ON THE
MORBID EFFECTS OF ALCOHOL,
AS SHOWN IN
PERSONS WHO TRADE IN LIQUOR.

BY

WM. HOWSHIP DICKINSON, M.D. CANTAB., F.R.C.P.,
PHYSICIAN TO THE HOSPITAL FOR SICK CHILDREN; SENIOR ASSISTANT
PHYSICIAN AND LECTURER ON PATHOLOGY, ST. GEORGE'S HOSPITAL;
CORRESPONDING MEMBER OF THE ACADEMY OF MEDICINE
OF NEW YORK.

(Received September 26th—Read October 22nd, 1872.)

IN my work on 'Albuminuria'* I brought forward facts which appeared to indicate that the injurious effect of alcohol upon the kidney had been exaggerated. My conclusions in their turn have been disputed. But it is not now my purpose to pursue the subject controversially, but to lay before the Society some details which have been extracted from the records of St. George's Hospital, the searching of which I began with especial relation to the glands in question, but have pursued with a widened scope, having regard to the effects of alcohol upon the whole body rather than upon any organ in particular.

The character of the books I have referred to is here well known. They are the work of a line of competent pathologists; they are systematic and complete, and inasmuch as the observations were made without special object, we may believe them to be generally unbiassed.

I have started with the assumption that a person in whose

* Chapter XVI. "Alcohol as a Cause of Renal Disease,"

vocation alcoholic drink, to be had for nothing, is ever suggestively present, will on an average take more of it than one in whose calling such liquor plays neither a necessary nor a gratuitous part. It needs but a slight experience of human nature to justify this surmise. The mouth is not muzzled of the ox who treadeth the corn or of the potman who carries the beer. With a reliance upon this general truth, justified by the notorious inebriety and the liability to delirium tremens of those who trade in drink, I have contrasted the morbid appearances in the bodies of people of this class with those in the persons of others who have neither been professionally conversant with intoxicating liquids nor known to have been addicted to their intemperate or excessive use.

It is scarcely necessary to observe that any pathological observations as to the effect of alcohol to be valid must be comparative. Bare statements that among so many dead drunkards many or few were tuberculous, while in such a number the liver was cirrhotic or the kidneys granular, convey little information. It is necessary to know how frequent such lesions are in persons similarly circumstanced in other respects save drink. I have, therefore, used a strictly comparative method, and have applied it to as large a number of dissections, and to as many particulars in each, as the materials permitted.

The post-mortem books of St. George's Hospital, which were begun with the year 1842, contain in chronological order a detailed account of every examination made from that date to the present time. Subsequent to the beginning of 1844 the history and clinical particulars corresponding to each are adjoined. From the commencement of 1842 to the end of 1871, a term of thirty years, I have abstracted the morbid appearances, and, with the exception of the first two years, the leading clinical facts relating to every person examined after death whose trade it had been to make, sell, store, or convey alcoholic liquor. As a counterpoise or standard of comparison for each such case (not that it was designed to compare single cases one with another, but in order to obtain two series as similar as possible, save in respect

of drink) I took after each alcoholic post-mortem one upon a person of the same sex, not employed about liquor nor known to have had delirium tremens or to have been of intemperate habits. In order to avoid bias in selection I went by rule. After each alcoholic examination I abstracted the non-alcoholic next afterwards, except where the end of the annual volume compelled me to turn backwards instead of forwards. Since the alcoholic series began at the age of sixteen, all post-mortems upon younger subjects were excluded. Also were excluded those which referred to workers in lead, the effect of this metal upon the kidneys possibly tending so far to obscure the result.

Thus, were contrasted two series of post-mortem examinations the subjects of which had been differently placed with regard to drink, but in no other respect were obviously dissimilar. They were of the same sex, of similar age, they belonged to the same stratum of society, they had been patients at the same time in the same hospital, and were at last examined, and the results recorded, by the same observers.

Each series comprised 149 post-mortem examinations*—146 men, 3 women.

The traders in liquor were thus divided :

Potmen	54
Waiters	43
Cellarmen	11
Draymen	11
Brewers or brewers' men	9
Barmen	8
Publicans	8
Barmaids	3
Distillerymen	1
Maltsters	1
	<hr/>
	149
	<hr/>

The opposed class, that not concerned with alcohol, com-

* Full details of every case, in a tabular form, were laid before the Society. These tables, which were very voluminous, formed the basis of the abstracts which are printed.

prised, as will be seen below, a great variety of occupations. The lead trades were excluded for reasons which have been stated; while billiard-markers, butlers, wine-coopers, and excisemen were not admitted on either side, their vocations holding with regard to drink an uncertain attitude.

In the course of the enquiry, the questions will arise how far certain differences in the morbid proclivities of the two classes are to be attributed to causes other than alcohol. Chiefly how far do the classes differ in exposure to weather, one undoubted agent in the production of rheumatic and inflammatory disease.

The non-alcoholic traders are therefore arranged so as to show as nearly as may be how many work in the open air, how many in houses, and with how many their place of labour is uncertain or variable.

Occupations of the non-alcoholic traders, arranged according to their probable exposure to weather.

Indoor.	Mixed or uncertain.	Outdoor.
Footmen or pages ... 6	Grooms 8	Labourers 21
Clerks 4	Railway or other	Coachmen, carmen,
Smiths or metal } 4	porters 6	or postillions..... 16
turners	Carpenters 5	Gardeners 5
Tailors..... 4	Stablemen or horse-	Travellers or col-
Shoemakers..... 4	keepers 4	lectors 4
Schoolmistress or wife 3	Old soldiers or pen-	Commissionaires or
Bakers 2	sioners 4	errand boys 3
Upholsterers 2	Plasterers 3	Sailors 3
Greengrocers 2	Butchers 3	Watermen or barge-
Cooper, wheelwright,	Stonemasons..... 3	men 2
bird-stuffer, iron-	Watchman, detec-	Milkmen 2
monger, mattress	tive, sweep, engi-	Hawker, brickmaker,
maker, dentist,	neer, shipwright,	postman, of each } 3
merchant, hair-	woodcutter, chaff-	1
dresser, draper, } 14	cutter, veterinary	
tallow - chandler,	surgeon, of no oc-	
saddler, cabinet-	cupation, of each	
maker, fishmon-	1	
ger, brush-maker,		
of each 1		
Total 45	Total 45	Total 59

Hence it appears that, excluding the callings of uncertain or mixed character the outdoor trades preponderate as 59 to 45, or about 4 to 3.

With the traders in liquor indoor pursuits are the more numerous. Waiters, cellarmen, brewers, publicans, barmen, barmaids, distillers, and maltsters, all generally under cover, together amounted to 84; potmen and draymen, mostly in the open air, together came to 65. Thus, the ratio of 4 to 3 will nearly represent both the preponderance of indoor occupations with the alcoholic series, and of outdoor occupations with the non-alcoholic.

