

## MEDICO-LEGAL ASPECTS OF GAS WARFARE

BY ALAN BROOKSBANK

A GENERAL MEETING of the Medico-Legal Society of Victoria was held on Saturday, May 27th, 1939, at 8.30 p.m., at the British Medical Society Hall, Albert Street, Melbourne. The President, Sir John Latham, occupied the chair.

The President said: This evening we are to be addressed by Mr. Alan Brooksbank on "Medico-Legal Aspects of Gas Warfare." Mr. Brooksbank had experience as a gas officer in the war and since has been continuously interested in gas and precautions against gas attacks, and he is really one of the leading authorities on that subject in the Commonwealth. I have very much pleasure indeed in inviting him to address us.

Mr. Brooksbank said: Some of the medico-legal aspects of gas warfare have changed since Mr. Barry first spoke to me about this paper in November last year. The interval has been a period of pleasing progress and I will begin by giving you a short account of what has happened.

Great Britain has recognized that the medical problems are so difficult, technical and pregnant with disaster that it is unwise for medical matters to be controlled by a general department. The medical arrangements have been taken over by the Ministry of Health and it is publishing better books which come to Australia.

Some controversial constitutional points have been waived by our States' voluntarily agreeing to be responsible for safeguarding civilians against gas and other warfare weapons. In January of this year, New South Wales set up a permanent department to administer civilian defence; in the same month Queensland accepted the onus of providing civilian protection and is making great headway. Tasmania followed in February, and the Victorian organism, which had a two years gestation period, has now arrived as a somewhat misshapen but thriving and growing

creature. You could, if you would, make it more shapely. South Australia had been fortunate in having an influential person, who understood the subject, has energy and a sense of responsibility, and it has recorded great progress.

The aspect has been so changed since Mr. Barry spoke to me that I have scrapped the paper I had proposed to read to you and have substituted one more in keeping with the times. I would like to address you for about twenty minutes in your capacity as responsible and influential citizens who have some little regard for their own safety and more for their children and womenfolk, and who are not unmindful of property. I want to show you that the developments, impressive though they may appear on paper, fall far short of what may unfortunately be required here and, when compared with overseas preparations, are rather of the kindergarten stage.

Then I will take specific medical problems and specific legal matters relating to the urgency of statutory provisions, adapting the law.

The progress is enough to show that we are dealing with live problems of great importance; it is no longer a subject of mere academic interest.

I have taken the title gas warfare, not because gas is more likely to be used, or is potentially more lethal, but because a greater amount of technical knowledge and organization is needed to minimise its very high nuisance value. I follow the precedents set by the Great Powers and indeed it was not until this year that instructors in England received any training in modern fire bombs and high explosives, and those who did gas courses in 1935-38 have to be further trained.

It has been generally recognized that if there be a good anti-gas organization its parts can be adapted to deal with fire and high explosives, but not vice versa. The general term to cover all phases of civilian defence is now "Air Raid Precautions," and that term is deemed to include coastal bombardments.

The reason for studying A.R.P. is that within the last

ten years there has been an international recognition that the basic ideas of the conduct of warfare have been revolutionized. Civilians are now to be the targets for direct and intentional attack. We deplore this retrograde step in civilization, but, alas, have no alternative except to take effective steps to safeguard ourselves.

The ideas are brutally simple. They are to attempt to terrorize the women and children; to break down the supply of food and munitions and, by a process of organized damage to national resources, to weaken the national endurance and morale.

Whatever group of causes may be assigned for the defeat of Germany in the last war, industrial exhaustion and weakening of civilian morale must be included as well as the defeats in battle of the fighting forces.

Now, owing to the development of the air arm, the fighting forces are no longer the sure bulwark; a nation with an undefeated army and navy could nevertheless be conquered, its civilians having yielded to the pressure of bombs.

I take the stand that, if overseas developments are such that it is desirable for Australia to double up its militia forces for service in Australia; then it is also desirable for us to follow overseas developments and prepare our Air Raid Precautions plans.

In Australia the officials appear to have drawn their information and inspiration from Great Britain and to have failed to recognize that Great Britain herself was many years behind; the way I can show you that is to give an account of what other countries have done.

