

Temperature - Alcohol - Physical Effect

ALCOHOL

From HOW TO LIVE:

RULES FOR HEALTHFUL LIVING BASED ON
MODERN SCIENCE---AUTHORIZED BY AND
PREPARED IN COLLABORATION WITH THE
HYGIENE REFERENCE BOARD OF THE LIFE
EXTENSION INSTITUTE, Inc.

BY

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*Eighteenth Edition
Completely Revised*

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WORLD LEAGUE AGAINST ALCOHOLISM
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"Our health ideals must not stop at the avoidance of invalidism, but should aim at exuberant and exultant health. Our aim should be to see not how much strain our strength can stand, but how great we can make that strength. Health ideals should rise from the mere wish to keep out of a sick bed to an eagerness to become a well-spring of energy. Only then can we realize the intricate wholesomeness and beauty of human life."

—From Introduction to First Edition of "How to Live."

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FOREWORD

THIS little volume reproduces, by the courteous permission of authors and publishers, the chapter on *Alcohol* from *How to Live*, the popular work on the maintenance and improvement of health.

The underlying principle of *How to Live* is that quoted from Disraeli in the foreword to the first edition: "*Public Health is the foundation on which reposes the happiness of the people and the power of a country. The care of public health is the first duty of a statesman.*"

Hence, *How to Live* discusses practical health questions such as housing, clothing, foods and nutrition, poisons from within and without (including alcohol), weight regulation, activity and rest, the general rules of hygiene, mortality tendencies among the nations, eugenics. Ten supplementary chapters discuss special subjects more in detail, and it is one of these chapters, that on *Alcohol*, which is reproduced here, from the eighteenth edition (1925).

Seventeen previous editions of *How to Live* comprising 180,000 copies have been printed and sold in ten years and placed in homes, schools, colleges, universities, libraries. One reason for its wide use is doubtless the fact that it represents not merely the knowledge and conclusions of one or two men, but the composite judgment of more than seventy authorities on the subject, as the book is written in collaboration with the HYGIENE REFERENCE BOARD of the LIFE EXTENSION INSTITUTE, composed, as the accompanying list of members shows, of some of the most distinguished specialists of the world.

Further, *How to Live* takes to its readers up-to-date information based on modern scientific knowledge. "The authors decided at the outset," said the preface to the fifteenth edition, "to show the courage of their convictions and those of the whole Hygiene Reference Board. Even when certain members of the Board would have preferred, because of life-long habits of extreme scientific conservatism, to re-

frain from changing their own personal customs and those of the people, the book has consistently and unhesitatingly given the conclusions of physiological science instead of taking counsel of tradition or of easy compromise with accepted indulgences. . . . The authors will welcome comment and criticism, but caution all who are disposed to question its material, especially scientific men, that beneath its popular form there lies first-hand scientific information and research and a certain sifting of material by the Hygiene Reference Board."

The same policy has been followed in this eighteenth edition of *How to Live*. It is believed that this background of the chapter on *Alcohol*, as well as of other portions of the book, entitles it to special consideration by thoughtful readers.

FROM THE AUTHORS' PREFACE TO THE EIGHTEENTH EDITION (1925) OF HOW TO LIVE

The book *How to Live* is approaching the tenth anniversary of its birth. It was born at a critical time in the history of preventive medicine and hygiene, when the minds of those interested in public health were turning toward the solution of individual rather than community health problems. . . .

During the ten years that the book has been carrying its appeal to the public for higher ideals of living there has been a tremendous forward movement along these lines [education, hygienic and correction of individual defects, sanitation, and periodic physical examinations] reflected in substantial gains in the vitality of the nation. . . . These movements are of practical interest to all who may read this book. There are many people who still take a cynical view of such activities, holding the mistaken notion that the death-rate is more or less fixed, that the life-span and health-span of man are governed by immutable laws, and that it is not worth while for a man to go to any great trouble in ordering his mode of living. The tangible results accomplished, however, by the application of scientific methods show the superficiality of such views and the worthwhileness of a general program for healthful living that truly represents the consensus of scientific judgment.

The present volume constitutes a complete revision of the text. . . . The seventeenth edition of the book was submitted to members of the Hygiene Reference Board for special suggestions as to improvement, and important contributions were received from this source. In addition, all matters of doubt with regard to emphasis or interpretation were referred to specialists on the Board for critical consideration. The book *How to Live* therefore continues to represent the consensus of scientific judgment of the leading authorities on hygiene.

IRVING FISHER.
EUGENE LYMAN FISK.

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SECTION V

ALCOHOL

Statistical and laboratory evidence shows very clearly to the unprejudiced mind that even the "moderate" use of alcohol by any large group of people will increase the death-rate in these groups as compared to a similarly constituted group using no alcohol.

One of the most satisfactory ways of noting the influence of alcohol on longevity is by the records of life insurance companies wherein the death-rates among those abstaining from alcohol have been computed as compared to those of the general class of insured lives.

Life Insurance Experience

In considering such figures it is well to bear in mind that the general, or non-abstaining, class comprises only those who are accepted as standard healthy risks and so far as could be determined were at least moderate in their use of alcohol. Such experiences have been carefully compiled by the following companies: United Kingdom Temperance and General Provident Institution of London;¹* Sceptre Life Association;² Scottish Temperance Life Assurance Company of Glasgow;³ Abstainers and General Life Assurance Company of London;⁴ Manufacturers Life Assurance Com-

* The notes ("1" etc.) refer to the publications listed at the close of the section.

pany of Canada;⁵ Security Mutual Life Insurance company of Binghamton, New York.⁶

The Northwestern Mutual Life Insurance Company of Milwaukee has computed the comparative mortality⁴⁹ among abstainers and those using alcohol in varying degrees within the limits of so-called moderation.

The comparative mortality among abstainers and non-abstainers in several of these companies is shown in the charts exhibited in this section.

It is probable that the heavier mortality among non-abstainers as compared with abstainers is not wholly due to the chemical effect of alcohol on the tissues, but in some degree to collateral excesses (especially those resulting in infection from the diseases of vice) as well as a more careless general manner of living engendered by, or associated with, alcoholic indulgence and that, furthermore, those who indulge in so-called "moderation" are open to greater temptation to increased indulgence and final excess than those who abstain altogether.

These life insurance statistics have been criticized by medical men and statisticians having no expert knowledge of the methods and principles of life insurance selection, on the ground that the groups studied are classified as to their habits with regard to the use of alcohol at the time of acceptance for insurance—not throughout life. This is a naive criticism, wholly ignoring one of the gravest risks of alcoholic indulgence, namely, increasing indulgence, or habit-formation. This is just as positive a risk as cirrhosis of the liver. It is a functional derangement of the brain and nervous sys-

tem; and to exclude it as a factor of risk among alcohol-users by confining the mortality investigation of a moderate-drinking class to those who are successful in resisting the effect of alcohol, would be to destroy the statistical validity of the study from a life insurance standpoint—and also from a sociological standpoint. It would be just as logical to confine the investigation to those who are successful in resisting the effect of alcohol on the liver.