Comparing the two classes, the alcoholic and the non-alcoholic, the results are these :

Age.

The alcoholic traders who die in the hospital attain a mean age of 36·8; the non-alcoholic a mean age of 40·6.

Excluding all deaths from accident, dealing solely, therefore, with the effects of disease, the figures are practically unaltered; alcoholic traders dying at the age of 36·8, non-alcoholic at the age of 39·9.

It, therefore, may be stated with general truth that to deal in liquor costs $3\frac{1}{2}$ years of life.

The shortness of life in both classes is, no doubt, owing to the fact that a hospital is essentially the resort of disease not of age. A workhouse would have given different results, though, possibly, the proportion would not have been much altered.

The following statement of the number of deaths in each decade of life in the two series shows that the mortality from alcohol is most marked between the ages of 30 and 40.*

* The increased mortality in the fourth decade among the alcoholic was chiefly due to delirium tremens, phthisis, diseases of the liver and kidneys, and sanguineous apoplexy. I have given some further details in the 'British Medical Journal' for 1873, p. 8.

Age at death.			Alcoholic trade.	Non-alcoholic trade.
From 16—20	.	.	10	11
21—30	.	.	37	39
31—40	.	.	50	28
41—50	.	.	31	32
51—60	.	.	12	21
61—70	.	.	5	13
71—80	.	.	1	4
81—90	.	.	0	1

I will now consider the morbid changes pertaining relatively to the two classes, necessarily confining the inquiry to the more obvious and tangible, and taking the organs in the order in which they would be reached by a fluid absorbed by the veins of the stomach.

This course is sufficiently obvious. Anything which enters by the veins of the stomach and survives admixture with the blood must needs first pass through the liver. Leaving it by the hepatic vein it enters the right side of the heart and is there mixed with other venous streams. Thence it is sent undiminished, though diluted, to the lungs. In these organs it is evident that in the case of alcohol some escapes with the breath, and probable that some may be transformed by oxidization. As much as emerges by the pulmonary veins is poured into the left side of the heart, in contact with which, and with the walls of the systemic arteries, it is brought before its final distribution. It is now uniformly mixed with the systemic arterial blood, and is with it impartially distributed to every part of the body. If subsequently to this part of its course it affect one organ more than another, it is from the susceptibility of the structure not from the direction of the poison.

Stomach.

The changes in the mucous membrane of the stomach are not patent enough to common observation to take the place in this enumeration to which their frequency would undoubtedly entitle them. It was noticed that in three of the

alcoholic series simple ulcer of the stomach existed; in two of the non-alcoholic malignant disease.

Liver.

With regard to this organ the annexed abstract will show that there is in the alcoholic class a striking excess of disease, especially of the fatty and fibroid kinds.

Obvious fattiness of the liver, with or without enlargement or congestion, existed in a ratio of exactly three of the alcoholic to two of the non-alcoholic class.

Abstract showing condition of liver in 149 alcoholic traders as compared with the same number of non-alcoholic traders.

				Alcoholic.	Non-alcoholic.
Natural	...	...	...	64	79
Hyperæmia	...	{ Congested	...	9	18
		{ Congested and enlarged	...	3	2
Fatty change	...	{ Fatty	...	12	11
		{ Fatty and enlarged	...	11	3
		{ Fatty and congested	...	4	4
		{ Soft	...	3	0
Lardaceous	...	...	...	4	4
		{ Capsule thickened	...	1	3
		{ Capsule thickened, structure con-	...		
		{ gested	...	1	1
		{ Surface puckered, organs enlarged	...	0	1
		{ Surface puckered, organs con-	...		
		{ gested	...	0	1
Fibroid increase	...	{ *Early or slight cirrhosis	...	10	5
		{ Advanced or well-marked cir-	...		
		{ rhosis	...	10	3
		{ Cirrlosed, fatty, and enlarged...	...	1	0
		{ Cirrlosed, also containing hy-	...		
		{ datids	...	1	0
		{ Lobules conspicuous	...	1	0
		{ Diminished in size (simply)	...	1	1
		{ Simply enlarged	...	7	5
New formations,	...	{ Abscesses, pyæmic or dysenteric	...	1	5
&c.		{ Tubercle	...	3	1
		{ Cancer	...	1	2
		{ Hydatids	...	1	0

* This includes cases where the surface was roughened, and the section showed increase of fibrous tissue or globulation of structure.

Analysis of hepatic symptoms referred to in preceding cases.

		Alcoholic.	Non-alcoholic.
Decided hepatic symptoms were observed in	...	13	3
Jaundice (hepatic)	„	9	3
Ascites (hepatic)	„	5	1
Hæmatemesis (hepatic)	„	1	0

Fibroid increase, which in an advanced stage produces the characteristic appearance of cirrhosis, preponderates even more heavily. In the alcoholic series were 24 instances in which thickening of the capsule, puckering of the surface, or early or advanced cirrhosis gave evidence of the change. In the contrasted series the total was 14.

Early cirrhosis among the alcoholic existed in 10 cases, advanced cirrhosis in 12. Among the non-alcoholic early cirrhosis existed in 5, advanced cirrhosis but in 3. Thus, on one side we have 22 instances of cirrhosis, against 8 on the other; in other words the liability to cirrhosis is nearly trebled by a liquorous pursuit.

The production of cirrhosis by alcohol, like most beliefs in medicine whether true or false, has been of late disputed. If there be any who still halt between two opinions in this matter the facts stated can scarcely fail to bring them back to the old view.

With regard to the relative effects of beer and spirits in causing disease of the liver it appears that of the 22 cases of cirrhosis referred to 15 concerned waiters or potmen; 3 cellarmen, 1 a brewer, who was notorious as a spirit drinker, while the remaining 3 occurred in brewers and draymen. Taking brewers and draymen as the representatives of uncomplicated beer drinking it seems that considering the smallness of their number they present nearly their fair share of cirrhosis as compared with the other alcoholic traders. It may be observed, however, that cellarmen who probably may be classed as drinkers of wine and spirit display a much larger proportion of cirrhosis than the beer drinkers.

With regard to beer drinkers it was noted that in two of

the cases the liver was fatty as well as cirrlosed, in one instance the organ weighed no less than 7 lbs. 3 ozs.

As to simple fatty change with enlargement, which, also, is a clear result of an alcoholic occupation, of the 11 persons presenting this alteration only one—a brewer—had been especially concerned with beer. The rest were potmen, waiters, cellarmen, barmen, and barmaids.