The Italians appear to have been the first to implement the recognition of the revolution in the manner of waging war. A Royal Decree of February 18, 1930, set up a special civilian militia—there followed such a voluminous series of decrees and other legal enactments that, by 1934, it was necessary to codify the law.

France followed in 1931 and placed the responsibility on the Ministry of the Interior; by 1934 instruction and

training, not merely of officials, but of the civilian population was begun. Its Air Raid Precautions Act of April 8, 1935, made civilian precautions compulsory, and to-day if anyone declines to take part in a "take cover" exercise he is liable to be fined.

This in itself opens up some nice legal problems.

Germany followed in 1932, before Hitler came into power, and as early as 1935 had arranged medical courses of 26 weeks duration. The Germans were probably the first to understand that in an air raid everyone must do something and they have concentrated on public instruction, and to-day we have the situation that at least one member per household has gone through a school of instruction. The number of civilians trained certainly exceeds ten million.

Russia has concentrated on the children; anti-gas instruction is obligatory in all schools throughout the Soviet Union, and in European Russia the school children have respirator drill once a week. The medical profession might consider at what age it is desirable to begin teaching children air raid precautions.

Our interest in Switzerland is mainly legal. The Federation found in 1934 that the Cantons were not interested and it was necessary to pass two Federal Acts of Parliament making financial provision.

The Japanese sound a novel note. They advertise what they are doing in civil precautions. They seek to give the impression that their civilians are so thoroughly prepared that it would be a waste of ammunition to attempt to injure them. Back in 1935 a civilian rehearsal was held in which some 200,000 civilians did some duty or other for which they had been trained.

England, relying on the Geneva Gas Protocol and collective security, was politely interested until 1935. By then the Air Raid Precautions organizations on the Continent had become the fourth arm of the defence services. The Great Powers had recognized that, however formidable their fighting forces might be, they could not keep out the hit and run raider.

I put it to you bluntly—can we in Australia hope to keep the raider out?

When England found that Continental powers thought it necessary to spend millions of pounds on precautions and to divert the energies of millions of their peoples from productive activity, and had created permanent secretariats with administrative officials, instructors and research workers, Englishmen began to realize that precautions could be effective—effective enough to warrant colossal expenditure.

A modest start was made in 1935 by the creation of a small sub-department with a staff of seven officials working under the Home Office, not the War Office—following the French precedent.

Two years later, an Act of Parliament was passed throwing the burden on to local governing bodies and making financial provision to the extent of £20,000,000, a sum which was of course quite inadequate.

I have laboured the point of the foreign developments, because it would appear that our officials here in Australia, both civil and military, have adopted the attitude of more or less polite interest, and that is not enough when you see the feverish activity in all the other Great Powers. I should mention also that the early English publications were issued in such a hurry that they did contain many serious mistakes.

What could you expect from a small department of seven persons, finding themselves confronted with highly technical engineering, medical, chemical, legal and administrative problems of great complexity and an apathetic public. It was not until the crisis of September last that any real and sustained public interest was shown in the subject. Our thanks are due to the few thousands of nameless volunteers who did the pioneering work, in face of ridicule and opposition and with but little encouragement.

I see no reason why the mistakes made in England in good faith should be repeated in Australia when we have the world resources to call upon, and I propose to tell you frankly the position in Australia.

A start was made in June, 1935, when State Premiers were invited by the Commonwealth to summon conferences. In 1936 the public was assured that all States had agreed to co-operate, but, until this year, the work has been of rather a preliminary nature.

The Defence Department, apparently as an act of grace, made the services of certain staff officers and drill sergeants temporarily available in each State to assist in civilian instruction. In fairness it should be said that the department itself had its hands full with problems of mechanization and modernization; it was short of trained officers and not over-financial. The officers selected were not released from other duties, nor, I am informed, given more pay, and were told that it was temporary. In fact very good types of conscientious officers were selected. But I put it to students of human nature—if you give an already over-worked man an additional task which involves a tremendous consumption of reading time, don't free him from other duties, tell him it is temporary, don't give him any more pay, what standard of learning and instruction would you expect? When to all that you add the fact that, owing to the Geneva Gas Protocol, the study of gas defence had been neglected, and these officers were expected to teach the medical side—again I ask what standard of learning would you expect? The fair answer is that, owing to the conscientiousness of the officers, it is higher than might be imagined.