It has also been alleged that the lower mortality among abstainers was due solely to a more conservative habit of living, and that this class is largely composed of people in favorable or preferred occupations, such as clergymen and teachers. The experience of the Security Mutual of Binghamton, New York, does not support such an hypothesis. During a twelve years' experience the mortality among the abstainers was one-third that of the tabular expectation, and their occupations were classified as follows:

Clergymen	4 per cent
Farmers	19 " "
Clerks	15 " "
Miscellaneous (earning \$15 to \$25 per week)	62 " "

Mr. Roderick McKenzie Moore, Actuary of the United Kingdom Temperance and General Provident Institution,⁷ has this to say regarding the abstainers' class in that company:

The total abstainer class was not nursed or favored to produce a low mortality. So far as could be determined (and many of the risks came in personal contact with the officers) they were of the same general class as the non-

abstainers. They were written by the same group of agents, for the same kind of policies, for the same average amounts, and were in the same general walks of life, and of the same general financial condition. They were almost equal in numbers to the general class, and did not form a small high-grade section of the policy-holding body. On the contrary, greater care was exercised in the selection of the non-abstainers because of the less favorable experience anticipated on them, and many borderline risks were accepted in the abstaining class because of a feeling that their abstinence would neutralize some unfavorable factor.

The accompanying tables contrast the experience of the "Temperance" with that of the "General" section of the United Kingdom Temperance and General Provident Institution.

UNITED KINGDOM TEMPERANCE AND GENERAL PROVIDENT INSTITUTION, 196 STRAND, LONDON
MORTALITY EXPERIENCE UNDER ORDINARY WHOLE LIFE POLICIES, 1866-1917

Years	TEMPERANCE SECTION			
	Expected* Claims		Actual Claims	
	Policies	Sums Assured	Policies	Sums Assured
1866-70 (5 years)	549	100,446	411	72,676
1871-75 (5 years)	723	139,819	511	97,773
1876-80 (5 years)	933	193,748	651	126,142
1881-85 (5 years)	1,179	268,272	835	168,003
1886-90 (5 years)	1,472	359,061	1,015	259,114
1891-95 (5 years)	1,686	430,211	1,203	278,815
1896-00 (5 years)	1,900	505,332	1,402	370,374
1901-05 (5 years)	2,021	574,144	1,456	378,487
1906-10 (5 years)	2,291	739,414	1,504	441,838
1911-15 (5 years)	2,609	859,332	1,638†	520,974
1916-17 (2 years)	1,098	380,884	822‡	255,835
52 years	16,461	£4,550,663	11,448	£2,970,031

Years	GENERAL SECTION			
	Expected Claims		Actual Claims	
	Policies	Sums Assured	Policies	Sums Assured
1866-70 (5 years)	1,008	196,352	944	230,297
1871-75 (5 years)	1,266	257,450	1,350	255,062
1876-80 (5 years)	1,485	311,326	1,480	322,644
1881-85 (5 years)	1,670	367,214	1,530	327,100
1886-90 (5 years)	1,846	429,046	1,750	388,913
1891-95 (5 years)	1,958	476,558	1,953	462,201
1896-00 (5 years)	2,058	535,686	1,863	477,145
1901-05 (5 years)	2,221	613,207	1,961	522,820
1906-10 (5 years)	2,282	681,932	1,900	544,946
1911-15 (5 years)	2,228	767,157	1,870‡	641,139
1916-17 (2 years)	863	317,510	738‡	283,609
52 years	18,885	£4,953,438	17,319	£4,455,876

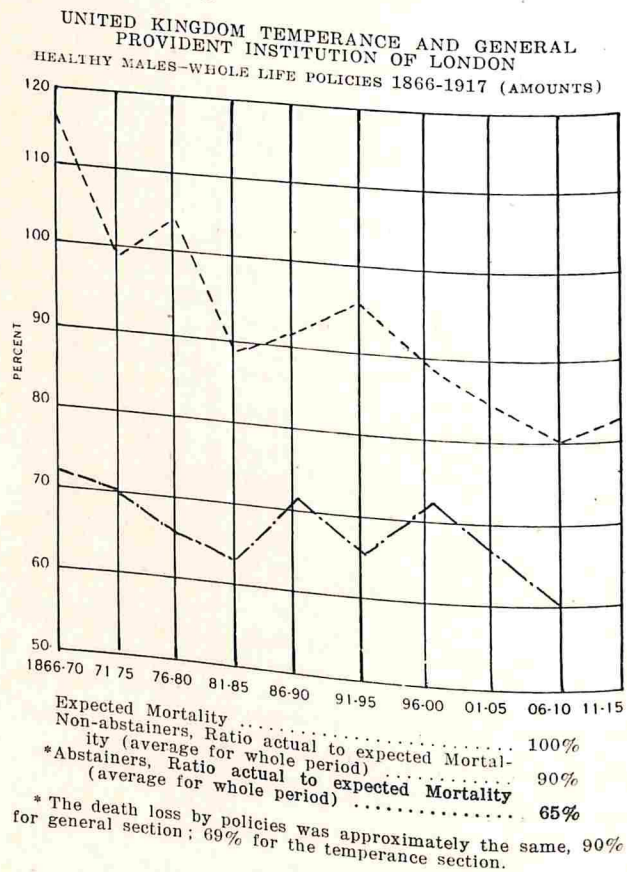
* The term "expected" deaths means the number of deaths that would occur according to the actuarial tables.

† Including 23 War Claims for £20,250, Temperance Section; and 21 War Claims for £19,900, General Section.

‡ Including 91 War Claims for £26,335, Temperance Section; and 63 War Claims for £32,504, General Section.

It will be noted that only 11,448 "actual" claims were made in the Temperance section instead of 16,461 "expected" according to actuarial tables, or only 69 per cent; while 91 per cent were made under the General section (i e., 17,319 actual against 18,885 expected). It is also true that this superiority of the Temperance section shows itself in every period contrasted, both as to the number of policies and the amounts.

The following chart shows graphically the contrasts of the above table.



To turn to another company—the Abstainers and General Life—the mortality experience on the lives assured during the 33 years, 1884-1916, is reported by the consulting actuary as follows:

ABSTAINERS AND GENERAL LIFE ASSURANCE COMPANY
ABSTAINERS DIVISION OF THE ORDINARY DEPARTMENT

Age	Years of Life under observation	Deaths "Expected" under the HM Table of the Institute of Actuaries	Actual Deaths		Ratio of Actual to "Expected" Deaths War excluded
			War included	War excluded	
10-24	19,767	123.1	62	42	34.1
25-34	71,685	544.7	217	184	33.8
35-44	65,380	656.5	338	225	34.3
45-54	35,145	532.5	227	223	41.9
55-64	12,561	341.6	192	191	55.9
65-90	3,538	241.5	170	170	70.4
Total	208,076	2,439.9	1,097	1,035	42.4

It will be noted that the actual deaths were only 42.4 per cent of the expected. This is a very low percentage, although modern companies often find their percentage somewhat below the 100 per cent expected by the old mortality tables.

