxicating drinks—have become considerably improved in health and general appearance."

963. "I have always found the health of drunkards improved by total abstinence, and they have always acknowledged the delusion which has drawn them to drink under the impression of its necessity."

967. "I do not recollect one instance of injury to health, but quite the contrary. An experience of eighteen years enables me to say that I have known many an instance of health completely restored by the use of water as the only beverage; some in which they had almost killed themselves by spirit-drinking before admission, but who left gaol in good health, acknowledging, and most thankful for, the change."

968. "I am not a teetotaller, but I know of nothing that affords so good an evidence of the value of teetotalism as its results in the cases of hundreds of prisoners on public works. Teetotalism enables emaciated and exhausted nature to revert to her original robustness, and has here transformed the prematurely aged and enfeebled to the healthfulness and activity of youth."

998. "Prisoners come in very ill; they recover wonderfully when taken away from drink. I never saw one prisoner injured in his or her health by enforced

abstinence, but the reverse. The women often recover their former good looks, even if they looked ugly and hideous on their admission."

1008. "The health of prisoners is directly benefited by total abstinence from intoxicating drinks."

1010. "Decidedly improved."

We might quote several hundred replies of the same character, did space permit, but we proceed with the question asked of

GOVERNORS OF WORKHOUSES THROUGHOUT ENGLAND AND WALES.

"How far do you consider the health of paupers to be affected by total abstinence from intoxicating drinks?"

Note the replies.

951. "We have had a great many cases admitted here in a very exhausted condition from hard drinking, that have improved in health wonderfully in a few weeks by the ordinary house diet, without stimulants."

1016. "So far from total abstinence from intoxicating drinks being detrimental to the health of paupers, I believe, speaking from an experience of fifteen years as workhouse officer, that it is beneficial to their general health."

1019. "The paupers who are not allowed any intoxicating drinks are in better health, and are better able to work, than the paupers who are allowed beer and spirits."

1045. "Since I have been Governor here, I have never known an instance of any inmate's health being injured by total abstinence from intoxicating drinks. On the contrary, I have known many, after a residence here for months, leave the house much benefited by the same."

1053. "I have found, after twenty-two years' experience, the health always to improve by the discontinuance of intoxicating drinks."

1069. "There are now in this workhouse rather more than 2,100 inmates. In no single case, to my knowledge, has the health of any inmate of this workhouse suffered through abstinence from intoxicating drinks. On the contrary, I have very frequently been struck with the altered and greatly improved appearance they speedily exhibit."

1077. "After a probation of about three months, they gain in flesh and improve in health. Although not a teetotaller myself, I don't believe that intoxicating drinks, in any shape or form, are conducive to health. I have now been a workhouse master for eleven years."

1080. "I have been ten years in this workhouse, and during that time many have been admitted into this house who have been habitual drunkards. We generally find them, upon their first admission, restless and apparently uncomfortable, eating little, and making all sorts of excuses to obtain a little stimulant in the way of beer or spirits; but if we prevail upon them to remain, after being compelled to refrain, we find them, in a very short time, eat their food with a good appetite, and a good change in their nervous system, and their strength of body increases."

1155. "I find that the inmates, in nearly every case, look better, and more able to work, when they leave the house than when they come in."

1172. "I can safely say that the health of all classes of paupers is generally benefited by total abstinence; the change is marked. A man will come here, after spending his last shilling in the ale-house, broken down and almost prostrate. In a week or two he begins to feel quite another man; his stomach, being rid of alcoholic poison, begins to take the food offered, and he soon assumes his natural state. I know scarcely any one would believe the effects regular living and no beer has upon even shattered old men."

1174. "My experience in various workhouses has uniformly been that of a great improvement in health being manifested in a short time."

1183. "I have been here nineteen years, and consider the health of paupers materially improved by total abstinence from intoxicating drinks. Many are the cases I remember of parties coming into the house lean, emaciated, sickly, and diseased, so much so that you would feel quite justified in saying, 'there was but a step between them and death;' yet they have gradually improved in health and appearance, and have been sent out new men. Some have remained with us for years. We have several men at the present time from eighty to ninety years of age."

1187. "Paupers wonderfully improve in their health by abstinence."

We have quoted the above from several hundred similar testimonies equally favourable to abstinence from intoxicating drinks. If prisoners in gaols, and paupers in workhouses, improve in health without intoxicating drinks, with a comparatively limited diet, other persons, who can obtain a more generous diet, need have no anxiety as to the result.

The Testimony of Superintendents of Asylums as to the use of alcohol as a medicine is important:—

946. "My experience is that of the leading physicians of the day, viz., that the total disuse of alcohol, and the substitution of beef-tea and milk, constitute

the best possible treatment; rest of body and rest of mind are, of course, essential to the cure; but the old belief that alcoholic stimulants could not be withdrawn altogether without danger to the patient has been generally abandoned."

1617. "I have never known any ill-effect result from the sudden total abstinence from intoxicating drinks. I am not a teetotaller."

In addition to the testimony from workhouses, prisons, and asylums, we note the experience of men engaged in the hardest and most laborious work.

Anchor Smiths.

Dr. Beddoes ascertained that the hardest-working men were those employed in forging ship-anchors. They were at the same time exposed to great alternations of heat and cold, and were in a constant state of excitement and perspiration. Their employers allowed them an unlimited supply of strong beer. Dr. Beddoes proposed to the men that six of them should drink only water for one week, and that six others should continue their usual allowance of beer. The men, amazed at this proposition, exclaimed, "Why, you want to kill us! Do you for a moment suppose it possible that we can endure such fatigue—that we can weld a ship's anchor and drink only water? You must surely intend to kill us." "No," said the doctor, "I have no such wish or intention. I am a physician, and shall carefully watch the progress, so that no injury shall ensue to you. I will put down £50. Try water for one week; if you succeed, the £50 is yours; if not, I shall put it back into my pocket." The two sets of men were pretty much alike during the first day of the trial; the second day the water-drinkers complained less of fatigue than the others; the third day the difference was more apparent in favour of the water-drinkers; the fourth and fifth days it became increasingly so; and on Saturday night the water-drinkers declared that they never felt so fresh in all their lives as they had felt through that particular week.