Thus the facts, though they do not enable us to distinguish one liquor from another in its morbid action, assert beyond question that alcoholic drink causes both cirrhosis and fatty deposition, or, in other words, increases both the fibroid and the fatty elements of the liver.

Lungs.

Next to the liver in the course of imbibed alcohol come the lungs. Here the more important inferences relate to pneumonia, pleurisy and tubercle.

Pneumonia or hepatization of the lungs, with or without pleurisy, was found in 8 persons of the alcoholic, in 12 of the non-alcoholic series. Pneumonia, as Dr. Stokes pointed out, is no uncommon associate of delirium tremens. The hepatization is usually grey or suppurative and the disease not unfrequently masked. This undoubted concurrence would lead us to expect a preponderance of pneumonia under alcohol which does not exist. It will be found, however, that in other organs as well as in the lung there is with the alcoholic trade a lessened tendency to acute inflammation.

With regard to pleurisy the chief difference to be observed is the prevalence of empyema among the traders in liquor; this as will be afterwards seen accords with a general suppurative tendency which belongs to the class, made manifest by the products of serous inflammations and the results of injuries.

*Abstract showing condition of lungs in 149 alcoholic and
149 non-alcoholic traders.*

		Alcoholic.	Non-alcoholic.
Congestion, &c.	Natural...	20	34
	Congested posteriorly or otherwise	16	16
	Congestion, &c., from typhoid	2	2
	Œdema (frothy or serous infiltration)	7	5
	Emphysema	3	3
	Congestion + œdema	6	5
	Congestion + emphysema	4	2
	Œdema + emphysema	1	2
	Congestion + œdema + emphysema	2	0
	Bronchitis (uncomplicated by other pulmonary change)	1	0
Bronchitis, &c.	Bronchitis + œdema	0	2
	Bronchitis + emphysema	0	2
	Pneumonia	1	3
Pneumonia and Pleurisy	Pneumonia + casts in bronchi	0	1
	Pneumonia + few tubercles, cheesy or cretaceous masses, no tubercles found in other organs	3	3
	Pleuro-pneumonia	3	6
	Pleuro-pneumonia from injury	1	0
	Pleurisy, recent, acute	4	5
	Pleurisy + few tubercles (no tubercles elsewhere)	2	0
	Pleurisy + few tubercles (tubercular disease in other organs)	0	2
	Empyema	3	0
	Hydrothorax	4	5
	Miliary tubercles, no vomica (no tubercle elsewhere)	4	3
Tubercle, &c.*	Miliary tubercles, no vomica (tubercle elsewhere)	3	3
	Crude or cheesy tubercle, no vomica (no tubercle elsewhere)	4	2
	Crude or cheesy tubercle, no vomica (tubercle elsewhere)	2	1
	Tubercles and vomica (no tubercles elsewhere)	11†	12
	Tubercles and vomica (tubercular disease elsewhere)	23	13
	Cicatrix at apex (no tubercle elsewhere)	1	0
	Cretaceous mass (no tubercle elsewhere)	6	4
	Cretaceous mass (tubercular disease elsewhere)	2	0

* With regard to cirrhosis of the lung this comparatively rare condition is not described in any instance. At the time the earlier notes were written the condition was scarcely recognised.

Two instances only occurred in the tables in which tubercle was found in

	Alcoholic.	Non-alcoholic
Pulmonary apoplexy ...	2	5
Pulmonary apoplexy + clot in pulmonary artery ...	1	0
Pulmonary apoplexy + cretaceous mass + pleurisy (no tubercle elsewhere) ...	0	1
Pyæmic abscess or pneumonia ...	7	6
Abscess from unexplained cause	0	1

The most important question with regard to the lungs relates to the distribution of tubercle, a point to which further interest attaches in consequence of the differences of opinion which have prevailed as to the relation between alcohol and phthisis. Dr. Peter of New York, whose conclusions though since attacked have been accepted by Dr. Walshe, inferred that drinking protects from tubercle.

Dr. Walshe,* indeed, whose opinion will be seen to be directly opposed to the observations here recorded, says "that publicans, who unquestionably as a class largely consume their own vendibles, are *cæteris paribus* less destroyed by phthisis than persons in various other walks of life." The antagonism of tubercle and alcohol appears to have been widely believed though apparently on insufficient evidence. Trousseau,† however, states that his experience has led him to coincide with those who hold the contrary view, and the facts before us instead of supporting strongly contradict the view that alcohol is antagonistic to tubercle. In tuberculosis we see, if the facts adduced be trustworthy, one of the modes in which the body is most vulnerable to drink.

Mindful of differences of opinion as to the nature and varieties of tubercle, I have as far as practicable specified with

other organs, none being in the lungs. Both were in the non-alcoholic series; one was of miliary subpleural tubercle, the other tubercle of brain.

† One of these was associated with diabetes. Pneumonia, bronchitis, and pleurisy are not mentioned when in connection with extensive tubercular disease of the lung. The same statement applies to emphysema, fibroid and other change clearly secondary to the tubercular disease.

* 'Diseases of the Lungs,' 4th edition, p. 453.

† The results of this paper nearly coincide, in most respects, with Trousseau's views.

regard to each case not only the nature of the pulmonary change but also the presence or absence of any conditions recognised as tubercular in any other part of the body. Doubts which may concern a change limited to the lung, as between tubercle, degenerating fibrosis or caseating pneumonia, can find no place where there are characteristic deposits or ulcers elsewhere. Community of tubercle-like changes to several organs may be held as sufficient indication of their truly tubercular character, at the same time that their being limited to one does not necessarily clear them from the imputation.

Taking first the more doubtful class, changes apparently tubercular but limited to the lung, such, comprising miliary, crude and cheesy tubercles, vomicae, cicatrices and cretaceous masses, were found in an aggregate of 31 persons of the alcoholic, in 25 of the non-alcoholic.

The same changes in the lungs, certified as tubercular by the existence of tubercular disease in other organs, were present in 30 individuals of the alcoholic, in 19 of the non-alcoholic series.

Thus under alcohol reputed tubercle of the lung of every kind preponderates, and the preponderance is greatest where the tubercular nature of the change is the least doubtful. It will be observed that the typical form of tubercular phthisis with tubercle and vomicae in the lungs and tubercular disease in other organs occurred in 23 of the alcoholic to 13 of the contrasted series.

Including all kinds, reputed tubercle of the lung affected 61 persons of the alcoholic, 44 of the non-alcoholic class; nearly 3 to 2. This must be conclusive as to the fact that drink instead of preventing promotes phthisis.

It is believed, probably with truth, that alcohol causes pulmonary fibrosis. The cases before us, however, gave no instance to which the terms cirrhosis of the lung or fibroid phthisis could be confidently applied. Within the necessary limits of this inquiry the amount of fibroid associated with the tubercle-like changes in each instance could not be indicated. Care has been taken, however, to separate those

cases in which other organs participated in the tubercular change from those in which the lung suffered alone. Any case of simple fibroid or cirrhotic disease which may have occurred has necessarily gone to swell the number of the latter class.