The mortality experience of a third company, covering 35 years, follows:

SCOTTISH TEMPERANCE LIFE ASSURANCE CO., LIMITED,
GLASGOW 1883-1917

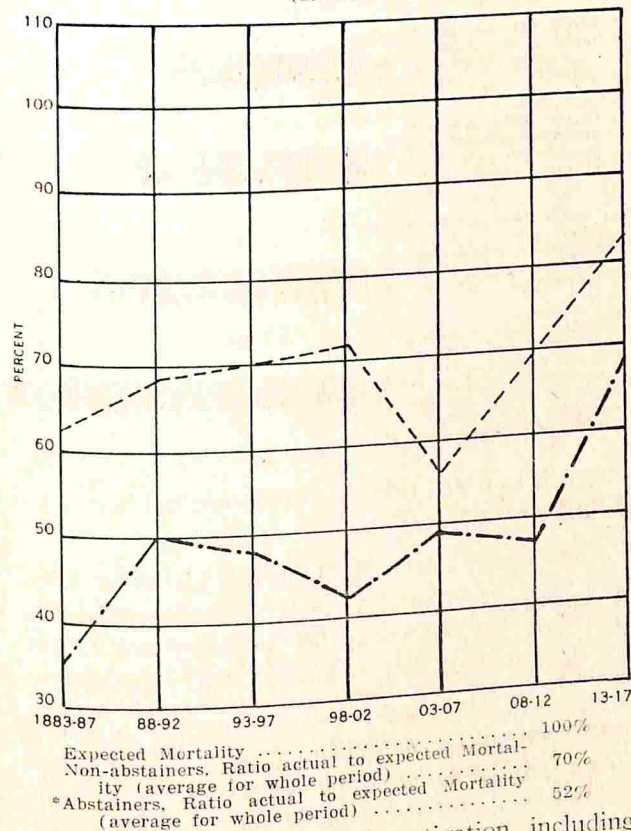
Period	Temperance Section			General Section		
	Claims Ex-pected*	Actual Claims	Ratio of Actual to Ex-pected	Claims Ex-pected*	Actual Claims	Ratio of Actual to Ex-pected
1883-1887	43	15	35%	11	7	62%
1888-1892	159	79	50	49	33	68
1893-1897	290	138	48	95	67	70
1898-1902	444	188	42	164	118	72
1903-1907	609	298	49	223	123	55
1908-1912	770	356	46	271	186	69
1913-1917	926	627†	68	317	260†	82
	3,241	1,701	52%	1,130	794	70%

Here we see the Temperance Section enjoying a 52 per cent experience as against 70 per cent for the General Section, the superiority showing itself in each period.

The following chart shows the contrasts of the above table, the abstainers' curve being always below the non-abstainers'.

* According to tables compiled by the Institute of Actuaries from the experience of twenty leading life assurance companies.
† Including war mortality.

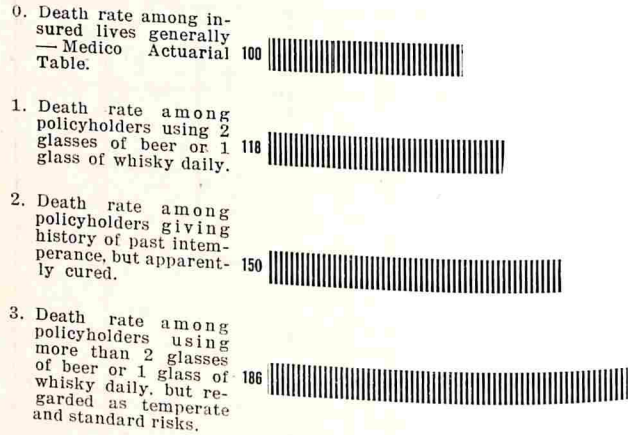
THE SCOTTISH TEMPERANCE LIFE
ASSURANCE COMPANY OF GLASGOW
HEALTHY MALES WHOLE LIFE POLICIES 1883-1917
(LIVES)



In the Medico-Actuarial Investigation, including forty-three American life insurance companies, the combined experience on users of alcohol has been compiled, with very interesting results.^{8†}

* Including war mortality.
† See also references Nos. 9, 10, 11, 12 and 13.

COMPARATIVE MORTALITY AMONG USERS OF ALCOHOL
43 AMERICAN LIFE INSURANCE COMPANIES, 1885-1905*



It will be noted that the experience has been subdivided as follows:

First: Individuals who took two glasses of beer, or a glass of whisky, or their alcoholic equivalent, each day. In this group the mortality was 18 per cent in excess of that of insured lives generally.

Second: Those who were accepted as standard risks, but who gave a history of occasional alcoholic excess in the past. The mortality in this group was 50 per cent in excess of the mortality of insured lives, in general—equivalent to a reduction of over four years in the average lifetime of the group.

Third: Men who indulge more freely than the preceding group, but who were considered acceptable as standard insurance risks. In this group the

mortality was 86 per cent in excess of that of insured lives generally. In short, we find the following increase of mortality over the average death rate among insured risks generally:

Steady moderate drinkers but accepted as standard risks	86 per cent
Having past excesses	50 " "
Very moderate drinkers	18 " "





This means that steady moderate drinkers who exceed two glasses of beer or one glass of whisky daily are not, on the evidence, entitled to standard insurance, but should be charged a heavy extra premium.

In these groups, the death-rates from Bright's disease, pneumonia, and suicide were higher than the normal.

The experience of the Northwestern Mutual Life Insurance Company is consistent with the evidence derived from other life insurance sources. It is, however, for this country, more informing than the Medico-Actuarial experience, inasmuch as it covers the mortality on total abstainers. This company carefully separates its policyholders into groups according to their habits as to the use of alcohol, and the comparative death rates in the various classes are contrasted in simple form in the following chart.⁴⁹

EXPERIENCE OF THE NORTHWESTERN
MUTUAL LIFE INSURANCE COMPANY—

286,392 POLICIES ISSUED 1885-1900.—EXPOSED TO 1915

Death rate in group A <i>Total Abstainers</i>	100	
Death rate in group B <i>Moderate Users</i>	115	
Death rate in group C <i>Regular Beer Drinkers</i>	132	
Death rate in group D <i>Regular Spirit Drinkers</i>	141	

In this experience the groups were classified as follows:

A. *Total Abstainers.*

B. *Moderate Users.*—Users of wine only, not exceeding four glasses of light or three of heavy wine daily.

Beer or light ale, not daily or more than three in any one day at most.

Porter or heavy ale, not daily or more than two in any one day at most.

Light wine, not daily or more than four in any one day at most.

Heavy wine, not daily or more than three in any one day at most.

Whisky, brandy, etc., not daily or more than two in any one day at most.

Daily, one glass, either beer or wine or whisky.

In Group B the mortality was 15 per cent above that of the total abstainers' group.

C. *Regular Beer Drinkers.*—Persons taking four or more glasses of beer or ale in any one day, or five or more a week, or a daily use of one or more.

Regular beer-drinkers who also take wine or whisky occasionally, but not enough for class D.

No "wine-only" cases in this group.

In Group C the mortality was 32 per cent above that of the total abstainers' group.

D. *Regular Spirit Drinkers.*—Whisky, brandy, gin, etc., daily, or three or more "in any one day at most."

Wine daily, five glasses light wine, four of heavy, or more.

Two glasses which may be either whisky, wine, or beer daily.

In Group D the mortality was 41 per cent above that of the total abstainers' group.

As already stated, the figures derived from life insurance experience have been questioned—by British authorities more particularly—but apparently, as suggested, without any sufficient injury as to the technique of life insurance selection or the actual treatment of these figures by the eminent physicians, actuaries, and life insurance experts who collected and studied them. As a matter of fact, these groups are far more homogeneous and reliable as a basis for study than those presented by Raymond Pearl,⁵⁰ in a recent contribution purporting to show that moderate drinkers live longer than abstainers.

The chief fallacies in Professor Pearl's thesis are these:

The so-called "moderate" drinking group in his studies are practically *total abstainers*; that is, they rarely use alcohol, and it is not strange that they should show only slightly different death-rates, even lower death-rates, than the total abstaining group. The steady moderate drinkers are thrown in with the heavy drinkers, thus still further obscuring the significance of the results, as this group is undoubtedly the most hazardous of the moderate drinking class.

