The hazards of inducing anaesthesia in patients with a full stomach are now widely appreciated, and for this reason the pre-operative preparation of diabetic subjects with oral glucose is deprecated. Other problems which anaesthetists may encounter are the incompatibility of pitocin with light cyclopropane anaesthesia and the possibility of citrate intoxication as a differential diagnosis for cardiovascular collapse after massive transfusion of stored blood.

In very few of the cases reported did the anaesthetist know of the use of various drugs before operation, or associate hypotension or prolonged unconsciousness with any form of routine medical treatment. It is hoped that this publication will focus the attention of all medical practitioners on the fact that during anaesthesia unexpected adverse effects may be produced by drugs which do not appear to have any side-effects in the conscious subject. It is to be expected that many additions to the list of drugs discussed above will be noted in the future.

I am grateful to Professor C. A. Wells for permission to quote Cases 5 and 6, and to Dr. J. Cross for details of Case 7.

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At a meeting of the South-eastern Branch of the B.M.A. on June 23, 1858, Dr. H. R. SILVESTER gave the first account of his method of artificial respiration. After considering other methods already in use, including that introduced by Marshall Hall two years previously, he described his own, in which, with the patient in the dorsal position, the arms are pulled over the head to enlarge the capacity of the chest and induce inspiration, and are then returned to the sides to diminish the cavity of the thorax and produce forcible expiration, the whole process being repeated at the rate of 15 times a minute. Silvester's account was published in the *British Medical Journal* on July 17, 1858, at p. 576.

THE RISK TAKEN IN DRIVING UNDER THE INFLUENCE OF ALCOHOL

BY

JOHN COHEN, M.A., Ph.D.

E. J. DEARNALEY, M.Sc.

AND

C. E. M. HANSEL, M.A.

Department of Psychology, University of Manchester

Alcohol as a cause of accidents on the road has been widely studied. The investigations that have been carried out, valuable as they are, suffer, however, from a serious limitation. They have usually determined the effect of alcohol on the driver by measuring changes in his reaction time and in his skills, such as steering and braking (Smith, 1945; *Handbook*, 1952; Piret, 1952; Thompson, 1956). Large quantities of alcohol do, of course, produce deterioration in skill and reaction time, but the conclusion has too hastily been drawn that because no changes have been recorded after small quantities road safety is unaffected. This conclusion is not justified, for all that can be inferred from earlier inquiries is that these skills and reaction times are or are not affected. It cannot, for example, be inferred that a driver is not a menace on the road because his reaction times are unaffected or because a test of skill revealed no impairment. The decisive feature is not the driver's skill in itself but in relation to what he believes he could do and what he would in fact undertake. Thus the negative outcome of these studies may signify only that the methods of measurement were inadequate, not that the alcohol was without effect on the safety of the individual's driving.

Our aim, therefore, is to assess the effects of alcohol on the more complex psychological processes and performances involved in risks which drivers take and in hazards which they incur. By "risk-taking" we mean embarking on a task without being certain of success. There can be various degrees of certainty of success and hence varying degrees of risk-taking. By "incurring hazard" we mean embarking on a task in which the performer will not invariably succeed. Thus risk is measured by estimates of success before the task is attempted, whilst hazard is measured by the proportion of successes in actual performance (Cohen and Hansel, 1956). In our previous studies (Cohen, Dearnaley, and Hansel, 1955, 1956a) of risks and hazards taken by inexperienced and experienced drivers we found that, on the average, experienced drivers tended to (1) take less risk, (2) incur less hazard, (3) vary less in their driving behaviour, (4) be more realistic in judging their driving ability, and (5) be prepared to drive only when they felt secure and were in fact safe; on the other hand, an instructor with long experience drove without risk or hazard. That is to say, he never attempted a task unless he was sure he would succeed, and he never failed in any task which he undertook.

These results suggested that a comparison of drivers who had imbibed various quantities of alcohol with drivers free of alcohol might reveal similar differences. The present inquiry was designed to measure the influence of alcohol on those drivers who might be expected to show its effects least—namely, bus drivers of long

experience with records of safe driving. If any impairment due to alcohol could be demonstrated in such a group it would follow that the consequences might be far more serious in younger, less experienced, or less skilled drivers. We hoped that, by introducing psychological measures at once more sensitive and more fundamental in a general sense as well as in a sense specific to driving, any possible effects of smaller quantities of alcohol might reveal themselves.