Tubercle.

After what has been said with regard to pulmonary tuberculosis, the wider question of tubercle without reference to its seat shrinks into a mere corollary. Only two instances were recorded, one of sub-pleural, one of cerebral tubercle, in which the lungs did not share in the tubercular disease. Both were in the non-alcoholic series, placing the sum of tubercular persons at 61 alcoholic ; 46 non-alcoholic.

The question arises whether the prevalence of tubercular disease in the lung is to be interpreted as especially pulmonary, or especially tubercular? Is the tendency to tuberculosis regardless of its seat, or to disease local to the lung out of which the tubercle is engendered? It is clear that the tendency to tubercle is general since it preponderates in other organs even more than in the lung. In each part of the body amenable to tubercle, brain, liver, kidneys, bowels, and peritoneum, the frequency of its occurrence is at least doubled by the alcoholic pursuit. Attributing the excess, as we need must to the influence of the liquor, we arrive at an important and secure deduction that alcohol engenders tubercle.

Tubercular disease in organs other than the lungs.

	Alcoholic.	Non-alcoholic.
Brain	6	3
Liver	3	1
Kidneys	8	4
Spleen	1	0
Bowels (tubercular ulceration)	12	5
Mesenteric glands	5	2
Peritoneum	2	0
	<hr/> 37	<hr/> 15

Heart.

In the alcoholic series atheroma and fatty degeneration prevail; in the non-alcoholic, endocarditis and pericarditis. Speaking roughly alcoholic pursuits increase the degenerative, and diminish the inflammatory tendency.

Taking atheroma first as often the initial change, it will be seen that labourers in liquor, notwithstanding that they die younger, are the more prone to this deterioration. Atheroma of the aorta in particular was noted in 39 persons of the alcoholic, in 29 of the non-alcoholic series, a proportion of about 4 to 3. Aneurism and sanguineous apoplexy connected as they are with atheroma, preponderate on the same side.

*Abstract showing condition of heart in 149 alcoholic and
149 non-alcoholic traders.*

			Alcoholic.		Non-alcoholic.
Healthy			57	...	67
Pericardium, &c.*	{	White patch on surface	8	...	7
		White patch + valvular disease	1	...	0
		White patch + valvular disease			
		+ hypertrophy	2	...	1
		Pericardial adhesions	2	...	2
		Pericardial adhesions + valvular			
		disease	2	...	3
		Pericardial adhesions + valvular			
		disease + hypertrophy	1	...	3
		Recent pericarditis (lymph and			
		serum)	2	...	2
		Recent pericarditis (pus and sero-			
		purulent fluid)	3	...	0
		Recent + old pericarditis	0	...	2
		Recent pericarditis + hypertrophy	3	...	1
Valves, &c.	{	Recent pericarditis + endocarditis	1	...	1
		Recent pericarditis + old valvu-			
		lar disease	0	...	2
		Valvular disease	11	...	14
		Valvular disease + hypertrophy	5	...	9
		Valvular disease + hypertrophy			
		+ dilatation	0	...	3
		Valvular disease + hypertrophy			
		+ fatty change	1	...	2
		Valvular disease + fatty change	1	...	1
		Valvular disease + dilatation	1	...	1

* Fluid in pericardium is not recorded; when the result of inflammation it appears under the heading of pericarditis.

		Alcoholic.	Non-Alcoholic.
Muscular wall, &c.	Simple hypertrophy (<i>i.e.</i> unconnected with other cardiac or obvious arterial change) ...	12	5
	Hypertrophy + white patch on surface ...	1	1
	Hypertrophy + recent endocarditis ...	1	0
	Hypertrophy + aortic disease ...	4	1
	Dilatation ...	7	5
	Attenuation, flabbiness, or flaccidity ...	10	9
	Fatty ...	6	4
	Fatty + enlarged ...	2	0
	Fat on surface ...	2	1
Aneurism, &c.	Aneurism of aorta ...	2	0
	Aneurism of aorta + valvular disease ...	1	0
	Aneurism of coronary arteries + valvular disease (embolism) ...	0	1
	Aneurism of ventricle + pericarditis + valvular disease + hypertrophy ...	0	1

Atheroma in alcoholic and non-alcoholic traders
(149 of each).

Atheroma of valves ...	3	7
„ coronary arteries ...	1	2
„ aorta ...	25	20
„ cerebral arteries ...	3	1
„ valves + coronary arteries ...	0	1
„ valves + aorta ...	10	6
„ coronary arteries + aorta ...	3	1
„ coronary arteries + cerebral arteries ...	1	0
„ aorta + cerebral arteries ...	1	1
„ aorta + valves + cerebral arteries ...	0	1
Total number of individuals in which atheroma was noted ...		
	47	40

With regard to valvular disease the stress is in the contrary direction. Valvular disease, speaking inclusively without distinction of kind, affected 28 persons concerned with drink, 42 concerned otherwise, being less frequent with drink as 2 to 3. It was not practicable in the tabulations to distinguish the results of valvular atheroma from those of endocar-

ditis ; if, however, atheroma on the valves, as elsewhere, is more frequent under liquor, the preponderance of endocarditis in the non-alcoholic series is proportionally increased. In any case it is clear that inflammatory affections of the valves are greatly the less frequent in the drink-trades.

Pericarditis, evinced by recent lymph, purulent fluid, or adhesions, occurred in 14 persons of the alcoholic, 16 of the non-alcoholic class. Thus, in one shape or another the disorder falls pretty evenly, though we find differences when we take into account the diverse circumstances in which the serous inflammation arises. Pericarditis associated with valvular disease, often though not necessarily rheumatic, left its traces in lymph or adhesions in 4 of the alcoholic, 9 of the opposed series, the preponderance corresponding with that of valvular disease. Recent pericarditis, with simple hypertrophy, always renal, was more common with the alcoholic, the numbers being 3 to 1. The suppurative form of the disorder was only found in the alcoholic class ; of this there were three instances. This has importance in connection with the prevalence of suppurative pleurisy under the same influence of an alcoholic pursuit.

White patches upon the heart which probably are sometimes though not always due to pericarditis, are slightly more frequent in the alcoholic. This is in accordance with an opinion which has been espoused by Lancereaux to the effect that these marks are increased in frequency by the use of alcohol.

With regard to changes in the muscular tissue of the heart, fatty degeneration or superficial excess of fat occurred in 12 of the alcoholic, in 8 of the non-alcoholic series, the fatty change prevailing in the heart as in the liver in the class where drink was at hand.