The groups are too small to warrant a broad generalization as to the significance of the results, only 2,047 lives being included in the entire study, as compared to 2,000,000 lives in the Medico-Actuarial study and 286,000 lives in the study of the Northwestern Mutual Life Insurance Company. The sub-groups are so small as to be practically useless for statistical purposes. For example, there were only 271 male total abstainers and only 26 women among the heavy-drinking class. To construct life tables from such meager material is wholly unwarrantable; and obviously a statistical fallacy is involved in classifying individuals as to the habit followed throughout life as compared to the habit known to be established at a given period of time marking the commencement of the mortality experience.

Laboratory and Clinical Evidence

Insurance experience seems consistent with accurate laboratory evidence available regarding the physiological effect of alcohol in moderate doses.

The higher mortality among moderate drinkers is only what we would naturally expect to find, in the light of the most recent knowledge regarding the effects of alcohol upon the human organism—not merely in the direct causation of disease, but in lowering the defenses against it and increasing the liability to accident and the tendency to careless living.

To interpret correctly the mortality statistics relating to moderate drinkers and total abstainers, one must have some knowledge of the physiological effects of alcohol in moderate doses—a knowledge which is often lacking in those who assume to interpret such statistics.

For example: If it could be shown that small doses of alcohol produce no ascertainable ill-effects upon the human organism, the higher mortality among the moderate drinkers as compared to total abstainers might have to be explained as due to some as yet unrecognized cause or causes other than alcohol. But if laboratory and clinical evidence shows that alcohol in moderate quantities (social moderation) produces definite ill-effects—such as lowering the resistance to disease, increasing the liability to accident, and interfering with the efficiency of mind and body, and thus lessening the chances for success in life, to say nothing of any toxic degenerative effect upon liver, kidneys, brain, and other organs—the excess mortality that unquestionably obtains among moderate drinkers as compared to total abstainers may, with a high degree of probability, be ascribed chiefly to alcohol.

It is not possible here to present all the evidence,

but the following items will serve to clarify these questions.

Kraepelin^{14*} and his pupils have contributed most extensively to our knowledge on this subject. According to such authorities, a half to a whole liter of beer is sufficient to lower intellectual power, to impair memory, and to retard simple mental processes, such as the addition of simple figures. Habitual association of ideas and free association of ideas are interfered with.

Vogt¹⁹ confirmed these findings in experiments on his own person—15 cubic centimeters (about 4 teaspoonfuls) of whisky on an empty stomach, or 25 cubic centimeters with food, being sufficient to distinctly impair the power to memorize.

Careful and exact experiments have shown the influence of moderate doses of alcohol in lessening the amount of work performed by printing compositors. There has also been shown a disturbance in the sequence of ideas. The time that elapses between an irritation and the beginning of a responsive movement can be measured within one one-thousandth of a second. According to Aschaffenburg,²⁰ under the influence of even very small doses of alcohol this reaction period is disturbed and at first shortened. It is below the normal, the acceleration being attained at the expense of precision and reliability. Indeed, the reaction is often premature, and constitutes a false reaction—"the judgment of the reason comes limping along after the hasty action."

It is now conceded that alcohol is not a real brain

* See also references Nos. 15, 16, 17 and 18.

stimulant, but acts by narrowing the field of consciousness. By gradually overcoming the higher brain elements the activities of the lower ones are released, hence the so-called "stimulation" and the lack of judgment and common sense often shown by those even slightly under the influence of alcohol. The man who wakes up under alcohol is really going to sleep, as far as his judgment and reason are concerned. Complete abolition of consciousness is brought about by sufficient doses, as when ether or chloroform is taken.

Under moderate doses, muscular efficiency is at first increased a little and then lowered, the total effect being a loss in working power, as shown by the experiments of Dubois, Schnyder,²¹ Hellsten,²² and others.

Muller, Wirgin, and others²³ have shown that alcohol restricts the formation of anti-bodies (the function of which is to resist infection in the blood) in rabbits; and Laitinen²⁴ has shown that the prolonged administration of small doses in men (15 cubic centimeters) is sufficient to lower vital resistance, especially to typhoid fever.

Rubin²⁵ has demonstrated that alcohol, ether, and chloroform, injected under the skin, render rabbits more vulnerable to streptococcus (blood poison) and pneumococcus (pneumonia) infection; Stewart,²⁶ that small amounts lower the resistance to tuberculosis and streptococcus infection; Craig and Nichols,²⁷ that moderate doses of whisky were sufficient to cause a negative Wassermann reaction in syphilitic subjects (since confirmed by numerous observers); Fillinger²⁸ found the resistance of red

blood cells much reduced after the administration of champagne to healthy human subjects. Similar results were found in dogs and rabbits.

Weinburg²⁹ confirmed these results by the same methods, showing that 20 per cent of the red cells lose their resistance after the administration of 450 cubic centimeters of champagne.

Parkinson,³⁰ in a series of careful tests, failed to establish any influence on the capacity of the white blood cells to destroy bacteria, except when large doses or continuous moderate doses were taken.

Konrádi,⁴⁷ has found that comparatively few antibodies against cholera germs develop in persons who consume alcohol daily in fairly large quantities and who had been inoculated against cholera. Pamboukis has observed that alcoholics are not favorable subjects for inoculation against rabies. The Pasteur Institute in Budapest has made similar observations, based on twenty-five years' experience.

On the heart and circulation alcohol acts as a depressant, increasing the rate, but not the force, of the pulse. It causes depression of the nerve center controlling the blood-vessels and thus lowers blood-pressure. Large doses cause paralysis of these nerves and of the heart.

This has been further emphasized by the studies of Reich³¹ at the University of Munich, who found that the resistance of blood-cells to salt solution and to typhoid bacilli was less among alcohol users than among total abstainers.

Miller and Brooks³² found from small doses (6 to 12 cubic centimeters absolute alcohol) an increase in blood pressure in conscious (unanesthetized) ani-

mals, contrary to the findings of Crile,³³ Cabot,³⁴ Dennig,³⁵ Hindelang and Grünbaum, Alexandroff³⁶ and others, *in man*; but the amounts were small and variable, according to individual susceptibility, *thus showing the drug to be, even on such evidence, uncertain and unserviceable as a heart stimulant.*

Atwater and Benedict,^{37*} and Mendel,⁴⁰ have shown that alcohol is a "protein sparer," and can, to some extent, take the place of fats and carbohydrates. This is what is meant by calling alcohol a "food." Always, however, it fails to pass some test by which true foods are measured. Apart from its effect on the nervous system, among which must be figured its action on the blood vessels which causes a *loss of body heat*, Mendel has shown that in moderate doses (96 cubic centimeters daily) it increases the output of uric acid and allied (purin) substances—a fact which distinguishes it from other foods. These poisonous or drug effects must always be considered, together with any alleged nourishing effects. Alcohol is still used by some as a rapidly available fuel food in fevers, and when ordinary foods can not be readily digested and made available. But this is done to a much less degree than formerly, now that its narcotic and poisonous effects are more fully understood. Sugar and water often serve quite as useful a purpose.

The researches of Hardin and Silva also have lately shown that there are in fact no vitamins in beer, as has been claimed, and thus disappears another alleged "food value."