Subjects and Procedure

Our subjects consisted of three groups of bus drivers working for the Manchester Corporation Transport Department. They had had on the average about 12 years' experience of driving a bus and, in addition, another eight years or so of driving other vehicles. The depots where the men worked were notified that the investigation was to take place, and drivers with awards for safe driving were invited to volunteer to take part. The arrangements were made through the personnel officer and representatives of the trade union. The average age of the men in each group was 45 years. There was one bachelor and one widower in the total sample; all except seven subjects had families. Drinking habits among the drivers varied from total abstinence to an average of 20 to 30 pints (11.5 to 17 litres) of beer a week; very few of our subjects drank spirits of any kind regularly.

All the drivers had worked an eight-hour morning shift immediately before the experiment and reported to us at 1 p.m. They then took lunch, without alcohol. During the meal they informed us about their drinking habits and driving experience. The alcohol, in the form of Scotch whisky (70° proof or 40% alcohol*), with an equal amount of soda-water, was taken from 2 to 2.30 p.m. The atmosphere was convivial.

The driving sessions began at 2.45 p.m. and lasted until about 3.15 p.m. The blood samples (0.5 ml.) were taken half an hour later. The procedure for the control group (without alcohol) was exactly the same as that for the two other groups except that they proceeded to the experiment immediately after the meal and the blood test was omitted. The moderate dose of whisky consisted of 2 British fl. oz. (or 56.8 ml.),† being the equivalent approximately of 23 ml. of *absolute alcohol*. The larger dose consisted of 6 British fl. oz. (170.4 ml.) of whisky, being the equivalent approximately of 68 ml. of *absolute alcohol*.

After consuming the whisky the drivers were taken to the site where the risk-taking experiments were to be conducted. The driver's task was to estimate how successful he would be in driving a bus through gaps of varying width. Having made his estimates he was to drive the bus through particular gaps.

Two vertical posts, 3 ft. (0.9 m.) high, 3 in. (7.6 cm.) square, and painted white, stood on a line. The gap between them could be varied and measured from calibrations on the line on which they were placed, the calibrations being visible only to the experimenter. Before the driving session began a bus 8 ft. (2.44 m.) wide was placed at a distance of 12 ft. (3.66 m.) from the gap and facing its centre.

The steps in the experimental procedure may be summarized as follows:

1. The driver sat in his seat and was told that he was shortly to drive his bus between the two posts in front of him. First, however, he was to tell us how well he *thought* he could do this at different sizes of gap between the two posts. At each prearranged size of gap between the posts the driver was asked to say how many times out of five he thought he could drive through without touching the posts. The gap between the posts was increased

by intervals of 2 in. (5 cm.), beginning with a gap of 7 ft. 4 in. (2.23 m.) or smaller if a driver thought he could drive through this gap. This was continued until the driver said he could succeed five times out of five.

2. We next determined the least size of gap through which the driver would *actually attempt* to drive. Here, too, the posts were moved apart in stages except that the gap was now increased by intervals of 1 in. (2.5 cm.) at a time. The size of the gap between the posts was increased until the driver signalled his intention to drive through it. He attempted to do so without touching the posts and then drove round the training site so as to return to the starting-point. He drove at his own speed.

3. Finally, we measured the driver's performance at different sizes of gap. The gaps through which he was asked to drive his bus were such as to reveal the smallest gaps at which he would succeed (a) once or twice out of five, (b) three or four times out of five, and (c) five times out of five.

The experiments were carried out at the Training School for Bus Drivers of the Manchester Corporation Transport Department.

Before presenting the results, we wish to make certain comments on the above procedure. First, it might be asked whether different estimates might be obtained if our subjects were asked to say how many times, say, out of ten (or a hundred) they would succeed. We have shown elsewhere (Cohen *et al.*, 1956b) that the mean estimates of adults, when expressed as fractions of unity—that is, as subjective probabilities—are unaffected by the range within which they are made. Thus estimates made within one range are transposable to another. Secondly, it might be asked whether the estimates would differ if the subjects had to say how many times they would fail rather than how many times they would succeed. Here, too, we have shown (Cohen *et al.*, 1957) that, at any rate, when the range is "out of five," estimates of success and estimates of failure appear to be additive.