Simple hypertrophy or hypertrophy without tangible cause in the vascular system was more frequent with liquor, as 15 to 6 ; more than twice as common in the alcoholic as in the other class. Such hypertrophy is generally regarded as renal, and it is of interest to inquire whether its marked preponderance is to be traced to a corresponding increase of renal disease under the influence of drink. I have, therefore,

shown in detail the condition of the kidneys in every case of simple cardiac hypertrophy.

Condition of kidneys accompanying hypertrophy of the heart, either simple or associated only with recent pericarditis.

Alcoholic series—12 cases simple hypertrophy + 3 cases hypertrophy with pericarditis = 15 cases.

Non-alcoholic series—5 cases simple hypertrophy + 1 case hypertrophy with pericarditis = 6 cases.

<i>Kidneys.</i>		Alcoholic.	Non-alcoholic.
Intertubal.	{ Advanced granular degeneration	5	3
	{ Early or slight granular degeneration	2	0
	{ Cysted, otherwise natural	1	0
Slight or uncertain.	{ Coarse, large and coarse, or coarse and fatty	3	0
Tubal.	{ Natural size, mottled, grey deposit in cones	0	1
	{ Large, solid, mottled	0	1
	{ Large and congested	2	0
	{ Healthy	2	1
		15	6

It would seem that simple hypertrophy of the heart may be associated not only with obviously granular kidneys but with kidneys otherwise and variously altered, and also with kidneys which passed as natural. The preponderance of hypertrophy of the left ventricle under alcohol was not solely due to a preponderance of renal disease, notwithstanding that granular degeneration with consequent hypertrophy is more common with liquor than without. In more than half the cases of this form of cardiac hypertrophy the kidneys were either natural or were described as congested, fatty or coarse, conditions which could not be confidently regarded as enough to produce cardiac change. We may probably conclude that what is roughly termed simple hypertrophy,

though often dependent on renal disease, has its origin also in deteriorations of the minute arteries, such as have been recently described before this Society,* which are not necessarily accompanied by obvious renal deterioration.

These minute arterial changes, if we may accept hypertrophy of the left ventricle as their index, prevail among the alcoholic to a larger extent than does renal disease, and must, therefore, be attributed to the direct influence of the liquor upon the blood-vessels.

Nervous system.

It is unnecessary to repeat that by the rule of classification delirium tremens is confined to one series, this disease having been taken as sufficient evidence of excess in drink to exclude its subjects from the non-alcoholic category.

Of the alcoholic traders, 17 or about 1 in 9 were affected with this disease, proof enough if it were wanted of the habits of the class.

In other respects the alcoholic side displayed an excess of inflammatory and hæmorrhagic affections of the brain, and of cerebral uræmia. The preponderance was most striking with regard to inflammatory conditions, and was marked whether associated with or independent of tubercle.

Six cases of tubercular disease of the brain occurred in the alcoholic, 3 in the non-alcoholic series.

Acute inflammation of the brain, not connected with tubercle, described as cerebro-spinal meningitis, encephalitis, and inflammatory softening, occurred in four instances, all of which belonged to the alcoholic series. There is evidence to show that drunkenness is alone sufficient to set up meningitis in an acute form. One of the cases in the table was a striking example of this, and another came under my own observation. In neither was there any tubercular or other disease with which the attack could be associated.

* Paper by Sir W. Gull and Dr. Sutton in the preceding volume.

There is also in the same category a strong disposition to the collection of aqueous fluid in the intercranial spaces; this, not usually manifest during life, is probably often simply a compensation for chronic shrinking of the cerebral matter.

An alcoholic trade increases the liability to cerebral hæmorrhage. Putting aside a case of cerebral purpura the tables include 10 cases of cerebral hæmorrhage of the ordinary kind. In every case the kidneys were granular, and, no doubt, with the same regularity the vessels of the brain were diseased. Six of these cases occurred in the alcoholic, 4 in the non-alcoholic series. Thus, cerebral extravasation, like hypertrophy of the heart, both especially associated with renal disease and both taking their origin in vascular decay, are both fostered by alcohol.

Disturbances of the brain dependent on uræmia are also more frequent under alcohol; but this fact will be more appropriately considered in connection with renal disease.

Abstract showing state of brain and nervous system in 149 alcoholic and 149 non-alcoholic traders.

		Alcoholic.	Non-alcoholic.
Hæmorrhage.	Sanguineous apoplexy ...	6	3
	Purpuric hæmorrhage under arachnoid ...	1	0
	Slight hæmorrhage under arachnoid, with congestion of brain, with granular kidney ...	0	1
	Delirium tremens ...	15	0
Delirium tremens.	Delirium tremens + calcareous deposit (in falx) ...	1	0
	Delirium tremens + uræmia (epileptiform convulsions) ...	1	0
	Uræmia (marked during life by convulsive attack, or partial or complete coma) ...	5	3
Uræmia.	Excess of fluid with anæmia, associated with renal disease, but without marked uræmic symptoms ...	2	3

		Alcoholic.	Non-alcoholic.
Excess of watery fluid, &c.	Excess of fluid in and about brain, without cerebral symptoms after death by cholera, fever, carbuncle, erysipelas, and suicide ...	5	1
	Excess of fluid after death from acute rheumatism + bony plate in arachnoid ...	0	1
	Congestion, or blood-tinged fluid under arachnoid, with erysipelas ...	1	1
	Excess of fluid in and about brain, productive of symptoms and due to disease primarily of brain ...	2	3
Tubercle.	Tubercular meningitis ...	4	2
	Tubercular disease of brain ...	2	1
Inflammation.	Inflammation of brain or membranes from blow or injury ...	3	3
	Inflammation of brain or membranes from disease of skull ...	1	1
	Cerebro-spinal meningitis ...	1	0
	Acute encephalitis (from hard drinking); softening, with, in one case, pus in ventricles, in the other lymph under arachnoid ...	2	0
	Softening + excess of fluid + congestion (cerebral symptoms)	1	0
	Softening of brain, circumscribed (pyæmic?) ...	0	1
	Softening of brain with symptoms of cerebral disease ...	1	0
	Old adhesions in arachnoid + insanity ...	1	0
	Coagula (ante mortem) in arteries ...	0	1
	Calcareous or osseous matter in membrane or choroid ...	0	1
	Tumour of brain ...	1	1
	Enlarged Pacchionian bodies ...	1	0
	Epilepsy ...	1	0
	Epilepsy + tetanus ...	1	0
	Paraplegia from disease of spine ...	1	1
	Paraplegia from disease primarily of cord ...	0	2

*Condition of kidneys associated with extravasation of blood within the cranium.**Alcoholic series.*

Common sanguineous apoplexy, 6 cases :			
Kidneys, advanced granular in	...	...	4
„ slightly „	...	...	2
			<hr/>
			6
Purpuric hæmorrhage, 1 case :			
Kidneys natural.			