Navvies.

The following interesting account of the conversion of the gauge on the Great Western Railway (from broad to narrow) is given by J. Ward Armstrong, Esq., Divisional Engineer, Great Western Railway, under whose immediate orders the work was done. The work was of the heaviest description, lasting from seventeen to eighteen hours per day for several successive days. It was the greatest work of its kind ever done in England:—

"*Conversion of Gauge on the South Wales Section of the Great Western Railway.*—In answer to your letter I have great pleasure in telling you all I know about the sustaining

powers of cocoa, coffee, oatmeal, and spirits to men engaged in long-continued and arduous labour. In the summer of 1872 I made the engineering arrangements and conducted the operation of narrowing the gauge of the South Wales section of the Great Western Railway, from Milford Haven to Grange Court Station, near Gloucester, a length, all branches included, of about 400 miles of single line. The number of men employed was about 1,500, and the time taken was two weeks, nearly. The work done was enormous, for the Great Western is one of the very few English lines whose rails are held down by bolts screwed into nuts. All these had to be unscrewed, and replaced after moving the rail two feet. As the period of completion was governed by the number of large stations and sidings to be dealt with, the open main line was manned so as just to keep abreast of their progress, and thus the utmost amount of exertion was maintained at every point. Very long days were made—in fact, nearly double time. To illustrate the mode of living, I will take the gangs employed on the open main line. These gangs numbered about thirty men, and they were housed in lodges built along the line, about six miles apart. They were directed to bring with them the food they would want for about two weeks; and, as a rule, they provided cocoa, coffee, sugar, bacon, bread, and cheese. At early dawn water was heated at the lodges, and breakfast made. That over, a start was made for the day's work. Two men went in advance provided with a large iron pot, and oatmeal in 28 lb. packages. Water being found, a fireplace of stones was soon made, and the pot boiled. Oatmeal was then sprinkled into it, and added until thin gruel was made. As soon as the shout for drink was heard, buckets were filled and carried round, small tins being used to drink it from. The men soon got to like it exceedingly, and used it very largely to supplement their solid food. It was the only drink taken during the day. I had not a single case of drunkenness nor of illness. I have often since heard these men speak with great approbation of the supporting power of oatmeal drink. It will be noticed that the oatmeal was cooked. I think it would not have answered nearly so well if it had not been. At the same time it has long been common for men labouring at the furnaces in large ironworks to drink cold water and oatmeal. I will conclude by saying that as the result of many opportunities for observing the best means of keeping up the energies of men undergoing great exertion, I am not in favour of spirits; I am strongly and decidedly in favour of cocoa, coffee, and oatmeal."

Sailors in the Arctic Regions.

Sir John Ross, when in the Arctic regions, and subject to severe labour, proposed to his men, having previously tried with success the experiment upon himself, that they should abandon the use of alcoholic liquors, which was done, with the most gratifying

results. The men had suffered from inflamed eyes and fatigue. June 7th, 1830, Sir John Ross remarks:—"As I was the only person who drank no spirits, and the only one who did not suffer from inflamed eyes, I represented that the use of grog might be the cause, showing further that although I was very much the oldest of the party, I bore fatigue better than any of them. There was no hesitation in acquiescing, and the merit was the greater since, independently of the surrender of a seaman's fixed habits, they had always considered this the chief part of their support. It is difficult to persuade men that the use of these liquors is debilitating instead of the reverse. The immediate stimulus gives a temporary courage, and its effect is mistaken for an infusion of new strength; but the slightest attention will show how exactly the result is the reverse. It is sufficient to give men under hard and steady labour a draught of the usual grog to perceive that often in a few minutes they become languid, or, as they generally term it, faint, losing their strength in reality, which they attribute to the continuance of the fatiguing exertions. He who will make the corresponding experiments on two equal boats' crews rowing in a heavy sea, will soon be convinced that the water-drinkers will far outdo the others."

Red River Expedition.

Sir Anthony Home, K.C.B., late Principal Medical Officer on the Gold Coast, writes:—"The experience of the Red River Expedition, that men could do very hard work without drink, was quite conclusive so far as that and strictly similar expeditions are concerned, and I had myself in Canada ample experience to the same effect. The 'lumberers' go into the woods, and live there all winter; they sleep in holes dug in the snow, lying on spruce-branches covered with buffalo-robes. They work very hard, and it is an inexorable rule that all drinks found in the camp are destroyed. The food was easily digested by healthy men doing hard work, sleeping soundly, no sickness present." The same writer adds—"Rum, if given in the morning before a march, in the delusive idea of adding to the men's strength, will be simply pernicious."

Soldiers in Tropical Climates.

Dr. Bell remarks:—"Rum, whether used habitually, moderately, or in excessive quantities in the West Indies, *always diminishes* the strength of the body, and renders men more susceptible of disease, and unfit for any service in which vigour or activity is required."

Dr. Mosely, in his work on Tropical Diseases, thus remarks:—"I aver from my own knowledge, as well as the observation of many other people, that those who drink

nothing but water, or make it their principal drink, are but little affected by the climate, and can undergo the greatest fatigue without inconvenience, and are not subject to troublesome or dangerous diseases."

Henry Marshal, Esq., Deputy Inspector-General of Army Hospitals, a writer of distinguished merit, who, it appears from his own statements, was subjected to great exertion as well as heat in a tropical climate, observes :—"So far from being calculated to assist the human body in enduring fatigue, I have myself marched on foot with troops in actual service, in a tropical climate whose mean temperature is considerably higher than that of Jamaica, without any other beverage than water, and occasionally a cup of coffee. I have always found that the strongest liquors were the most enervating, and this in whatever quantity they were consumed, for the daily use of spirits is an evil habit which retains its pernicious character through all its gradations; indulged in at all, it can produce nothing better than a diluted or mitigated degree of mischief."