A third point arises in connexion with the order in which the estimates were made. For practical reasons, it was only convenient to present the entire series of gaps in *ascending* order of magnitude. In principle it would have been equally possible to present them in *descending* or random order of magnitude. The ascending order, as we know from our previous experiments (Cohen *et al.*, 1958), has the effect of yielding larger estimates for each gap (or level of difficulty) than the descending order. The ascending order of presentation was also employed in relation to the least gap which the driver was prepared to attempt. This feature of the procedure must be borne in mind when considering the results.

Results

1. Hazard

The first results which we wish to present reveal the greatest degree of hazard in which our three groups of drivers became involved. This is indicated by the difference between the mean of the narrowest gap which the drivers attempted and the mean of the narrowest gap through which they were always able to drive successfully, as shown in Table I.

TABLE I.—*Margins of Hazard (Means)—Width of Bus=8 ft. (2.44 m.)*

Quantity of Whisky (1)		Narrowest Gap which Drivers Attempted (2)		Narrowest Gap at which Drivers Always Succeeded (3)		Difference (Margin of Hazard) (4)	
British fl. oz.	ml.	ft. in.	m.	ft. in.	m.	in.	cm.
0	0	7 11.3	2.420	8 6.7	2.610	-7.4	-18.8
2	56.8	7 9.6	2.375	8 6.9	2.615	-9.3	-23.6
6	170.4	7 7.8	2.330	8 7.3	2.625	-11.5	-29.2

On the average, the drivers in all three groups were prepared to drive an 8-ft. (2.44-m.) bus through a gap less than 8 ft. in width, the proportions in each group undertaking this being 68, 75, and 80% respectively. Under our experimental conditions, therefore, even the alcohol-free

*In the United States the *degrees proof* is twice the percentage of alcohol by volume. So that in the U.S. this whisky would be described as 80° proof.

†The U.S. fluid ounce (29.6 ml.) is rather larger than the British (28.4 ml.).

drivers were involved in hazard. The effect of the alcohol is, however, revealed in the degree of hazard incurred by the drivers in the three groups. Three inferences relating to the effect of alcohol may be drawn from Table I. First, as the drivers consumed more whisky they were prepared to drive through a narrower gap. Second, as they consumed more whisky they needed a wider gap before they could always succeed; thus there was a progressive deterioration in performance as more whisky was consumed. Third, it follows that the margin of hazard, as shown in the fourth column, increases with greater intake of alcohol. The difference between the two extreme groups is significant ($t=2.2$, $df=37$, $p<0.05$). We may therefore conclude that, as compared with the alcohol-free drivers, those who had taken 6 fl. oz. of whisky (68 ml. of absolute alcohol) were involved in considerably greater hazard.

2. Risk

Whilst greater hazards were incurred by imbibing alcohol, the risks taken were unaffected. In other words, although the drivers were prepared to drive through a narrower gap, their confidence of success at this gap remained unchanged. At the narrowest gap which they attempted the mean estimates of success of the groups taking 0, 2, and 6 fl. oz. respectively were 2.8, 2.1, and 2.8 times out of five. We can express these as subjective probabilities by converting them to fractions of unity, thus: 0.56, 0.42, and 0.56 respectively. These values do not differ significantly. Accordingly the effect of alcohol was not to make drivers take more risk—that is, act at a lower level of subjective probability—but to assign the same subjective probability to a more difficult task. If the difficulty of the task remained unchanged they became more optimistic and attached a higher subjective probability to the task.

Furthermore, on the average, the narrowest gap (7 ft. 10.5 in.—2.40 m.) at which the high-alcohol group believed they could always succeed was smaller than the narrowest gap (7 ft. 11.3 in.—2.42 m.) which the alcohol-free drivers even ventured to attempt.