The length of the courses varied from 12 to 20 hours and, until this year, there was no co-ordination officer.

A few of us became critical of the adequacy of the arrangements, but both Sir Archdale Parkhill and Mr. Thorby, who were experienced politicians, found that the press and public were quite satisfied with the statement that the Defence Department experts advised that the danger of gas being used here was remote.

When you, however, come to look at the syllabus of training arranged by the Defence Department in 1935-38 you find that the only weapon dealt with was gas. No

instruction at all was given in modern fire bombs and none in high explosives.

Taking the gas course itself, there is very little specialized training, very little team work, no opportunity to develop sectional leadership, no practice in executive control. The olfactory nerve of the nose is very important in a gas attack; there is no systematic training of the nose, no opportunity given for acquiring a vocabulary of odours. Apart from respirator drill and a tear gas chamber test, there is little practical work. Trainees were not shown gas bombs, fire bombs or high explosive bombs bursting. There were no simulated raids showing the working of the organization, and as yet no code of warning signals has been published. Until this state of affairs is rectified we could not hold a rehearsal or a blackout.

Once more a few of us were critical, but it was found that to call us "enthusiasts" was a complete and satisfactory answer. To be an enthusiast appears to be some dreadful crime of which I stand charged and plead guilty.

I am happy to say that some States have seen the light and in 1939 Hobart has a six full days course of civilian instruction; Sydney an eight days course; Brisbane a fortnight; and the bigger course in England is of three weeks duration and is limited to persons who have already familiarized themselves with some 16 books and 50 circulars.

Why it is that the Defence Department should provide Victoria with a course of 20 hours when other States get more than twice as much training is difficult to explain. Perhaps it is that some 350 trainees were examined by their own instructors and all passed and have become duly qualified instructors in turn.

Victoria is now about to train municipal employees and some of the above-mentioned instructors will be doing the work.

I am apprehensive that in dealing with modern warfare weapons a little knowledge may be very dangerous. Here we are about to ask persons to undertake very dangerous duties in the public interest in an honorary capacity, and

are we giving them a fair deal in offering them such limited instruction?

As a lad of 18 I had to carry on without proper instruction and to learn by experience; through ignorance I made bad mistakes and men are still suffering from them. When I understood the work, I brought my own unit through the last 18 months of the war without a gas casualty. To-day the instruction is available and it is not fair to ask men to learn at the expense of their neighbours' health and possibly lives.

*Medical Aspects*

I come now to some medical aspects and wish to say in advance that I disclaim any medical knowledge other than what I have had through necessity to learn, and even that is limited to what to do on the first day.

The outstanding difficulty is how to solve the problem of speedy and accurate diagnosis of the injuries of persons who have inhaled invisible odourless gases which have a delayed action.

For the lawyers' benefit I should explain that many of the warfare gases have what, in jury language, is an incubation period of some hours duration. It is rather a delayed awareness or consciousness of a destructive action which is continuous and progressive, and no readily recognizable medical symptoms may appear for some hours, and by then substantial injury will have been caused. If the doctors cannot solve this problem of advance diagnosis, then the art of preventive medical attention is discounted and the medical action is limited to alleviation and not prevention.

The medical men cannot take a chance, for it so happens that the medical treatment for one group of gases is diametrically opposed to that prescribed for others, and if the wrong treatment be applied death may result.

Again for the lawyers' benefit I should explain that for convenience we classify the warfare gases into four main



divisions, according to their more spectacular effect on the human body. It is not a mutually exclusive classification, not very scientific, and the terminology comes from the Tommies and Diggers in the trenches. We have tear gases, lung gases, blister gases and nose or nerve gases. The nerve gases have such a depressing effect on the nerves that they produce melancholia and even insanity, and it is necessary somewhat speedily to administer stimulants; but if stimulants be given to a person suffering from a lung gas the patient will probably be killed. We had a very high mortality among phosgene cases until we learnt more about its insidious property of delayed action on the lungs.

Again I put the question, in a mixed attack, where say three different kinds of gases are used in the one attack, how are the doctors to solve the problem of diagnosis?