Non-alcoholic series.

Common sanguineous apoplexy, 4 cases :			
Kidneys advanced granular in	...	...	3
„ slightly „	...	...	1
			<hr/>
			4

Results of accidents and injuries.

It is well known that with drunkards the power of healing is weakened, that processes of repair are slowly and unsafely conducted, and that small injuries and trivial operations are attended with disproportionate danger. The facts before us bear upon this point.

Traders in liquor are less exposed in their way of life to external hurts than those to which they are compared. Draymen meet with horse accidents, and potmen are sometimes involved in disputations which end in a violent misuse of the pewter pot, but the class to which they belong is less often subjected to accidental injury though, possibly, suffering more fatally from its effects, than the other. This is shown by the distribution of necessarily and immediately fatal accidents. Such accidents as are inevitably fatal, and are therefore unaffected in their issue by the antecedents of the victims, will by the number on either side indicate the liability of the class to violent bodily damage. We find five necessarily fatal accidents in the alcoholic, ten in the non-alcoholic series. Thus, it would seem that traders in drink are only half as often the subjects of such accidents as those

who follow other and in this respect more dangerous callings. If the same rule applies to small accidents as to great, traders in liquor have a comparatively small exposure to mechanical violence. But accidents among them, though less frequent, are more fatal.

List of fatal accidents.

ALCOHOLIC.		NON-ALCOHOLIC.
5	<i>Directly fatal.</i>	10
Fracture of ribs, laceration of lung. Fracture of pelvis. Cut throat (suicidal). Fracture of skull. Laceration of liver.	Fracture of skull. Fracture of thigh, &c. Rupture of bowel. Fracture of skull. Laceration of liver. Gunshot (suicidal). Fracture of skull. Laceration of liver. Fracture of leg, &c. Wound of brachial artery.	
10	<i>Succeeded by delirium tremens.</i>	0
Bruise of chest. Burn, ulcer of duodenum. Compound fracture of leg. Slight injury of nose. Cut wrist. Dislocations of ankle. Compound fracture of leg. Slight bruise of head.		
4	<i>Succeeded by pyæmia.</i>	4
Compound fracture of leg; amputation. Scalp wound, pus outside dura mater, &c. Compound fracture of leg. Compound fracture of thigh.	Compound fracture of leg. Abscess of thumb, followed by cellulitis. Crushed hand, amputation. Compound fracture of skull.	
5	<i>Succeeded by diffuse cellulitis.</i>	3
Scalp wound. Slight injury of thigh (delirium tremens occurred also). Fracture of thigh, ununited. Bite of donkey. Pugilistic bruises.	Scalp wound, fracture of spine. Fracture of skull, laceration of brain. Severely cut throat.	
1	<i>Succeeded by erysipelas.</i>	1
Injury of leg, suppuration of knee, &c.	Small scalp wound.	
1	<i>Succeeded by gangrene.</i>	0
Fracture of fingers.		

ALCOHOLIC.		NON-ALCOHOLIC.
2	<i>Succeeded by empyema and pleuro-pneumonia.</i>	0
Simple fracture of ribs.		
Fracture of ribs, &c.		
1	<i>Succeeded by tetanus.</i>	0
Burn.		
1	<i>Succeeded by superficial softening of brain.</i>	0
Blow on head.		
1	<i>Succeeded by cystitis.</i>	0
Fracture of leg.		

Pyæmia seizes more than its share.

Diffuse inflammation of the cellular tissue is fatal and readily induced.

Complications of accidents ultimately, but not immediately or necessarily fatal.

	Alcoholic.	Non-alcoholic.
Pyæmia	4	4
Cellulitis	5	3
Erysipelas	1	1
Gangrene	1	0
Pleuro-pneumonia } from broken ribs { ...	1	0
Empyema } ...	1	0
Pus between skull and dura mater (from scalp wound)	1	0
Tetanus	1	0
Superficial softening of brain (from blow on head)	1	0
Accidents directly and necessarily fatal ...	5	10

The non-alcoholic series yielded three fatal cases of cellulitis which were respectively produced by fractures of the skull and spine and a deeply cut throat. The alcoholic series gave five, one of which only had its origin in a severe injury, namely, a fracture of the thigh which had refused to unite; the others were consequent upon a scalp wound, a slight injury of the thigh, pugilistic bruises, and the bite of a donkey.

An increased liability to spreading inflammation of the cellular tissue belongs, therefore, to the trader in drink, produced, no doubt, by the liquor. In other words, under the

chronic influence of alcohol, the product of inflammation is apt to be purulent and non-adhesive, such as can spread and disseminate, rather than of the plastic and circumscribing sort, which limits the process by means of fibrillating lymph, and eventuates in false membrane and solid repair. The formation of pus instead of plastic lymph under the same influence is seen in the generation of empyema and of abscess within the skull from external injuries, nothing of the kind having occurred in the non-alcoholic category. These observations have additional weight when taken with reference to what has already been shown with regard to the distribution of the suppurative forms of pleurisy and pericarditis.

These conclusions are consistent with some observations lately published by Dr. Péronne,* who reckons among the effects of chronic alcoholism in relation to the healing of wound, abundant suppuration, diffuse inflammation, partial gangrene, secondary hæmorrhage, and tardiness of healing.

Kidneys.

The effect of alcohol upon the common channels of exit may naturally be considered last. The kidney, which has been credited with a morbid susceptibility to alcohol much in excess of what is warranted by facts, is the only gland of excretion which need occupy us in this relation.

By reference to the annexed abstract it will be seen that the kidneys were described as free from disease in almost exactly the same number of the two classes. The same statement holds good with regard to kidneys which presented no further departure from their natural state than simple congestion, probably in many instances a fleeting and almost accidental condition. Thus it remains that the number of kidneys presenting tangible morbid changes was almost exactly the same on the two sides; or, to speak precisely, the kidneys of 82 persons in the alcoholic, of 83 in the non-

* 'De l'Alcoolisme dans ses Rapports avec le Traumatisme,' p. 154.

alcoholic series, presented distinct morbid changes. This statement includes, of course, not only the alterations recognised by albuminuria, but comprehends also suppurative, tubercular, cancerous, embolic, and calculous affections.

Condition of kidneys in 149 cases of each kind.