Ashanti Campaign.

Experiments were made by E. A. Parkes, M.D., F.R.S., Fellow of the Royal College of Physicians, and Professor of Military Hygiene in the Army Medical School, in order to show the relative reviving effects of rum, extract of meat, and coffee during marching.

Three intelligent and trustworthy soldiers, who knew the nature of the experiments, made the following marches, in heavy marching order, carrying the rifle and sword-bayonet, the valise equipment, with service kit, forty rounds of ammunition, great coat, water-bottle (full), and haversack (empty), in all, including the clothes on person, there was a total weight of 51 lbs., avoirdupois.

Having breakfasted at six o'clock, they started at seven, and marched thirteen and a quarter miles without a halt or refreshment of any kind. This march was accomplished in four hours and twenty minutes. After resting for an hour, during which time their pulses and temperatures were taken, they received either rum, or extract of meat, or coffee, with in each case ten fluid ounces of water.

They then marched four and a quarter miles, making seventeen and a half in all, and then after another halt had a second allowance of the same substance, with the same quantity of water. A march of three miles was then made, making twenty and a half miles. The rate of march was 3.2 miles per hour, the time taken was eight hours and a half, of which two were occupied with halts. At the end of the last march, the men had their dinner. The rations were the usual rations, and the same amount of food was taken daily. The marches were continued for six days, so that each man received rum on two days (but not on successive days), meat extract on two days, and coffee on two days.

Final opinion of the men :—

At the end of the experiments the men were asked to state their candid opinion of the relative value of these three substances during marching.

Serjeant-major Don said :—"The meat extract is the best to march on—more strength is given by it—about this I have not the slightest doubt. After the extract I prefer the coffee; and I put the rum last for marching."

Private P. Holz said :—"I prefer the meat extract for getting along in marching; as regards the coffee, I would put it before the rum, as the effect of the rum went off in two miles, and I felt better after the coffee than after the rum."

Private W. Hutchins said :—"I prefer the meat extract; it certainly gave me more strength for marching—it does not put a spurt into you for a few miles only, but has a lasting effect; if I were ordered for continuous marching, and had my choice, I would certainly take the meat extract. I prefer the coffee to the rum—it quenched thirst; the rum at the end of a couple of miles left you as bad as before, or even worse, while the coffee had no effect of this kind."

J. Wiles, surgeon-major, further states :—"I never took any stimulants of any kind during the whole period I was in West Africa, and during that time I never felt better, and had no sickness of any kind, and marched the whole way up and down, besides doing some amount of hard work. Regarding the men's feelings, I did not find that they missed it not being issued, except when they came amongst other corps who were getting it. They cared more for the tea and lime-juice with which they filled their bottles for the day's march. My experience, derived from active service in the Crimea, India, and China, is very much against the use of spirits on active service, as I think its use renders men especially liable to dysentery and camp diarrhœa."

Sir Charles Napier at Calcutta.

Sir Charles Napier, in his quaint style, when reviewing the troops, made the following remarks :—"Let me give you a bit of advice, that is, don't drink. I know that young men don't think much about advice from old men. They put their tongue in their cheek and think they know a good deal better than the old cove who is giving them advice; but if you drink you are done for. You will be either invalided or die. I know two regiments in this country; one drank, and the other didn't drink. The one that didn't drink is one of the finest regiments, and has got on as well as any regiment in existence; the one that did drink has all been destroyed. I know there are some who will have drink in spite of the devil and their officers, but such men will soon be in hospital, and very few that go there in this country ever come out again."

Circassians and Turks.

The special correspondent of the *Telegraph*, writing from the head-quarters of the Turkish army, September 12, 1876, remarks as follows :—"Tales were told of personal adventure, the prospects of the war debated upon in rude fashion, and so the evening wore on. Not one of these men drank anything stronger than coffee; and in this they followed the custom of all the Circassians in camp, who, while undergoing more fatigue and privation than any other class of men in the army, and always evincing the greatest daring, are total abstainers from their youth upwards, even from the thin wine with which the country abounds. The Turks, since the Crimean war, have unhappily contracted a taste for raki, a heady, disagreeable spirit, made, I believe, from some parts of grapes; but into this vice the Circassians have never fallen, and their marvellous *physique* and endurance is a proof of what temperance can effect."

Agricultural Labourers.

Hertfordshire.—Captain Trotter, late of Derham Park, near Barnet, adds the following important additional testimony :—"Having tried the system of total abstinence last year, during the hay-season, with my men, I have found it answer in every respect perfectly. I had my men from Bedfordshire, and having calculated the expense of the former allowance of beer per day per man, I gave them exactly the same amount in money, and my bailiff assures me that nothing could be more regular than the men, and on Monday morning, instead of being weaker, as formerly, from the effects of Saturday's and Sunday's drinking, they were refreshed, and stronger than ever; that he never had an angry word during the whole season, and never heard an oath; and such was the success that I shall never have any more beer in my fields, and I know that I shall be as much benefited by the steadiness of my men as the men will be by the saving of their constitutions and money. Many persons came during the hay-season to see the dinners go into the hay-fields, which one of the men cooked at their expense for his time, and instead of cans of beer and a little bread and cheese, a large wheel-barrow full of roast and boiled meat, in large pans, and potatoes, &c. &c., and a pailful of coffee, were sent to them. At the end of the day, instead of going to the alehouse, the men read a chapter of the Bible, united in prayer in the barn, and then lay down to rest; and it really was a scene upon which I look back with great delight. Two or three of my neighbours tried the same plan with similar success."

Stage-Coach Driving.