Lately further light has been thrown upon the

* See also references Nos. 38 and 39.

alleged food-value of alcohol. The one great therapeutic stronghold still held by alcohol is diabetes. Even Ewald, and others strongly opposed to the use of alcohol generally as a therapeutic weapon, concede its value in this disease because of its alleged action in preventing the development of acidosis when starches and sugars are withdrawn or greatly reduced in diet. That this view, however, is based on dogma and not on scientific fact has been shown by Higgins, Peabody, and Fitz⁵⁹ in their experiments at the Carnegie Institution and at the Peter Bent Brigham Hospital, where carefully controlled experiments on normal human beings showed not only an absolute lack of acidosis-preventing influence on the part of alcohol, but an actual acceleration of such conditions by its use, the measurements being made by the most delicate and accurate methods available to science (oxygen tension of alveolar air).

This evidence concerns normal people as well as diabetics, because the trend of modern diet is toward the overuse of acid-forming foods, such as eggs, meat, fish, cereals, and an insufficient use of base-forming foods, such as most fruits and vegetables. Those who eat inordinately of these concentrated flesh foods and also drink alcohol, are increasing the tendency to acidosis, a condition which, in its milder form, is often given the absurd misnomer of "biliousness." (Bile never has anything to do with the symptoms usually charged against it.)

Further authoritative scientific sources of evidence relating to the effect of alcohol on mankind are the reports of the committee appointed by the

Central Control Board (Liquor Traffic) of Great Britain, headed by Lord D'Abernon,⁴⁸ and composed of eight other eminent educators, physiologists, pharmacologists, and psychiatrists.

The first report issued in 1918 is entitled *Alcohol, Its Action on the Human Organism*. It is extremely cautious and conservative in its tone, yet the following main conclusions were expressed:

(1) That the main action of alcohol (apart from the effects of its continued excessive use) is confined to the nervous system;

(2) That alcohol is narcotic rather than stimulant in action.

(3) That its nutritional value is strictly limited.

(4) That its habitual use as an aid to work is physiologically unsound.

(5) That the ordinary use of alcohol should not only be moderate, but should also be limited to the consumption of beverages of adequate dilution, taken at sufficient intervals of time to prevent a persistent deleterious action on the tissues.

The comments in this report on the statistical aspects of the question were admittedly not exhaustive or of an expert character and the immense weight of testimony contributed by the Medico-Actuarial Investigation of forty-three American companies is wholly ignored.

The comment on the United Kingdom Temperance and General Provident Institution, the most important British experience, is confined to the figures for 1848 to 1901.

A subsequent revised report of the Advisory Committee of the Central Control Board is even stronger in its testimony.⁵² This report supplies

new evidence elicited by recent research, which shows:

(1) That the rate at which alcohol is absorbed into the blood-stream can be modified by the conditions under which alcoholic beverages are drunk; the slower the absorption, the less the degree of inebriation.

(2) That food in the stomach acts as a dilution, certain kinds of food exercising a greater effect than others; that milk, or bread and milk, taken two and a half hours before alcohol, caused absorption of alcohol in the blood to be slower than was observed under any other experimental conditions; and that meat, so frequently taken with alcohol, has only a slight influence on absorption.

(3) That in experiments on the effect of alcohol on speed and accuracy in typewriting, the disturbing influence of the drug was much diminished when alcohol was taken with or soon after food.

(4) That the popular belief that malted liquors are good for nursing mothers is not confirmed by scientific evidence.

(5) While it is not denied that alcohol is a food in the sense that it is a fuel the body can use, when wine aids toward recovery after illness, this is held to be chiefly because it makes the patient more contented and improves the appetite for ordinary foods.

(6) That the use of alcohol in hospitals has been much reduced without injury to patients, and in some hospitals, abandoned altogether; that alcohol is not, like quinin, a specific cure for any disease.

(7) The popular opinion that alcohol in excess is more dangerous to people of sedentary habits is not confirmed; and it is pointed out that active exercise creates an increasing demand for the drug as a supposed aid to labor.

(8) That while other influences besides alcohol have to be considered, the experience of one insurance company confirms the view that total abstainers live longer than non-abstainers.

(9) The extreme difficulty of forming a scientific con-

clusion as to the effect of the daily glass of beer or spirits on the length of life is pointed out, but the general conclusion is that alcoholic beverages are not necessary for healthy life, and that they are definitely dangerous for children and for most persons of unstable nervous system.

The verdict of the profession most qualified to pass judgment on the matter, the medical profession, is no longer in doubt.

At the meeting of the American Medical Association held on June 6, 1917, Dr. Charles H. Mayo, the noted surgeon, in his presidential address stated that the only legitimate use for alcohol was in the arts and sciences, and that its use in medicine had become greatly restricted because other less menacing drugs and remedial measures could be used instead. He stated that the advisability of national prohibition as a war measure was beyond discussion, and that the medical profession would welcome national prohibition. These expressions brought enthusiastic response from the assembled physicians, which left no doubt as to their sentiments.

Entirely apart from moral grounds, the judgment of the majority of scientific men is against even the moderate use of alcohol, and this judgment, long withheld through scientific conservatism, but now unequivocally and boldly stated by the distinguished surgeon who has received the highest mark of confidence that the medical profession can offer, should be accepted by the lawgiver, business man, and patriotic citizen who wishes to best serve his fellow men with his total and maximum efficiency of mind and body.

That this was not merely the opinion of an individual or of a faction is shown by the presidential address of Dr. Arthur Dean Bevan before the same association in June, 1918, in which he said:

I want to plead for the united action of the organized medical profession of this country to secure protection by law against the injury that drink is doing to our people, not as a political measure but as the most important public health measure that could be secured. In this crisis, when we and our allies are fighting not only for ourselves but also for humanity and civilization, we must organize the entire nation in the most efficient way possible, and this can not be done without eliminating drink.

There can be no doubt of the injurious effects of alcoholic drinks on both the physical and mental well-being of our population. There can be no doubt that the greatest single factor we can control in the interests of the public health of the nation would be the elimination of alcoholic drink.

Each member of the medical profession, each county medical society, each state medical society, should take an active part in the propaganda against drink and secure national prohibition not years from now, but now, when it is so badly needed and will accomplish so much good not only for our boys in khaki and in blue, but for the nation in arms.

Subsequently the House of Delegates of the American Medical Association passed the following resolution:

Whereas, We believe that the use of alcohol is detrimental to the human economy, and whereas its use in therapeutics as a tonic or stimulant or for food has no scientific value; therefore

Be it resolved, That the American Medical Association is opposed to the use of alcohol as a beverage; and

Be it further resolved, That the use of alcohol as a therapeutic agent should be further discouraged.

Following the enactment of prohibition, there was

some reactionary sentiment among physicians, mainly on account of the fact that the Volstead Act restricts freedom in prescribing alcohol.

A questionnaire as to the therapeutic value of alcohol was sent out by the American Medical Association to its members in December, 1921. The results of the questionnaire are summarized in the *Journal of the American Medical Association*⁵³ as follows: "Questionnaires were sent to 53,900 physicians, representing 37 per cent of the physicians of the United States, and 31,115, or 58 per cent, were returned. Of physicians indicating the form of their practice, 25,889, or 83 per cent, were general practitioners, 2,401 were engaged in surgical specialties, and 2,825 in the nonsurgical specialties."

The total vote cast in all States on the question "Do you regard whisky as a necessary therapeutic agent in the practice of medicine?" was 30,843; 15,625, or 51 per cent answered yes, and 15,218, or 49 per cent, answered no.

The total vote cast in answer to the question "Do you regard beer as a necessary therapeutic agent in the practice of medicine?" was 30,597; of these 22,663, or 74 per cent, were negative, and 7,934, or 26 per cent, were affirmative.