Alcohol thus produced dangerous effects apart from inducing the drivers to incur greater hazards. In addition to influencing the drivers to attempt to drive through a narrower gap, it also induced greater confidence of success at a narrower gap. This may be seen from column 3 of Table II. To illustrate: the subjective probability of the high alcohol group for a gap of 7 ft. 7.8 in. (2.33 m.)—the narrowest they attempted—was 0.56, as compared with 0.34 for the non-alcohol group. Similarly, because the values in both column 2 and column 3 of Table II decline with increasing alcohol, the margins of safety remain more or less the same, the small variations in column 4 not being significant.*

TABLE II.—Margins of Safety (Means)

Quantity of Whisky		Narrowest Gap which Drivers Attempted		Narrowest Gap at which Drivers Believed They Would Always Succeed		Difference (Margin of Safety)	
(1)		(2)		(3)		(4)	
British fl. oz.	ml.	ft. in.	m.	ft. in.	m.	in.	cm.
0	0	7 11.3	2.420	8 1.3	2.470	-2.0	-5.1
2	56.8	7 9.6	2.375	8 1.4	2.475	-3.8	-9.6
6	170.4	7 7.8	2.330	7 10.5	2.400	-2.7	-6.9

3. Estimates and Performance

The effect of alcohol may be shown in a third manner (as in Table III), by comparing the size of the gap at which the drivers believed they would always succeed with the gap at which they did in fact always succeed.

*The effect on speed of driving is similar. As Vernon (1936) has shown, moderate quantities of alcohol tend to make most drivers increase their rate of driving, this tendency being usually unrecognized by them.

TABLE III.—Estimates in Relation to Performance (Means)

Quantity of Whisky		Narrowest Gap at which Drivers Believed They Would Always Succeed		Narrowest Gap at which Drivers Always Succeeded		Difference	
(1)		(2)		(3)		(4)	
British fl. oz.	ml.	ft. in.	m.	ft. in.	m.	in.	cm.
0	0	8 1.3	2.470	8 6.7	2.610	-5.4	-13.7
2	56.8	8 1.4	2.475	8 6.9	2.615	-5.5	-14.0
6	170.4	7 10.5	2.400	8 7.3	2.625	-8.8	-22.4

In the circumstances of this experiment even the drivers in the control group displayed an excess of confidence. They believed they would succeed before they could actually succeed. But this effect was much more marked in the group which had taken 6 fl. oz. of whisky. The influence of the alcohol thus led to a tendency to overrate ability in relation to performance, even in our group of experienced drivers. The fact that two whiskies had little or no effect on our highly selected group should by no means encourage any ordinary driver to indulge himself to that extent or less.

4. Blood Alcohol in Relation to Whisky Consumed

Analysis* of the blood samples showed that the mean level of blood alcohol was 0.04 mg./ml. ($\sigma=0.07$) in the group taking 2 fl. oz. of whisky (=23 ml. of absolute alcohol) and 0.58 mg./ml. ($\sigma=0.17$) in the group taking 6 fl. oz. (=68 ml. of absolute alcohol). The difference between these two means is significant ($t=12.5$, $df=38$, $p<0.001$). With one exception it is possible to state from a knowledge of his blood alcohol whether a driver had taken 2 or 6 fl. oz. of whisky. It follows that the mean level of blood alcohol in the two groups is related to their respective mean margins of hazard. But the variation in the margin of hazard within the groups is so large as compared with the variation between them that a knowledge of the blood alcohol of any individual driver tells us little about the degrees of hazard in which he might become involved.

Discussion of Results

It is a well-known fact that individuals vary widely in their reaction to the same amount of alcohol. Our results bear this out. Some of our subjects seem to have been more adversely affected by two whiskies than others by six. Hence, so far as the practical implications of this investigation are concerned, we have to bear in mind not only deterioration in the average performance of drivers in general after taking alcohol, but also extreme effects on a small proportion of individuals.

After taking alcohol certain drivers attempted to drive through extremely narrow gaps. No alcohol-free driver tried to drive his 8-ft. (2.44-m.) bus through a gap less than 7 ft. 5 in. (2.26 m.) in width, whereas three of the