The Rev. Dr. Molesworth, Vicar of Rochdale, in his interesting popular periodical,

the *Penny Sunday Reader*, tells us that on one occasion he, when travelling, happened to be on the coach-box, and observed the manly, independent, quiet, and sensible bearing of the coachman—a man apparently between thirty and forty years of age. He was struck with the exact punctuality with which he kept his time at each stage—not a minute before or after. Dr. Molesworth also noticed that with steady driving they passed several other coaches, while their drivers were in at the roadside public-houses, and that his coachman never drank anywhere, or lost a moment which he might be compelled to make up by unduly urging his master's cattle. On a request being made, the man, in a perfectly unaffected and artless manner, gave the following account of himself:—

"I drive every day (Sundays not excepted) ninety-four miles, and have not been off the road for a single day, either from pleasure or sickness, for three years. Next Sunday I am to have my first rest during that period. I never drink any spirits or malt liquors, neither do I eat animal food more than once a day. I never take eggs for breakfast, nor do I eat or drink anything between my three meals, viz., breakfast, consisting of tea and bread and butter; dinner, at which I take usually a very little toast and water; supper, consisting of tea, or gruel, and bread and butter. I suppose there is not a man in England can enjoy better health than I do. I am always cheerful. I never found myself so strong as since I adopted this course, nor so comfortable in all respects. I commenced it on my marriage, eight years ago, and have never had cause to repent it. I had before that time been accustomed to live rather freely. I calculated that I spent on the average (and I believe that a great proportion of guards and coachmen do the same, and many spend more) three shillings a day for drink. Since I have adopted my present plan, I have a box in my bed-room, of which I consider the contents to be devoted to my children as their money. Into this every night I drop three shillings, always saying, 'Three glasses of brandy and water.' The amount of three glasses of brandy and water at the year's end I find to be exactly fifty-four pounds fifteen shillings. I live in an exceedingly comfortable house. I have the happiest home that ever blessed man, and my wife and children always know, when I return home from my journey, who is coming; I come home always the same, not one night sober, another stupefied and cross, and another noisy and drunken. I always rise to a moment, with ease, without being called, at six in the morning. I mind my business, and I find that the way I live is both pleasant and advantageous. My wife and family like it, my employers like it, the public like it, and I like it myself. It has kept me in health of body, peace of mind, and continual cheerfulness and content."

Pedestrians.

Weston, the pedestrian, who walked 450 miles in six days (in one day walking 96 miles), is another proof of the power of endurance without intoxicating drinks. After the six days' walking, the temperature of his body was exactly the same as on the day he began. He did not become tired or footsore, but became drowsy from want of sleep on the sixth day, and experienced great difficulty in keeping awake; but after an ordinary night's rest, when his walk was finished, he got up and went about as though nothing unusual had been undertaken, and has since walked 500½ miles in six days. Some may be curious to know of what food and drink he partook. We give that consumed in twenty-four hours as an example, it being a fair sample of that taken during the whole period:—

Cooked meat, 1¼ lb. (lean of chop); boiled chicken and minced chicken; 3 yolks of eggs; 2 poached eggs; jelly, 2 pints; beef-tea from fresh meat, ¾ pint; Brand's essence of beef, 5¼ oz. by weight; oatmeal, 3½ oz., in the form of gruel; bread, 4 oz., in the form of dry toast; bread, 3 oz.; milk, 3½ pints; potatoes, 6 oz.; coffee, 2½ oz.; tea, 1 oz.; sugar, 3 oz.; black currant jelly, 2 oz.; grapes, ¾ lb.; 1½ oranges.

If he had taken fermented drinks and less solid food, or converted by fermentation the grapes, fruit, jelly, sugar, &c., into an intoxicating drink, many of their essential and natural elements would have been changed, and their nutritious and sustaining power lost.

The London correspondent of the *Hampshire Independent* writes:—"My own experience is that I always tire out my wine-drinking friends on a tour. In this summer's journey through Scandinavia, where the day's travel generally tired my companions, it left me as fresh as when I rose in the morning."

Cricketing.

It is well known that Mr. Grace, who obtains more runs and stands at his wicket perhaps longer than any man in the United Kingdom, is a teetotaller, and that he attributes to his abstinence from intoxicants his stamina and his ability to be at the wickets all day without feeling exhausted. He certainly is, for muscle and power of endurance, one of the best specimens of water-drinkers.

Lovers of Athletic Sports.

Some of the most successful competitors in athletic sports are abstainers. The Messrs. J. C. Clegg and W. C. Clegg, of Sheffield, two brothers, studying for the law, who have been total abstainers all their lives, and their parents abstainers for many years, have achieved great results, and without undergoing what is usually termed training. Mr.

J. C. Clegg, in 1868, won six first prizes. The following year he won eight, at Sheffield, Huddersfield, Nottingham, Northampton, and Leeds. In 1870 he secured no less than thirty-one first prizes, two seconds, a third, and a fourth, making thirty-five in all; and in 1872 won thirty-four prizes. Altogether, Mr. Clegg has won eighty-four prizes, seventy-four of which are first. At Staleybridge, in one afternoon, he secured five first prizes and the champion medal—the 100 yards' race, the 440 yards, 880 yards, 230 yards, and the 440 yards' hurdle race. He went to the Isle of Man for a holiday, and brought back with him four prizes, three first and a second. At Glossop he won four first prizes. These exploits show that beer or wine is not essential to maintain speed, strength, or stamina.

We note also that Mr. Joseph Nottage, whose exploits are recorded in the "Boat-Racing Calendar," as winner of the Grand Challenge Cup at Henley and several times at the Royal Thames National, during part of his career, when he was using intoxicating liquors, won fifteen races and lost ten; after he became a total abstainer, he won twenty-two races and only lost four.

For rifle-shooting and steadiness of aim, we point to Angus Cameron, a total abstainer, who has twice won the Queen's Prize at Wimbledon.

Swimming.