In answer to the question "Do you regard wine as a necessary therapeutic agent in the practice of medicine?" the total vote cast was 30,451; 20,648, or 68 per cent, voted no, and 9,803, or 32 per cent, voted yes.

Commenting on the final report, the *Journal* says: "The vote in twenty States was affirmative for whisky, while in twenty-nine the majority vote was

negative. The vote in the larger cities and rural communities is interesting. In regard to the necessity of whisky as a therapeutic agent, 58 per cent of the vote in cities is in the affirmative, while of the vote in the rural districts, 54 per cent is in the negative. For wine and beer, however, the majority in both cities and rural districts is decidedly in the negative, the percentage of negative votes being higher in the rural districts."

On the basis of the returns, it was estimated that only 25 to 30 per cent of the physicians of the country hold federal permits, showing how easily the majority of physicians are able to practise medicine without whisky.

The Carnegie Institution Nutrition Laboratory Experiments

In 1913-14 there was undertaken at the Nutrition Laboratory of the Carnegie Institution at Washington a very broad and comprehensive study of the effect of moderate doses of alcohol on the healthy and normal human body. The immense scope of the investigation as originally planned may be judged by the fact that under the physiological division of the research, as laid out by Professors Raymond Dodge and F. G. Benedict, there were one hundred and sixty subdivisions under seven main sections. The program was arranged after conferences, either in person or by letter, with the leading physiologists of the world.

The psychological program carried out with the cooperation of Dr. F. Lyman Wells,⁴¹ and the further studies of Dr. Walter R. Miles⁴² covering both

physiological and psychological phases of the alcohol problem have been completed and the findings published. The results of these researches must be accepted as scientific testimony, free from all bias or even remote suggestion of propaganda.

The Dodge and Benedict researches were based upon experiments with moderate doses of alcohol (30 cubic centimeters, or about 8 teaspoonfuls, and 45 cubic centimeters) upon ten normal subjects, very moderate users of alcohol, and may be summarized as follows:

A very simple reflex act, the "knee-jerk," a nervous mechanism controlled by a center at the lower level of the spinal cord, was markedly depressed, the time of response being increased 10 per cent and the thickening of the muscles concerned in the act decreased 45 per cent. In some subjects the larger dose, 45 cubic centimeters, practically abolished the knee-jerk.

The eyelid reflex, elicited by a sudden noise, showed the next largest effect, the time of response being increased 7 per cent and the degree of movement decreased 19 per cent.

Other nervous mechanisms, or reflex arcs, at the higher levels of the cord, were next investigated: (1) eye-reaction to suddenly appearing stimulus, and (2) speech reaction to visual word stimuli. Dose A (30 cubic centimeters), accelerated the eye-reaction, while dose B (45 cubic centimeters) positively depressed it, agreeing with the simple reaction experiments of Kraepelin. The first mentioned was the only instance of acceleration of movement of the voluntary muscles through alco-

hol, all the other tests showing it to be a consistent depressant. The speech reaction showed a positive depressant effect of 3 per cent.

Free association of ideas and memory tests were also made, and showed practically no effect from alcohol; but, unfortunately, the smaller dose was used in these tests.

The sensitiveness to electrical stimulation was decreased 14 per cent.

Motor coordination, as evidenced by eye-movements in fixating seen objects, was next investigated. The velocity of these movements was decreased 11 per cent. Finger-movements, measured in an exceedingly delicate way, were reduced in speed 9 per cent.

The effect on the pulse while these tests were made was observed, and electrocardiograms taken. The pulse was found to be accelerated, but not increased in force; that is, the "brake" was taken off the heart but no driving force supplied by alcohol. The condition of the circulation was impaired by the narcotic effect of alcohol on the cardio-inhibitory center which holds the heart action in check.

According to the investigators, the effect is to "decrease organic efficiency." This should shut off such little debate as still persists with respect to alcohol having any value as a direct heart stimulant.

It seems reasonable, on the evidence herein presented, to class alcohol among the narcotic or "deadening" drugs, such as ether or chloroform. Indeed, Aschaffenburg²⁰ has called attention to the growth of the ether habit in eastern Germany, where this drug is used as a so-called "stimulant," while in

reality the effects are well known to be narcotic, or deadening.

While these investigations only confirm in part the contention of the Kraepelin school that alcohol first acts by depressing the higher centers, and tend to show that its first and most profound effect is on the lower levels of the spinal cord and the simpler nervous mechanisms, they fully confirm the view of these and other investigators, that the total effect of alcohol is that of a narcotic, depressing drug, even in the smallest doses usually taken as a beverage.

Dr. Walter R. Miles,⁵⁵ carrying forward Benedict's investigation at the Carnegie Institution, failed to confirm the thesis that the first effect is on the lower levels and simpler mechanisms, but it may be said that this question is still unsettled.

The possible reactions are more complex than those supposed by Kraepelin. There is evident in the higher centers (the effect on highest brain functions were not measured by Dodge and Benedict) a power of "autogenic reinforcement." This is well exemplified by the ability of a half-intoxicated person to sober up under some shock or strong incentive. When social conditions do not stimulate this reinforcement, but, on the contrary, dull and retard it, as in convivial company, there is reinforcement of the lower, more animal mechanisms of the nervous system, and we have exhibited the revolting and foolish reactions to alcohol, which are consistent with these findings.

The slight effect on memory and free association is explained partly by the methods used in the laboratory (difference in time of recognizing words

suddenly exposed a second time), which are more in the nature of "short cuts" and perhaps not so accurate a reproduction of normal memorizing as those employed by Kraepelin and Vogt (memorizing numbers and verse), and partly by the power of "autogenic reinforcement," which it is difficult to eliminate in a laboratory test.

The study by Dr. Miles⁵⁵ published under the title *Alcohol and Human Efficiency*, is a voluminous report of his work on alcohol at the Carnegie Institution and deals with exceedingly interesting phases of the alcohol question investigated in the spirit of pure science, and with no propagandist object in view, either political or scientific. These experiments were all conducted under the most rigid requirements as to scientific accuracy and involved many physiological and psychological measurements designed to reveal the effect of alcohol on the organic efficiency of the body.

Without going into minute analysis of the methods followed or the tests made, we may call particular attention to the most interesting conclusions that were reached in this study. As to the general effect of alcohol in moderate doses, the author has this to say:

It will be difficult to challenge the conclusion that these changes represent other than a decrease in organic efficiency due to depressant action of ethyl alcohol, inasmuch as such changes are regularly associated with decreased reflex irritability, slower reaction, less keen, i.e., higher sensory thresholds, slower muscular movements, less adequate and accurate muscular control, and less agile mental operations. The whole qualitative picture is one of decreased human efficiency as a quickly-following re-

sult from the ingestion of this pharmaco-dynamic substance. . . .

In most respects the results of these researches are in substantial agreement with those of Dodge and Benedict, in so far as the former experimenters used comparable conditions and dosages.

The popular impression has been that alcohol is less injurious when taken with food, and Miles's investigations support this belief.

The likewise popular impression that 2.75 per cent beer is innocuous, however, is not supported by these researches. On the contrary it is shown very clearly that alcohol, even in this dilution taken in the quantities usually consumed, is toxic if not intoxicating. The author states:

There is no longer room for doubt in reference to the toxic action of alcoholic beverages as weak as 2.75 per cent by weight. If 27.5 grams of alcohol are taken in this form, the well-defined and measurable depression in physical and mental processes, judged within the limits of this investigation, is not far short of the result found when 21 to 28 grams of alcohol are taken in solutions varying from 14 to 22 per cent.