*We are most grateful to Dr. L. P. Kendal, M.Sc., senior lecturer in physiological chemistry at the University of Manchester, for carrying out the analysis of the blood samples. Dr. Kendal has kindly provided the following note on the method employed of estimating the blood alcohol concentration: "The highly specific alcohol dehydrogenase method was used (Bücher and Redetzki, 1951; Bonnicksen and Theorell, 1951); and the instructions given in the pamphlet published by C. J. Boehringer and Soehne, of Mannheim, from whom diphosphopyridine nucleotide and crystalline alcohol dehydrogenase (yeast) were purchased, were followed. At the testing-ground a blood sample of approximately 0.5 ml. was withdrawn from the subject into a syringe by venepuncture, and transferred immediately into a weighed bottle containing 4 ml. of the perchloric acid protein precipitant. The bottle was reweighed on its return to the laboratory and the weight of blood obtained by difference. The volume of the blood sample was then calculated on the assumption that its specific gravity was 1060. The well-mixed contents of the bottle were then transferred to a centrifuge tube, and, after centrifuging, the ethanol concentration in the clear centrifugate was determined, always in duplicate, by the alcohol dehydrogenase-DPN spectrophotometric method. From the mean of the duplicates the ethanol concentration in the original blood sample was calculated."

group taking 2 fl. oz. (56.8 ml.) were prepared to undertake this task, one of them being willing to attempt a gap 1 ft. 2 in. (35.5 cm.) narrower than his bus, his subjective probability of success at this gap being 0.8, although his blood alcohol was only 0.02 mg./ml. Two drivers after 6 fl. oz. (170.4 ml.) attempted gaps which were respectively 1 ft. 2 in. (35.5 cm.) and 1 ft. 4 in. (40.6 cm.) narrower than the bus; the blood alcohol of the former was 0.74 mg./ml. and of the latter 0.26 mg./ml., and the subjective probabilities of success were 0.6 and zero respectively.

It is perhaps not surprising that in our very highly selected and experienced sample of drivers there should have been one or two who compensated for the effects of six whiskies by becoming extremely cautious. One driver, after 6 fl. oz. (170.4 ml.) of whisky, refrained from making an attempt until the gap was 10 in. (25.4 cm.) wider than his bus, though he *believed* he could always succeed when the gap was 8 in. (20.3 cm.) wider, and, in fact, he always succeeded when it was 7 in. (17.8 cm.) wider; his blood alcohol was as much as 0.60 mg./ml. The blood alcohol of the most dangerous driver was less than half that of the most cautious one. This relatively dangerous driver was 5 stone (31.8 kg.) heavier and 15 years older than the cautious one, though a greater weight and age might be expected to be associated with a reduced effect of alcohol. The absence of any significant correlations between performance and the age, weight, driving experience, and drinking habits of our drivers may be attributed to the homogeneity of the sample.

The reader may wonder whether our results suggest any level of blood alcohol which should not be exceeded. In the United States, the National Safety Council (1953) recommended that the lines of demarcation between levels of blood alcohol should be as follows:

0.0-0.5 mg./ml.,	safe
0.5-1.0 " "	possibly under influence of alcohol
1.0-1.5 " "	probably " " " "
Above 1.5 " "	definitely " " " "

We do not, however, think it is justifiable, on the basis of our experiment, to establish the interval of 0.0-0.5 as safe. We have found that the trustworthiness of a man's judgment of his driving skill was impaired even after a small quantity of alcohol producing a blood alcohol concentration lower than 0.5 mg./ml. This impairment of judgment occurred in what might be described as the *élite* of drivers on the road. Furthermore, the effects of the alcohol were in a sense minimal, as the alcohol was taken immediately after a meal. The performance of the drivers deteriorated, they were involved in greater hazards, and they displayed a false confidence in their driving abilities.

Ordinarily a driver suspected of being under the influence of alcohol cannot be given a test of safe driving. We suggest, therefore, that measures taken to reduce traffic accidents due to alcohol must forbid the taking of alcohol for some specified period before driving. The menace to public safety comes particularly from those who, after a slight amount of alcohol, feel they are sober or believe they are driving more cautiously.

In Great Britain it is extremely difficult to assess the effects of alcohol on the incidence of traffic accidents. The reason is that the police, when reporting an accident, are extremely reluctant to state that they strongly suspect the driver of being under the influence of alcohol unless they charge him with being drunk. It is well known that the police are very unhappy about this state of affairs. They are well aware that even when the driver is charged with being drunk he stands a good chance of being acquitted if he elects to go for trial before a jury at quarter sessions.