One of the greatest feats of endurance was that of Captain Webb swimming across the Channel. The time he remained in the water, the distance he swam, together with the continued determination to accomplish his object, were truly surprising, and all this without the aid of intoxicants, while Mr. F. Cavill, considered an equally expert swimmer, in a much shorter time was compelled to leave the water, and succumbed to the effects of stimulants. The following is the account from the *Daily Telegraph*:—"At ten o'clock Cavill was going about 19 strokes a minute, and making very slow progress; but his friends in the small boat were giving him a great deal of refreshment. It now began to be apparent that he could not get across, as he seemed dreadfully fagged, and looked very distressed; but he did not seem to think of giving in, hopeless though his efforts appeared. About noon he was swimming still slower—in fact, seemed to be rather delirious. As he was making most erratic courses, and going in any direction but the right one, it seemed a pity to let him continue, as he had no chance of success; however, his friends kept him supplied with stimulants, and no one liked to interfere. We were now about mid-channel, and the land on both sides was clearly seen. The sea was getting rather lumpy, and poor Cavill was evidently quite done up. A little after one o'clock it came to a crisis, as Cavill appeared to lose all consciousness; and if D. Pamplin, of

London, who was in the small boat, had not promptly dived in, he would probably have been drowned. As it was, he was prostrate and unconscious when they got him out, and Dr. Walter informed me he was quite pulseless; but, by vigorous treatment, they restored him, and he is now recovering, though very feverish. He was in the water eleven hours and twenty-five minutes."

Cavill, writing on this, admits that he was in the water only about half the time of Captain Webb, and that although Captain Webb would have no chance against him on the side-stroke, yet, he says, "as regards the stimulants given me, there is no doubt I drank too much, administered in over-anxiety for my success, but *on my next attempt I do not intend having any stimulant whatever in the boat.*" The surgeon who accompanied him writes, "It was very much against my wish that alcohol should have been given him so early in his journey, or at all in such quantities, at any rate, till he was very much nearer his goal. In addition to the whiskey mentioned, Cavill received both brandy and old ale, and I believe that he might have finished nearer the French coast had it not been for the unwise use of stimulants." Commenting on this, the *Globe* says:—"It is time to realise the truth that, whatever virtue it may have for the momentary revival of flagging energies, alcohol is worse than useless in cases of prolonged exertion. Not only does its beneficial influence pass off rapidly, but, like the whip to a tired horse, it leaves the system weaker for the transitory stimulus it has imparted. Gentlemen who aspire to swim to France will do well, therefore, to make sure of the absolute soundness of their physical organs before starting, to leave all *impedimenta* behind, and to abjure the deceptive promises of whiskey by the way."

Endurance of Mental Exertion.

The following is the testimony of Mr. S. C. Hall, a well-known author, and editor of the *Art Journal*:—"He lived by the labour of his brain; and he could testify that since he had become a teetotaller he had an increase of intellectual powers, so that what he sent out to the public never came trickling through a disturbed and disordered medium. And as to *endurance of fatigue*, he was able to work three times longer than ever he could while he indulged, *even moderately*, in the use of strong drinks. He was better in body, in mind, in home, in every comfort; and he felt proud, therefore, of the pledge he had taken to abide by the practice of entire abstinence."

To this we may add the following emphatic statement of personal experience, given by Mr. Edward Baines, late M.P., and editor of the *Leeds Mercury*:—"I feel it my duty, having abstained from intoxicating liquors for fifteen years, to state that during that whole time I have enjoyed good and vigorous health, with scarcely a day's

interruption; that I have never for an hour felt any need of such liquors; and that I believe I have done more work, have had better spirits, have eaten my food with greater relish, and have slept more tranquilly, than I should have done if I had habitually taken wine or beer. . . . . Within fifteen years of life one passes through various circumstances, which would be likely to try the merits of any regimen. But I have never felt as if strong drink would help me in any of those circumstances—certainly not in protracted study; as certainly not in the prolonged and exciting public meeting; not in active business, however pressing; not in travelling, by night or by day; not in pedestrian rambles on the mountains of Cumberland or Wales; not in the cold of winter; not in the heat of summer; not in the raw damp of intermediate seasons; not in the morning, not at noon, nor yet at night; not in anxiety and trouble; not in joy and social intercourse. I need it in none of these circumstances; it would do me mischief in many. It might cloud my intellect, or excite my brain, or disorder my stomach, or cause local inflammation more or less serious. There are those who think that wine or beer is needful whenever they feel fatigued or exhausted. But surely Nature provides her own restorative at a much easier and cheaper rate. He who is tired should rest; he who is weary should sleep; he who is exhausted should take wholesome food or innocent beverages; he who is closely confined should take air and exercise. I repeat that in my own case alcoholic drinks are never necessary, and would never do me good."

Effects upon Women and Children.

Dr. Conquest, Physician to the City of London Lying-in Hospital, in his treatise on Midwifery, says:—"There is an evil too generally prevalent, and most pernicious in its consequences on individuals and on society, and by no means confined to mothers in the lowest classes of the community, which cannot be too severely reprobated. It is the wretched habit of taking wines and spirits to remove the languor present during pregnancy and suckling; it is a practice fraught with double mischief, being detrimental both to mother and child. The relief afforded is temporary, and is invariably followed by a degree of languor which demands a more powerful stimulus, which at length weakens and eventually destroys the tone of the stomach, deteriorates the milk, and renders it altogether unfit to supply that nutriment which *is essential to the welfare and existence of the child.* Most nurses who have good sense enough to try will find the comfort of their feelings best consulted, the constitution best supported, and the improvement of their infants most rapid, when they avoid spirits, wine, and beer, and drink milk as their ordinary beverage."

The concurrent testimony of all medical writers, whether of ancient or modern times, prohibits the use of inebriating liquors to children and young persons.

Dr. Trotter remarks:—"It may be asked, at what age ought a child to begin the use of wine? To this I must reply, that spirits, wine, and fermented liquors of all kinds, ought to be excluded from the diet of infancy, childhood, and youth. The use of these liquors is hurtful in proportion to the tender age in which it is begun. The parent who offers them to the infant, whatever may be the motives of tenderness, ought to weigh the consequences. If the babe were left to the instincts of nature, these articles would be the very last it would fix upon, their qualities are so diametrically opposite to the mother's milk."