One interesting observation made by Miles, in which the authors heartily concur, is that the actual effect of these doses of alcohol taken under living conditions outside of the laboratory, would be greater than as recorded in the laboratory. In the laboratory there is necessarily a certain control of conduct. There is a sub-conscious tendency to resist the effect of alcohol. While the subjects experimented on are prevented, so far as possible from detecting that alcohol is being given them during the various periods of investigation—that is,

an attempt is made to disguise the alcoholic doses so that the subject may not be aware that the test is made after the ingestion of alcohol—nevertheless, the subject is aware that he is under investigation as to the influence of alcohol; and his natural tendency would be during all the periods of investigation to concentrate on the work done and maintain a reasonable level of efficiency. In daily life conditions vary in both directions. When there is an invitation to loss of control, the alcoholic effect may be greatly increased. On the other hand, a man under observation or discipline may successfully resist the effect of alcohol to a measureable degree. Unfortunately, alcohol is too often taken under conditions of moral relaxation and temptation to lax conduct.

Possible Effect of Alcohol on Progeny

Stockard,⁴⁴ in his earlier experiments on animals, showed that apparently the germ cells of males can be so injured by allowing the subjects to inhale the fumes of alcohol that they give rise to defective offspring, although mated with vigorous untreated females. The offspring of those so treated when reaching maturity are usually nervous and slightly undersized. These effects are apparently conveyed through the descendants for at least three generations (Plate VIII). Such evidence establishes at least the probability of the transmission of serious ill-effects to human offspring through alcoholic indulgence of the male parent.

Dr. J. W. Ballantyne⁵⁴ in an extensive review of this question claims that the balance of evidence

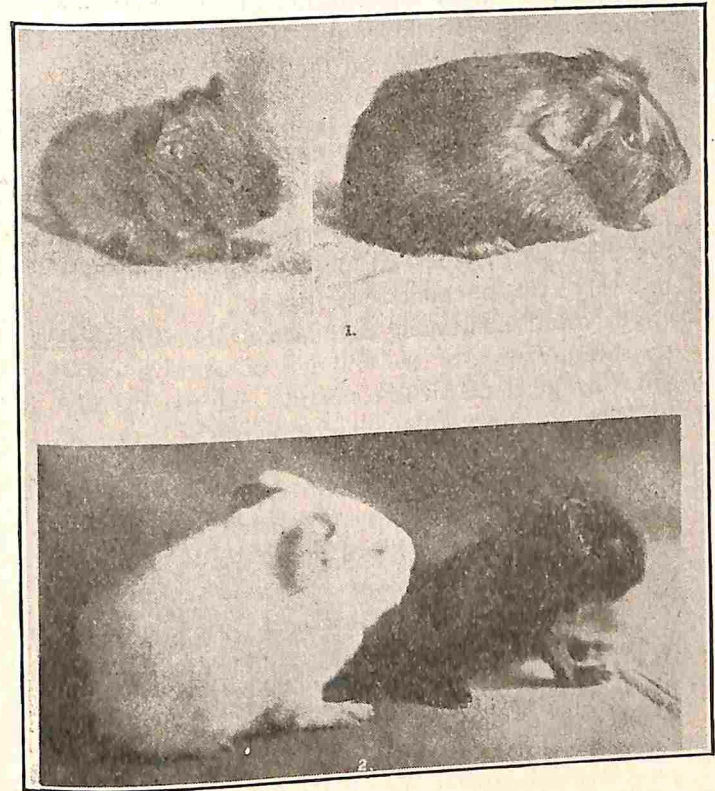


PLATE VIII.—THE EFFECT OF ALCOHOL ON TREATED GUINEA-PIGS AND THEIR DESCENDANTS

1. On the left a non-inbred female with six of its eight great-grandparents treated with alcohol while only two on the paternal side were not so treated. She was small and degenerate and lived only one day. On the right is shown a normal animal born on the same day. These two guinea-pigs were photographed on one plate.

2. Two guinea-pigs born in the same litter from a normal father and mother derived from four alcoholized grandparents. The albino female, on the left, weighed at birth 90 grams; the small, defective male on the right weighed only 38 grams and died within two days. The sister is still alive. [Charles R. Stockard and George N. Papanicolaou, *The Journal of Experimental Zoology*, vol. 26, No. 1, May 1918.]

confirms the earlier experiments of Stockard and Papanicolaou,^{60*} Bertholet and Mjöen as to the injurious effect of alcohol on the offspring of mammals, thus tending to establish the biological fact that the germ-plasm of an alcoholic parent can be adversely affected.

Much of the statistical evidence that has been produced on both sides of this question of transmissibility of the effect of alcohol is misleading unless very critically analyzed.

Stockard,⁴⁵ continuing his experiments, reaffirmed his interpretation of the findings as far as adverse effect on germ-plasm is concerned, but claims that the ultimate effect is the elimination of the unfit and an improvement of the stock. He presents the following table:

ALTERNATE MATINGS OF NORMAL ANIMALS WITH
NORMAL AND ALCOHOLIZED MATES

	Matings of 35 normal males alternately with		Matings of 44 normal females alternately with	
	Normal females	Treated females	Normal males	Treated males
Number of matings	81	81	77	81
Average litter	2.42	2.28	2.53	2.25
Total offspring	196	185	195	182
Failure to conceive	6	6	3	10
Lived over three months	7.9%	7.9%	3.89%	12.34%
	151	105	161	118
Died under three months	77.03%	56.64%	82.56%	64.83%
	45	80	34	64
Defective	22.96%	43.35%	17.45%	35.16%
	0	11	0	9
	5.95%	4.97%

Stockard comments on the table as follows: "This difference between the records of offspring from the same normal individuals when paired with normal and alcoholic mates clearly demonstrates an in-

* See also reference No. 61.

jurious action of the experimental treatments on some of the germ-cells of these mammals."

He further declares that in the fourth generation the animals descended from alcoholized great-grandparents show a death-rate of 13.5 per cent against 21 per cent in the controls, and that the weak or altered germ cells having been eliminated, a group of superior animals has been developed which average well above the controls.

Stockard offers the postulate that alcohol is, therefore, a factor in race improvement, and supports the time-honored thesis that the countries addicted to strong alcoholic beverages are found in the van of civilization for this reason. He does not, however, offer any explanation as to why, after 30,000 years or thereabout of alcoholic indulgence mankind has failed to show any distinct improvement in physical type. The abundant statistical evidence presented in this book showing the physical inadequacy of civilized man is sufficient answer to such a far-fetched and wholly unjustifiable generalization derived from a laboratory study of animals. Unfortunately, the unfit are still with us in deplorably high ratio, notwithstanding the ages-old opportunity of alcohol to eliminate them.

The *Journal of the American Medical Association*,⁵¹ commenting editorially on Stockard's recent report, has this to say:

"Such extreme generalizations in fields where many agencies of man and nature may cooperate or conflict in the course of the centuries can scarcely be claimed to abide within the range of exact science or even fully warranted hypothesis."

In fact, this particular line of experimentation—regarding the possible effect of alcohol on progeny—may be said to have not yet reached a final stage warranting dogmatic conclusions. At least such experiments show that alcohol does reach and injure a certain number of the germ cells, and results in defective offspring.