We have been privately told by many members of the police force that they have no confidence in the tables published by the Ministry of Transport and Civil Aviation and Scottish Home Department (1955-7), giving details of the "factors where drivers were regarded by the police as contributing to the accident." From the figures in these

tables the influence of alcohol appears to be a negligible factor, whereas the police believe that the figures give a grossly misleading impression. Thus, for example, in 1956 there were 216,172 road accidents in Great Britain. "The influence of drink or a drug" was considered by the police (according to the official report) to be a contributing factor in only 994 of these accidents—that is, less than 0.5%. In 1954 and 1955 the proportion was approximately the same. The true proportion, according to various estimates and investigations in different countries, would appear to be of the order of 50%. The position appears to be much the same in many other countries. According to Piret (1952) there appears to be a conspiracy of silence between the authorities, the lawyers, and the witnesses to wrap the effects in a cloak of innocence. Only the most drastic measures, firmly carried out, could cope with this appalling state of affairs.

Conclusion

Our main results may be briefly summarized as follows.

Drivers who took alcohol became involved in greater hazards than alcohol-free drivers.

As the amount of alcohol taken was increased, the drivers were prepared to drive their vehicles through narrower gaps. This revealed that the alcohol had adversely affected their judgment.

The performance of the drivers, as well as their judgment, progressively deteriorated as they consumed more alcohol.

After taking alcohol the drivers became more dangerous, although they did not take greater risks. This was due to the fact that the level of confidence above which they were prepared to drive their bus remained unchanged. But at any given size of gap the drivers, after taking alcohol, were more confident of success. Thus they were prepared to drive through narrower gaps.

Alcohol intensified any driver's tendency to overrate his ability in relation to his performance.

APPENDIX 1

Margins of Hazard (Standard Deviations)

Quantity of Whisky (1)		Narrowest Gap which Drivers Attempted (2)		Narrowest Gap at which Drivers Always Succeeded (3)		Difference (Margin of Hazard) (4)	
British fl. oz.	ml.	in.	cm.	in.	cm.	in.	cm.
0	0	5-3	14-0	1-8	4-6	5-4	13-7
2	56-8	5-3	13-5	1-4	3-6	5-0	12-7
6	170-4	6-0	15-2	1-7	4-3	5-8	14-7

Margins of Safety (Standard Deviations)

Quantity of Whisky (1)		Narrowest Gap which Drivers Attempted (2)		Narrowest Gap at which Drivers Believed They Would Always Succeed (3)		Difference (Margin of Safety) (4)	
British fl. oz.	ml.	in.	cm.	in.	cm.	in.	cm.
0	0	5-5	14-0	6-3	16-0	4-4	11-2
2	56-8	5-3	13-5	7-9	20-0	4-6	11-7
6	170-4	6-0	15-2	5-6	14-2	5-4	13-7

APPENDIX 2

Driving under the Influence of Drink or Drug

The British reader might be specially interested in the statistical differences between the proportions convicted of (a) those who elect to be dealt with by magistrates and

(b) those who elect to go for trial, respectively. Relevant figures for the years 1953 to 1957 have very kindly been provided for the County of Lancashire by the Chief Constable, Colonel T. E. St. Johnston. These are summarized below:

	Electing to be Dealt with by Magistrates (1)	Percentage Convicted (2)	Electing to go for Trial (3)	Percentage Convicted (4)	Percentage of Total Charged who Elect to go for Trial (5)
1953	115	92	8	38	6
1954	161	94	20	35	11
1955	166	92	13	46	7
1956	197	89	30	33	13
1957	193	91	37*	35	20

* Excluding 10 who elected to go for trial but not yet tried.

It might be argued that those electing to go for trial are in fact less culpable. If this is not the case, the more or less constant differences between columns (2) and (4) require some explanation. From column (5) it may be seen that there is a tendency for an increasing proportion of the total charged to elect to go for trial. This is not surprising if it is becoming more widely believed that trial by jury, other things being equal, carries a higher probability of acquittal. But it is hardly credible that an increasing proportion of those less culpable are being apprehended by the police and electing to go for trial. These figures bring to light what appears to be a serious discrepancy in the administration of the law. We are faced with one of two conclusions: if both groups (columns 1 and 3) are equally culpable, which may well be the case, either a large number of people are wrongly convicted by the magistrates or wrongly acquitted by the jury.