				Alcoholic.	Non-alcoholic
	Natural...	...	...	49	43
Hyperæmia.	{ Congested	...	...	18	18
	{ Congested and enlarged	...	...	10	5
	{ Coarse	...	...	3	3
Tubal changes.	{ Coarse and enlarged	...	...	4	1
	{ Slight or uncertain change in cortex	...	...	2	4
	{ Large, smooth, mottled*	...	...	5	9
	{ Mottled, normal size, grey deposit in cones	...	...	0	1
	{ Smooth, pale, yellow or grey, cortex shrunk	...	...	1	1
	{ Fatty or flabby	...	...	2	1
Fatty change.	{ Fatty or flabby and enlarged	...	...	3	3
	Lardaceous	...	...	3	6
Intertubal, fibroid increase.	{ Cysts without other change	...	...	1	2
	{ Cysts and depressions	...	...	3	1
	{ Cysts and tubercles...	...	...	0	1
	{ Slightly granular	...	...	10	11
	{ Highly granular	...	...	18	15
	{ Granular + pyelitis	...	...	1	0
	{ Granular + tubercles	...	...	1	0
	{ Granular + conversion of other kidney into a cretaceous mass...	...	...	0	1
	{ Granular + stone	...	...	1	0
	Pyelitis...	...	...	0	2
	Abscesses in kidney associated with pyelitis	...	...	1	6
	Abscesses from pyæmia	...	...	1	1
	Abscess of uncertain nature	...	...	1	0
	Tubercular disease	...	...	8	4
	One converted into cretaceous mass, other natural	...	...	0	1
	Cancer	...	...	1	1
	Fibrinous blocks, without other change	...	...	0	2
	Stone	...	...	2	1

* It is possible that some of the kidneys thus described in the earlier records were lardaceous, in which case the preponderance of lardaceous disease in the non-alcoholic series would probably be greater than is represented.

*Symptoms referable to albuminuria in the preceding cases.**

		Alcoholic.	Non-alcoholic.
Number of cases in which renal symptoms of			
any kind were prominent	...	20	26
Renal œdema occurred in	...	14	18
Internal dropsy, apparently renal, occurred in	...	4	6
Albuminuria found in	...	23	29
Cerebral uræmia (coma, convulsions, &c.)	...	5	3
Death from renal disease (directly)†	...	10	14

Descending to details, and taking first changes which, so far as the descriptions allow us to judge, are in the tubes and their contents, we find on adding the kidneys described as enlarged and congested, and those which were fatty, to the varieties included within the tubal bracket, that in one or other of these ways the kidneys were diseased in 30 persons of the alcoholic series to 28 of the opposed class. Among these changes those only which had marked predominance in the alcoholic category were enlargement with either coarseness or congestion; of these were 14 in the alcoholic, to 6 in the contrasted series. The typical large white kidney was most common in the non-alcoholic class. Thus, it would seem that though certain alterations, which apparently have their seat within the tubes, prevail under an alcoholic trade, yet that they are not such as have marked symptoms or are generally discoverable during life. Under this influence tubal changes, though slightly more frequent, are less acute and obvious. It must be taken into account, however, as affording a partial explanation of their lessened liability to acute inflammatory affections of the kidney, that traders in liquor are less exposed to wet and cold, not infre-

* The table comprises all the renal symptoms observed in the cases of the two series, excepting those referred to pyelitis or renal abscess, tubercle, or other morbid growths, or calculus. These are excluded for the sake of placing the results of albuminuria in a distinct form.

† Sanguineous apoplexy is not included here.

quent causes of acute nephritis, than are the persons with whom they are compared. (See page 31.)

With regard to the intertubal or fibroid change we find distinct granulation in 31 alcoholic to 27 of the non-alcoholic series. If we look upon cysts (as with general truth we may) as evidence also of intertubal change, we must place the total among the alcoholic at 35, among the non-alcoholic at 31. Thus, it would seem that the frequency of granular degeneration is slightly increased by a converseance with liquor, the inequality in the distribution of the disease between the two classes being nearly represented by the proportion of 8 to 7.

Lardaceous infiltration, like other diseases of the kidney, has been loosely ascribed to intemperance in liquor. This change, however, is decidedly the less frequent in the alcoholic series. The diminution may be due, wholly or in part, to the comparative rarity of surgical accidents in the class, with a correspondingly smaller share of such hurts of bone and joint as give rise to long suppuration. We may at least conclude that the excessive imbibition which accompanies habitual intimacy with liquor, though it may not prevent, does nothing towards engendering the change in question.

This evidence, relating solely to inspection of the kidneys, may be supplemented by collateral reference to other organs affected in dependence upon or association with them, as well as by a glance at the accompanying symptoms. Pathological facts as gathered after death and clinical observations made during life agree with each other and with the preceding statements in indicating under alcohol an increase of granular degeneration, a diminution of active tubal nephritis and of lardaceous disease.

As to the changes in the vascular system we find under alcohol a marked excess of common atheroma, of simple hypertrophy of the heart and of sanguineous apoplexy. These indications of vascular deterioration are so often associated with the granular kidney that they may be generally taken as signs of its prevalence. Simple hypertrophy, however, and cerebral extravasation predominate in

the alcoholic series to an extent which would lead us to expect a larger excess of renal disease than is found. Alcohol has, it would seem, independently of renal disease, a damaging effect upon the arteries, whence the heart may become hypertrophied though the kidneys are natural. Thus, the deterioration of the coats of the vessels which accompanies renal disease, more especially of the granular kind, is enhanced by familiarity with liquor.

Cerebral uræmia, which is a more constant associate of the granular kidney than of the other forms of renal disease, also predominates in the alcoholic series.

Symptoms which point to other renal changes tell with equal consistency a different tale. In the alcoholic series we note fewer cases in which renal disease was detected during life; there is here less discovered albuminuria, less dropsical effusion of every kind, and a smaller number of deaths attributable directly to renal mischief. These details concur with the facts derived from examination of the kidney itself in showing that traders in liquor, either from the operation of the drink or the circumstances of the trade, are less liable than their neighbours to lardaceous disease and to tubal inflammation of the active and prominent kind.

Diverging for a moment from the strict subjects of our inquiry, and looking at the state of the kidneys generally accompanying delirium tremens, we may find additional evidence on this point.

I subjoin a table* compiled from the same sources in which the post-mortem state of the kidney in subjects of delirium tremens is compared with that of men not known to have been intemperate who have been cut off by accidental violence.

* This table is similar to one published in my work on 'Albuminuria;' it, however, comprises the records of seven additional years.

Kidneys after death with delirium tremens, and from accident without known intemperance. All of adult males. (From the year 1841 to 1871 inclusive.)

Condition of kidneys.	Delirium tremens. 58 cases.	Accident. 58 cases.
Natural	28	24
Congested	15	7
Slight or uncertain change in cortex	5	1
Large, smooth, mottled ...	3	1
Granular surfaces	6	8
Cysts without other change	1	7

Average age of delirium tremens patients, 38 years.