Dr. Beddoes says:—"There are an infinite number of facts which show that the organisation of children is, in general, most apt to suffer from many classes of violent agents. Medical practitioners, much conversant among the poor, find them perpetually stunting the growth and destroying the constitution of their children by their ill-judged kindness in sharing with them those distilled liquors which they swallow with so much avidity themselves. Among the causes so fatal to the health of the higher classes, the allowance of wine that is so often served out to children, short as it may appear, deserves to be considered as not the least considerable."

Space will not permit, or these examples might be multiplied a thousandfold, either from ancient or modern history. Samson, the strongest man, who never tasted strong drink; Daniel, who would not drink of the king's wine; the ancient Persians; the Carthaginian soldiers; the Himalayan wrestlers; the athletes who trained for the ancient games, are all examples of the advantages of abstinence, and at the present day the result of the evidence is the same on every hand.

Good Health of the Sons of Temperance.

The report of the Sons of Temperance Grand Division of London, just issued, states that the transactions of the society verify in a remarkable degree what has been persistently stated at every stage of its progress, viz., that the practice of teetotalism is in strict accordance with the laws of general health, and conducive to a speedy restoration when the system has been weakened by disease. The operations of the division have indeed passed beyond the region of experiment, and their practical utility has been demonstrated by undeniable facts. The annual profits for the last four years have been: 1872, £578 5s. 5d.; 1873, £821 6s. 7d.; 1874, £877 4s. 10d.; and 1875, £1,236 3s. 1d. The sum now standing to the credit of the sick and assurance fund is £4,586 2s. 11¼d., viz., sick, £2,799 4s. 5½d.; and assurance, £1,786 18s. 5¾d.; of which £3,400 is invested

in Government securities, producing about £125 a-year interest, and which are of course convertible into cash at any moment. 282 members claimed on the sick fund to the extent of £956 1s. 8d.; of these fifty-five were cases of accident. "Taking the ordinary sickness as a basis, this will show exactly an average of four days of sickness per member during the year, or including accidents, 5¼. The bulk of the members are artisans who are exposed to all weathers, and many of whose occupations are scarcely distinguishable from those usually classed as hazardous (as proved by the fact that one in every twenty-seven members in the sick fund received pay for accidents during the past year), and it will have to be admitted that the practice of total abstinence has not only preserved many from being ill, but enabled them to recover much sooner than if they had been moderate drinkers." In the assurance department £588 12s. 11d. was received, and only £35 was paid in funeral claims, four of the members having died. This out of a membership of 1,632 makes less than one in 400 or 2½ per 1,000, a rate which, compared with the statistics of even our healthiest towns, and allowing for infant mortality, is almost too low to be credited. It is hardly possible to imagine a set of figures to be more gratifying than these. They only bear out the experience of other temperance institutions, and, indeed, wherever the lives of abstainers are separated from those of non-abstainers, the superiority of the former is incontestably proved. A rule of this order is that where the medical man deems intoxicating liquors necessary for the patient he himself has to provide them. It need not be added that under a rule of this description these liquors are very seldom required.

In a benefit society, near London, the club-doctor on one occasion ordered a member to take two or three glasses of port wine per day. He replied, "Doctor, do you order wine as food or medicine?" "Medicine," replied the doctor. "Well then, doctor, as you have contracted to supply the club with all the medicines, it is your duty to supply it." The doctor neither sent it himself nor even ordered it again for his patient.

But we need not seek for further evidence from the Arctic regions, tropical climes, or amongst those not personally known, to convince our readers that the use of intoxicating or fermented liquors, instead of producing an increase of mental or physicial power, decreases that power in proportion to the quantity taken. Observe the action of alcoholic drinks upon those around you. A young man, for example, has just taken what many term only a moderate quantity. As soon as any direct influence upon him is perceptible, what will be the result? Has he gained, or lost, mental and physical power? Watch his words and actions closely. There will be an unconnected or uncertain mode of speaking; his conversation will be either too fulsome or too abrupt; the answer to a question will not be a direct reply to the question asked; if he attempts to write, his writing will not

be kept straight on the line, the letters will be irregularly shaped; if adding a column of figures, memory will fail before he arrives at the top, and it will have to be added again and again before the addition will be correctly made. If walking, there will be now and then a slight inclination forward or sideways, a certain amount of giddiness, producing an impression that the arm of a friend might be serviceable; if driving, the reins, instead of being held well in hand, the hands will be rested on his knees, or there will be a slight carelessness, inducing any friend seated by his side to lose confidence in the driver; there will be a slight tendency to drowsiness, and a difficulty of sitting upright. If another glass is taken, his conversation will sometimes become vulgar, at other times boastful; he loses power of self-control; he cannot place his foot so firmly on the ground—he walks as if on board a rolling ship—is glad to lean against a post for support, or hold by a railing; he cannot walk erect, or if sitting by your side on a journey in a railway train, he leans on one side, his head coming somewhat nearer yours than is agreeable; as he leaves the carriage his walk is unsteady, and you begin to question if it will be safe for him to walk in a crowded thoroughfare, or if he had better not be assisted into a cab. If a little more is drank he begins to lose the use of his legs—he falls, or sleeps, and is rendered utterly powerless to help himself; in fact, in proportion to the amount drank power is lost.

Dr. Richardson, in one of his lectures delivered at the Society of Arts, thus scientifically describes the action of alcohol on the human frame:—"By common observation the flush seen on the cheek during the first stage of alcoholic excitation is presumed to extend merely to the parts actually exposed to view. It cannot, however, be too forcibly impressed that the condition is universal in the body. If the lungs could be seen, they too would be found with their vessels injected; if the brain and spinal cord could be laid open to view, they would be discovered in the same condition; if the stomach, the liver, the spleen, the kidneys, or any other vascular organs or parts, could be exposed, the vascular engorgement would be equally manifest.