Experiments by Raymond Pearl⁴⁶ on domestic fowl have been interpreted as showing similar end results. That is, Pearl claims that the administration of alcohol to the parents resulted in a selective elimination of the inferior germ cells and an improvement in the offspring.

Effects of Alcohol Under Prohibition

The term "alcohol," as applied in foregoing discussions, connotes ethyl alcohol, found in standard alcoholic beverages, such as wines, beers, and strong liquors made and marketed under average conditions. The effect of alcoholic beverages made and marketed under prohibition conditions in the United States requires separate and specialized consideration.

Many confusing and misleading statements have been made with regard to the effects of prohibition. It is an unquestionable fact that the death-rate in this country since prohibition took effect—barring the influenza year—has been very low, and that the death-rate from alcoholism and cirrhosis of the liver decreased rapidly until 1921. The death-rate in 1920 from alcoholism was less than one-fifth of that prevailing in 1906-1910. From 1906 to 1917 the death-rate from alcoholism fluctuated between 5.1

and 5.8 per 100,000. In 1918 it fell to 2.7 and in 1920 it was 1.0; in 1921 there was a rise to 1.8, and in 1922 to 2.6. But the rate is still only one-half of that prevailing in 1917; and reports from industrial life insurance sources, affording a good index of conditions in the population at large, show a decided drop in the death-rate from alcoholism in the first quarter of 1924—the first downward turn since 1920.

DEATHS FROM ALCOHOLISM

Per 100,000 of Population

(United States Registration Area)

1906-1910	1911-1915	1916	1917	1918	1919	1920	1921	1922
5.8	5.1	5.8	5.2	2.7	1.6	1	1.8	2.6

DEATHS FROM CIRRHOSIS OF THE LIVER

Per 100,000 of the Population

(United States Registration Area)

1906-1910	1911-1915	1916	1917	1918	1919	1920	1921	1922
14.3	13.2	12.3	11.4	9.6	7.9	7.1	7.4	

It must be borne in mind, however, that these deaths from alcoholism, under present conditions, *do not necessarily reflect a parallel change in alcoholic consumption.* The alcoholic beverages now sold by the bootlegger are far more lethal in their effect. A much more limited general consumption of these beverages would not be inconsistent with a high and increasing death-rate per 100,000 of population from alcoholism.

A study at the Cook County Psychopathic Hospital of Chicago, reported by Francis J. Gerty⁵⁶ is exceedingly interesting in this relation. In an article in the July, 1924, issue of the *American Journal*

of *Public Health*, he summarizes his observations of the effect of moonshine liquor. He calls attention to the fact that Doran and Boyer,⁵⁷ on a basis of 75,000 examinations, reports that due to poor control of fermentation, faulty distilling methods, and lack of aging, the raw whisky, or moonshine, now produced has a high content of aldehydes and particularly of acetaldehyde. "Acetaldehyde is a rapid intoxicant inducing profound stupor and deleterious effects."⁵⁸ Fusel oil and the higher alcohols are not responsible for the high toxicity. A questioning of patients in the hospital developed that nearly all of them had used some of this raw, illicitly distilled liquor. Wood alcohol, denatured alcohol, synthetic gin, toilet waters, and other substances supposed to have an intoxicating effect were also used. One man had used a mixture of methyl alcohol, hydrochloric acid, and Turkey-red dye.

It will be readily seen that even a limited number of people using such wretched stuff would show a relatively high death-rate. When it is considered that the total number of deaths from alcoholism in the United States Registration States in 1922 was only 2,424, it is apparent that it would not take much bootleg liquor to cause that number of deaths and to increase the death-rate chargeable to alcohol in the United States Registration records, even tho the population at large is using comparatively little intoxicating liquor.

The statements regarding the high toxicity of this moonshine, or bootleg liquor, should give pause to those reckless individuals who trifle with it. It is well known that the bootlegger is a criminal of low

type. Regardless of the ethics of dealing with such criminals, a man with ordinary common sense would have absolutely no confidence in their assurances as to the source of their supply. No man who uses bootleg liquor can have full confidence that he is not going to lose his eyesight or his kidneys.

For the information and warning of the public, Dr. Gerty's summary of the evidence is here presented:

1. For practical purposes we must consider moonshine poisoning as alcoholism of a modified or aberrant type. Various aldehydes, of which acetaldehyde may be considered the chief example, are responsible for the increased toxicity. Practically all alcoholism now encountered clinically is of the "moonshine" type.

2. It is a very prevalent form of poisoning at present, and in Chicago, at least, is as frequently found as alcoholism was in the pre-war and pre-prohibition periods.

3. The physical and mental morbidity and the mortality are high.

4. The type of poisoning seen differs from ordinary alcohol poisoning in the following ways:

(a) The poison takes effect more rapidly, and the patient is brought to the hospital sooner because of the gravity of his symptoms. A smaller amount of the prevalent beverages is required to incapacitate.

(b) The effect is more profound and more often fatal.

(c) Mental deterioration is a common sequel even after a few sprees.

(d) As far as the mental symptoms are concerned, the clinical picture is usually blurred, thus making classification of cases more difficult.

(e) Pneumonia has not so frequently been associated with the present form of poisoning as with alcoholism in the past.

5. Men alcoholics outnumber the women alcoholics to a greater extent than ever.

Social Responsibility of the Individual

Recent contributions of science to the study of the alcohol problem give added proof that the higher mortality among so-called "moderate" users of alcohol is largely due to the unfavorable effect on the protective machinery of the body.

Life insurance records and laboratory research give exact expression to what has long been a matter of common knowledge to employers of labor and to leaders and commanders of men—that the influence of alcohol on any large group of men, whether they be artisans or soldiers, is harmful and lowers the efficiency of the group.

Groups representing large industries have gone on record in favor of the abolition of liquor from industrial plants, as a factor in safety. The statement has been made by Quensel⁴³ that "work and alcohol do not belong together, especially when the work demands wide-awakeness, attention, exactness, and endurance." As to the effect of alcohol upon the soldier, we have the testimony of such men as Major Lelean* who says: "Alcohol should be forbidden on the march; it lowers blood-pressure and causes rapid heat production without corresponding tissue-repair."

Individual susceptibility varies, of course, but the man who thinks he is an exception and that he can indulge with safety may find that he is mistaken only after serious damage to the body has been done, and perhaps a definite loss sustained in hap-

*Author of the text-book *Sanitation in War* used in British and American medical schools.

piness and achievement. One's own feeling is not a safe guide and may well fail to warn of danger until serious damage has been done. Those who trifle with alcohol should at least take the precaution to be periodically examined in order to detect the earliest signs of ill-effects.

As already suggested, the effect of alcohol on conduct as well as upon the tissues of the body must be considered. An animal protected in the laboratory may show no ill effects from a certain administration of alcohol; whereas the administration of a proportionate amount to a human being in society might well react on conduct through its influence on the brain and nervous system. Obviously, great caution should be used in utilizing laboratory data in the consideration of the alcohol problem in relation to man. For example, in Stockard's experiment, the animals alcoholized by inhalation did not appear to suffer in health—some attaining an unusual age.

Even an animal placed in its natural environment and occasionally alcoholized, as in Stockard's experiments, would obviously be handicapped in its struggle for existence.

There is great need to consider the alcohol problem in its totality as regards its effects on human beings. We should not generalize from partial data. This applies with equal force to both sides of the question so far as it is an academic question. But in so far as it is a medical question affecting the welfare of humanity, the benefit of any doubt should always be given to the individual and to the unborn child rather than to a mere indulgence.

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