„ accident „ 41 „

Assuming, as we safely may, that most of the victims of delirium tremens have been habituated to alcoholic excess, we find in this fraternity of drunkards what to many persons may be a surprisingly small increase of renal disease. It must be observed, however, that the cases of accidental death are taken without exclusion as to trade, so that a certain proportion of lead workers, of whose calling granular degeneration is a necessary result, have been admitted.

Taking all the facts together, and allowing to the trader in liquor his full measure of protection from weather and violence, we must conclude—

1. That alcohol has no effect in causing lardaceous disease.
2. That it promotes granular degeneration, though not to an extent commensurate with the arterial change produced by the same agent.
3. That acute nephritis, though in exceptional instances possibly caused by intense alcoholic excess, is not generally increased in frequency by habits of drinking. In its comparative rarity under this influence the affection resembles others, save of the brain, of the acute inflammatory type.
4. Chronic and latent tubal disturbances, including fatty degeneration, are increased by the use of alcoholic liquors.
5. And that on the whole the kidneys are affected less injuriously by the popular poison than are the liver, the lungs, the blood-vessels, and the nervous system.

General conclusions.

We are led to conclusions which are mainly with, though in some respects against, old views. In the present state of medicine it may be as useful to fortify old truths as to assault old errors. The results may be thus summed up.

Persons who trade in liquor drink on an average more than those who do not, and their morbid peculiarities are mainly due to that excess. Estimating the effects of alcohol on this basis by means of comparison between the class described and persons similarly situated save in relation to liquor, the following conclusions have been reached.

Alcohol shortens life; to trade in liquor costs three and a half years.

Reviewing the morbid results which the examination of each organ has revealed, they present a consistency which is in some sort their warrant.

Alcohol causes fatty infiltration and fibroid encroachment; it engenders tubercle, encourages suppuration, and retards healing; it produces untimely atheroma, invites hæmorrhage, and anticipates age.

The most constant fatty change, a replacement by oil of the material of epithelial cells and muscular fibres, though probably nearly universal, is most noticeable in the liver, the heart, and the kidney.

The fibroid increase is little evident in the simply fibrous structures' such as fasciæ and tendons, but occurs about the vascular channels and superficial investments of the viscera, where it causes organic atrophy, cirrhosis, and granulation. Of this the liver has the largest share; the lungs are often similarly though less simply affected, the change being variously complicated with or simulative of tubercle; the kidneys suffer in like manner but in a more remote degree.

Alcohol also causes vascular deteriorations which are akin both to the fatty and the fibroid. Besides tangible atheroma there are minute deteriorations of the arterial walls, which show themselves by cardiac hypertrophy and cerebral hæmorrhage.

Drink causes tuberculosis, which is evident not only in the lung, but in every organ which is amenable. It must be observed, however, that from the tendency of tubercle to dissemination it is only necessary that it be planted in one organ to be found in many.

Drink promotes the suppurative at the expense of the adhesive process. This is sufficiently seen in the results of pneumonia, of pleurisy, and of pericarditis, in diffuse inflammation after injuries, and in the sloth and insecurity of the healing process.

Descending from general conditions to individual organs, the effect of alcohol upon the nervous system must be looked upon as special and taken by itself, since nervous matter presents to this agent a singular excitability of function, or in other words, a singular susceptibility of structure, for the purpose of acting upon which mankind in all countries and in all ages have sought and used alcoholic drinks.

Passing over those effects of intemperance which like delirium tremens are manifest rather during life than after death, we find that the brain pays a large reckoning in the shape of inflammation, atrophy, and hæmorrhage.

Alcohol multiplies inflammatory states of the brain of every kind, both of the substance and the envelopes, whether tubercular or not.

It occasions a gradual shrinking of the brain, as evinced by the accumulation of fluid in spaces once filled by cerebral substance.

It causes a liability to cerebral hæmorrhage by means of the arterial deterioration common to the greater part of the body.

With regard, to other organs they are damaged by alcohol much as they stand in its line of absorption. Passing over the stomach, the changes in which, however numerous, are, save when it is ulcerated, more prominent during life than after death, we come to the liver. This organ suffers more than any other, chiefly by way of cirrhosis and fatty impregnation. Next the stress falls upon the lung, probably less heavily than upon the liver, certainly more heavily than

upon any other part of the body with the exclusion of the nervous system. The mischief in the lung takes apparently every shape of phthisis. It is probable that the change most often is of a kind to which the term tubercular would strictly apply, while there is evidence, not comprised in the present tables, of a fibroid overgrowth, which apparently may either accompany or simulate tubercle. The arterial deterioration need not be further mentioned than to assign its relative frequency. Judging by its tangible results—atheroma, hæmorrhage, and cardiac hypertrophy—we should assign to this change a large share in the pathology of intemperance, though unless the connection between alcohol and tubercle has been much overrated it would seem to play a less fatal part than disease of the tubercular kind. Lastly, the kidneys, more remotely exposed, have a smaller participation in the common damage of alcoholism. They undergo congestive enlargement, fatty and fibroid change; they do not suffer, however, commensurately with the blood-vessels or with the same frequency as other viscera.

So far we have seen only the ill which alcohol produces; it may be asked is there none which it obviates? Apart from any medicinal or curative action, which the evidence before us does not touch, has it no *per contra* of prevention? It is difficult to answer this inquiry. Some active inflammations, such as pneumonia and endocarditis, are diminished in the alcoholic trades, but it must at once be seen that the increase of the alcoholic disorders must necessarily produce an apparent diminution of all which are unaffected by this agent. A man may be saved from pneumonia or acute rheumatism, not because alcohol antagonises such diseases, but because it kills him prematurely. He can die but once. Therefore, though under alcohol some forms of disease are comparatively infrequent, we must use much caution in concluding that it has a directly preventive influence. Nevertheless, it may be laid down as an axiom that any drug which can do harm can do good. Disease is most various, and may or rather *must* represent contrary conditions. It may be positive or negative, plus or minus. Too much or too little of any of

the shapes of heat, food, and work may spoil the equipoise of health. If a drug promotes one change it may prevent its opposite. Alcohol certainly gives an asthenic type to disease; although we cannot as yet say with certainty that it defibrinates the blood, yet it retards adhesive and plastic processes. This influence may be beneficent if it hinder the development of acute inflammation, and obviate the formation of coagula where, as in acute rheumatism, that action is harmful. It is possible that by some such antagonism to the sthenic and fibrous type of disease we may explain the remarkable paucity of endocarditis in the alcoholic series. But, at the best, the protecting is less certain and less effective than the deteriorating influence.

In brief and final enumeration, alcohol replaces more actively vital materials by oil and fibrous tissue; it substitutes suppuration for new growth; it promotes caseous and earthy change; it helps time to produce the effects of age; and, in a word, is the genius of degeneration.