"The action of alcohol continued beyond the first stage, the function of the spinal cord is influenced. Through this part of the nervous system we are accustomed, in health, to perform automatic acts of a mechanical kind, which proceed systematically even when we are thinking or speaking on other subjects. Thus a skilled workman will continue his mechanical work perfectly, while his mind is bent on some other subject; and thus we all perform various acts in a purely automatic way, without calling in the aid of the higher centres, except something more than ordinary occurs to demand their service, upon which we think before we perform. Under alcohol, as the spinal centres become influenced, these pure automatic acts cease to be correctly carried on. That the hand may reach any object, or the foot be correctly planted, the higher intellectual centre

must be invoked to make the proceeding secure. There follows quickly upon this a deficient power of co-ordination of muscular movement. The nervous control of certain of the muscles is lost, and the nervous stimulus is more or less enfeebled. The muscles of the lower lip in the human subject usually fail first of all, then the muscles of the lower limbs; and it is worthy of remark that the extensor muscles give way earlier than the flexors. The muscles themselves by this time are also failing in power; they respond more feebly than is natural to the nervous stimulus; they, too, are coming under the depressing influence of the paralysing agent; their structure is temporarily deranged, and their contractile power reduced.

"This modification of the animal functions under alcohol marks the second degree of its action. In young subjects there is now, usually, vomiting with faintness, followed by gradual relief from the burden of the poison.

"The alcoholic spirit carried yet a further degree, the cerebral or brain-centres become influenced; they are reduced in power, and the controlling influences of will and of judgment are lost. As these centres are unbalanced and thrown into chaos, the rational part of the nature of the man gives way before the emotional, passional, or organic part. The reason is now off duty, or is fooling with duty, and all the mere animal instincts and sentiments are laid atrociously bare. The coward shows up more craven, the braggart more boastful, the cruel more merciless, the untruthful more false, the carnal more degraded. '*In vino veritas*' expresses even indeed to physiological accuracy the true condition. The reason, the emotions, the instincts, are all in a state of carnival, and in chaotic feebleness.

"Finally, the action of the alcohol still extending, the superior brain-centres are overpowered; the senses are beclouded, the voluntary muscular prostration is perfected, sensibility is lost, and the body lies a mere log, dead by all but one-fourth, on which alone its life hangs. The heart still remains true to its duty, and while it just lives it feeds the breathing-power. And so the circulation and the respiration, in the otherwise inert mass, keeps the mass within the bare domain of life until the poison begins to pass away and the nervous centres to revive again. It is happy for the inebriate that, as a rule, the brain fails so long before the heart, that he has neither the power nor the sense to continue his process of destruction up to the act of death of his circulation. Therefore he lives to die another day."

The writer of the "Edinburgh Medical and Physical Dictionary" thus defines drunkenness:—"*Drunkenness*, a well-known affection of the brain, occasioned by drinking too freely of intoxicating liquors; it appears in different shapes in different constitutions—some it makes gay, some sullen, some furious."

"Persons drinking too much suffer, in the intervals of sobriety and near the return of their accustomed indulgence, a faintness and oppression about the præcordia which exceeds the patience of human nature to endure. This is usually relieved for a short time by a repetition of the excess, and to this relief, as to the removal of every long-continued pain, they who have once experienced it are urged almost beyond the power of resistance. As the liquor loses its stimulus the dose must be increased to reach the same pitch of elevation or ease, which increase proportionately accelerates the progress of all the maladies that drunkenness brings on. A person at all addicted to this vice, the moment he perceives the least tendency in himself to a growing inclination to drinking, should collect his resolution, and abandon the cup before the violent craving leads him on to the more advanced stages of the habit, and the fatal termination to which the gratification leads."

In some cases the effects are immediate; we have before us the case of a sergeant-major in the North-Devon Hussars who was poisoned by drinking brandy. We extract the following from the *Barnstaple Times*, October 3rd, 1876:—

"At the inquest the medical evidence proved that in the stomach of the deceased was found about three-quarters of a pint of sour-smelling dark fluid with an alcoholic odour, and that the deceased died in a state of collapse, caused by vomiting and exhaustion following upon an excessive dose of alcohol." The following truthful verdict was recorded:—"DIED FROM THE EFFECTS OF ALCOHOLIC POISONING."

Others destroy themselves prematurely by drinking to excess, in fact commit a slow suicide; while others blindly enter into the trade of innkeeper or publican notwithstanding the terrible mortality that follows. The most startling fact of all in reference to occupation and health is that which is told of the innkeepers and publicans (see page 58). "This class of the community," says Dr. Richardson in his lecture on trades, "is really at the lowest of the vital scale. The cause, unhappily, is not difficult to discover. There is nothing in the occupation of an innkeeper, as an occupation, which can account for the unhealthiness on ordinary grounds of labour. It is not an occupation which exposes those who fill it to physical danger, as the work of the miner or the engine-driver does. It is not an occupation which makes great demands on the physical organism like that of the blacksmith or rope-maker. It is not an occupation which leads men into solemn charges and responsibilities like those of the physician, solicitor, or clergyman. It is not an occupation which brings those who follow it to the miseries of want and starvation. WHY THEN IS IT THE OCCUPATION MOST NEARLY ALLIED TO DEATH? THE ANSWER IS SIMPLY TOLD. THE OCCUPATION IS THE ONE MOST NEARLY ALLIED TO ALCOHOL. This agent of death, which diffuses danger more or less amongst all classes of workers, tempts

most rapidly into destruction those who are the dispensers of it The influence of this one agent vitiates to some extent every calculation on the vitality of classes of men ; here it stands out on its own ground, telling its effects on its chosen servants, and teaching a lesson by the fruits it yields in them which, if the one lesson stood alone, were a sufficient recompense for all the labour through which the facts that have now passed before us have been collected."