We should like to express our gratitude to the Manchester Corporation Transport Department, and in particular to Mr. J. F. J. Webb, personnel officer, and Mr. G. Walker, chief instructor, for their most valuable help in making this investigation possible. Our thanks are also due to Dr. R. I. Johns and Sister E. West for taking the blood samples, and to the local branch of the Transport and General Workers' Union and the volunteer drivers for their helpful co-operation.

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The American Heart Association (44, East 23rd Street, New York) has issued a booklet summarizing, in easily understood diagrams, various mortality statistics for the U.S.A. As elsewhere, deaths from rheumatic heart disease have fallen sharply in the last two decades, though it still causes 31% of the deaths from cardiovascular disease among young people aged 5-24. A comparison of death rates from cardiovascular disease in different countries among men aged 45-64 in the year 1954 shows it to be greater in the U.S.A. than in most of the countries of Europe, including the United Kingdom, and about double the rates in the Scandinavian countries, France, Italy, the Netherlands, and the German Federal Republic.

URINE-ALCOHOL TESTS AND “DRUNK-IN-CHARGE”: SURVEY OF 312 CASES

BY

H. J. WALLS, Ph.D., B.Sc.

Staff Chemist, South-Western Forensic Science Laboratory,
Bristol

This laboratory has during the past few years made several hundred alcohol determinations on blood and/or urine samples taken from allegedly intoxicated drivers. This number seems to me large enough for a statistical examination of the results to be of interest.

TABLE I

Concentration in Urine* (mg./100 ml.)	No. of Cases	Circumstances			Medical Opinion†			Result of Proceedings				
		Accident‡	No Accident	Not Driving	Unfit	Borderline‡	Fit	Convicted	Pleading Guilty	Acquitted	Convicted of Other Offences	No Action Taken
Under 100	1	1			2	1		1			1	1
101-120	3	3			3	1		4			2	
121-140	6	3	1		3			1	1			
141-160	2	1	1		2							
161-180	4	4			2			1	1			
181-200	9	5	1	1	1	3		2	1	3		3
201-220	15	7	4	2	5	1		4	4	2	2	3
221-240	26	11	7	4	20			12	6	3	3	2
241-260	24	12	7	4	14	1		12	6	3	1	2
261-280	29	5	13	6	17	4		17	7	5		
281-300	47	20	15	6	35	4		18	17	8		1
301-320	25	14	3	6	14	2	2	12	6	6		1
321-340	24	4	11	2	14	1	1	8	7	5	3	1
341-360	31	8	11	8	23	4		12	13	3	1	1
361-380	22	6	7	3	14	1	1	11	8	2	1	
381-400	19	7	7	1	14	1		7	7	4		
401-420	14	4	3	4	7			10	1	2		1†
421-440	4	2		1	3			1	1	1		
441-460	3	1		2	2	1		3				
461-480	2		1	1	1			2				
481-500	1		1		1			1				
Over 500	1	1						1				

* In the few cases in which only blood samples were analysed the blood concentrations have been included here after multiplication by 4/3.

† Incidents involving personal injury, damage to other vehicles, driving off the road so as to be unable to proceed, motor-cyclists falling off, etc. Mere temporary mounting of road verge, etc., not counted as accidents.

‡ Inconclusive opinions such as: "recovering from effects of alcohol at time of examination," "unable to distinguish between effects of alcohol and shock," etc.

§ Conviction of other traffic offences in which element of intoxication does not enter.

|| Defendants convicted in spite of medical opinion.

¶ Defendant committed suicide.

** Defendant certified insane.

The Investigation

In all, 312 cases are considered; the details are summarized in Table I. The figures under the headings "circumstances," "medical opinion," and "result of proceedings" are based on information supplied by the police forces which submitted the samples. Where the sum of the numbers under each of these headings is less than the total number of cases in the same concentration range, that signifies in most cases merely that the relevant information could not be obtained. In a small number of cases, however, the defendants were not medically examined.

Over 90% of the samples consisted of urine only. Where both blood and urine samples were submitted, only the urine figures are included in Table I; they are probably in general more significant than figures for blood taken, usually, at least an hour after the defendant was arrested. Where only blood samples were submitted, however, the figures have been included in the table after multiplication by 4/3.

The ratio 4:3 (1.33:1) for urine: blood alcohol appears to be generally accepted (*Taylor's Medical Jurisprudence*, 1957), although Elbel and Schleyer (1956) suggest that the