The following are some of the Diseases induced by Alcoholic Liquors :—

Apoplexy
Congestion of Liver
Cerebral Disease
Cirrhosis of Liver
Drunkenness
Delirium Tremens
Diseases of Heart and Arteries
Diminished power of sustaining injuries
Disorders of Mucous Membrane
Dropsy
Dipsomania
Fatty Degeneration
Gastric Dyspepsia
Gout
Insanity
Inflammation of Liver
Inflammation of Brain
Indigestion
Kidneys, Diseases of
Loss of Appetite
Meningitis
Mental Debility in Offspring
Paralysis
Physical Deterioration
Rheumatism
Skin Diseases (numerous)
Sickness
Premature Decay and Death

The following are some of the Evils resulting from the use of Alcoholic Liquors :—

Accidents
Criminal Offences
Cruelty
Depression of Spirits
Destitution
Desolate Homes
Greater Liability to Epidemic Diseases
Idleness
Ignorance
Intemperance
Loss of Health
Loss of Mental Power
Loss of Moral Sensibility
Loss of Physical Strength
Manslaughter and Murder
Neglect of Wife and Children
Pauperism
Poverty
Profligacy
Prostitution
Recklessness
Religious Declension
Shipwrecks
Strife and Bloodshed
Waste of Wealth
Premature Death

The advantages of Abstaining from Alcoholic Liquors are, on the other hand, numerous, amongst which are—Health and Safety, Cheerfulness and Longevity.

These blessings alone would more than compensate for the trifling gratification of indulging in the use of intoxicating drinks. The following eloquent passage from the census abstract is important, and to the purpose:—"The prolongation of the life of the people must become an essential part of family and national policy. What is so bitter as the premature death of a wife—a child—a father? What dashes to earth so many hopes, breaks so many sweet alliances, blasts so many auspicious enterprises, as unnatural death from preventible causes?" The poets, as faithful interpreters of our aspirations, have always sung that in the happier ages of the world this source of tears shall be dried up, and if every home were without the terrible evils produced by the intoxicating cup we might indeed say, "Home! oh how sweet that word! What beautiful and tender associations cluster thick around it! Home! that word warms the heart and stirs the soul to its depths. The thought of it has proved a sevenfold shield to virtue. The very name of it has been a spell to call back the wanderer from the paths of vice."

In conclusion, in review of the evidence as to the process of manufacture, the waste occasioned by fermentation, the cost of production, the capacity of mankind to bear more mental and bodily labour without the use of intoxicating liquors, the terrible evils caused by their use, both physically and morally, we appeal to all to abstain from the intoxicating cup. We are not asking you to abandon a necessary article of diet, but a useless and injurious compound; not asking you to refuse "a good creature of God," but an invention of man. God in His wisdom has created grain to nourish and fruit to refresh; but man has taken this grain, intended to be used for food and to afford sustenance for cattle and poultry, for his use, and converted it into an alcoholic poison; man has taken the rosy apple, and crushed it for cider; has taken the mellow pear, and made it into perry; has taken the luscious grape, and changed it into an intoxicating wine. We simply ask you to use these things in their natural state, as the Divine Being in His infinite wisdom has provided them. We should be faithful and wise stewards; earth was created a paradise, but the evils in it are the result of man's infringement of the social, physical, and moral laws. God has given us iron and other minerals, which we can use in the form of ploughshares and pruning-hooks, and other articles of domestic utility, to aid in producing or carrying food and water to nourish and sustain our bodies; or we can convert these minerals into swords and spears, daggers and bullets, for the destruction of mankind. He has given us also grain and fruit, which we can appropriate either as a nutritious food or an injurious drink. It is our duty to use every blessing aright.

The very nature of intoxicating drink is to create a craving for more; in this consists

its danger. A lady, signing herself "A very temperate lady," writing to the *Lancet*, asks how much wine may be taken, not only without detriment, but with advantage, by a lady? We give an abstract of the reply: "The answer to the question cannot be an absolute one. An estimate by the sensation produced is beset with fallacies; the pleasurable sense of stimulation is absolutely misleading. If the sense of stimulation be the guide, use establishes tolerance, and a larger and yet larger quantity can be taken without the sense of pleasant stimulation being overpassed, but not without permanent damage to the nervous system. All use of alcohol between meals should be absolutely prohibited, &c. &c."

We advise a safer course—"Look not thou upon the wine when it is red, when it giveth his colour in the cup, when it moveth itself aright. At the last it biteth like a serpent, and stingeth like an adder." If, in the words of an eminent author, "it does impart a transient pleasure, this is an infinitesimal advantage by the side of an infinity of evil, for which there is no compensation."

We want you seriously to think of the mischief this drink has caused—of the homes it has desolated, the hearts it has broken, and of the cruelties inflicted under its influence. In its power of contamination its sources are endless; it meets the youth at the very first step he takes in life. We behold him, rich in promise, the delight of the circle in which he moves, and whose bosom glows with generous sympathies, stricken down by it; we see homes, that might otherwise be scenes of unity and peace, transformed into abodes of misery and strife; natural affection extinguished, conjugal love erased, parental hope blotted out.

We venture to say there is hardly a spot of our beloved country, or home of domestic quiet, no scene of social enjoyment, no movement of importance connected with public, private, or political life, but what feels directly or indirectly its baneful influences.

The loftiest intellects have quailed before it. Churches have been robbed of their ministers and members by it, Sunday-schools of their scholars and teachers; missionary efforts have been paralysed, wealth wasted, pauperism, crime, and insanity increased, health and life sacrificed; yet people *drink—still* drink this ensnaring fluid. All drunkenness proceeds simply from one cause, and one only, and that is—from drinking alcohol either in the shape of beer, wine, or spirits. The remedy is simple—*abstain*, change your *drink*, that is all that is required. We are not asking you to adopt a wild and Utopian theory which cannot be reduced to practice, Abstinence from the use of intoxicating drinks has been tested by experience, and the evidence of constantly accumulating facts fully prove that it is sound in principle, and not only safe but beneficial in practice.

We propose to remove the evil by the most certain means—that of cutting off the source from which it springs—to remove the effects by removing the cause. We aim at the production of that smiling scene—a land without a drunkard. Will you help us?

There is a luxury in that self-denial which lures the drunkard from his drink, and prevents others falling into his vice and degradation; remember that example is more powerful than precept—prevention is better than cure.

We will conclude in the words of the late venerable and Rev. W. Jay, of Bath, who said, "I believe that next to the glorious Gospel, God could not bless the world so much as by the abolition of all intoxicating drinks."

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