The only solution I can offer you is that you work in very close co-operation with the chemist members of the gas detection and identification service which may be established. If chemists report that strong concentrations of, say, phosgene are in X, Y, Z streets, then treat unprotected persons in that street as potential casualties; or, if they say mustard is in streets A, B and C, treat persons there as mustard casualties. In other words, diagnosis may not be individual but on the basis of geographical areas.

We leave the lawyers to solve the problem of persons who, honestly believing themselves to be all right, decline medical treatment and next day become a charge on the State.

The next medical aspect arises out of the better tactical use of the modern high explosive and gas bombs as distinct from fire bombs. For a great and overwhelming variety of reasons the attackers cause more casualties if they concentrate their gas and H.E. bombs on a relatively small area. The consequence is that the medical organization must be prepared to cope with a high casualty rate in a section of a city or part of a suburb. England quite early recognized this and made plans for so many thousands of aid posts that no inhabitant of a city, suburb, country town or village will have to travel more than a mile, and all large

industrial plants are expected to have their medical arrangements.

Suppose, for example, Maribyrnong munition works be bombed and there are many walking wounded and gas casualties. Naturally they would first be attended at Maribyrnong, and many sent to their homes, situated, no doubt, in many suburbs.

Next day, are they to attend at Maribyrnong for further medical attention, as outpatients visit public hospitals? I submit that the sight of wounded persons travelling has an undesirable moral effect. Is the Maribyrnong doctor to waste time and petrol in visiting many suburbs?

I understand that the existing hospital accommodation is hardly enough for peace time purposes and I am somewhat apprehensive of the effect of the sight of long lines of people queued up outside hospitals and emergency hospitals. I would submit for your consideration what I may term a home nursing service, whereby a less serious casualty will occupy his own bed and be treated in his or her own home. There are many objections to the plan, but if there be insufficient hospital accommodation, what are you to do?

I mentioned my pleasure that the Ministry of Health had taken over the medical organization, and I would direct your attention to the fact that in one document prepared by the A.R.P. department the undressing room for mustard gas casualties was not separated by an air lock from the room where the doctor may have to operate. I don't know how many of you would care to perform an urgent operation whilst encumbered by a respirator and a gas-proof suit. On a warm day it is doubtful whether many of you could work in such a suit for a spell longer than twenty minutes.

This raises the general question as to when it is proposed to make our hospitals gas-resisting; if not the whole hospital, at least the operating room.

Elsewhere I have trenchantly criticized the idea that  $13\frac{1}{2}$  cubic feet contains enough oxygen to supply a person's needs for one hour, and I am pleased to say that, with

filtration plants, the specifications are that each person should have 150 cubic feet of air per hour.

I have also criticized the somewhat dogmatic medical teaching, particularly in the military manuals, that so far as nose gases are concerned removal from the poisonous atmosphere and rest are all the treatment that is necessary in the majority of cases and a similar teaching for tear gases with the added statement that cases should be fit to return to duty in a few hours.

My submission is that, even if those teachings were correct for the gases used in the Great War, they overlook possible developments both as to the manner of discharging chemicals and developments in chemical research.

To be practical I think that any gas casualty should be detained for observation for at least 24 hours; if you send people home and they die en route there would be a tremendous weakening of morale.

I submit that the better mental attitude is to regard the experience in the last war as doing no more than providing some principles and illustrations of them. You should be prepared to encounter new gases, some of which will involve different principles and others will illustrate old principles in different ways, and the medical teachings should be flexible enough to provide for both developments.

I would like to pay a tribute to the very great industry and public spirit of the St. John Ambulance personnel in many States in learning and teaching gas defence and treatment, and also to the tremendous burst of activity of the Red Cross this year.

At the same time I am a little apprehensive. The main source of information of the St. John Ambulance instructors was military; they attended classes run by the officers who had to fog up the subject in their spare time. According to their standards they did their work very well. But I have had the honour in several States to address these certificated instructors of the Ambulance and they are much more confident of their knowledge than I am. I would suggest that refresher courses be run for them and that

a duly qualified medical practitioner teach them the medical part of their course.

*Legal Aspects*

I disclaim the possession of any legal knowledge other than that which one might be expected to obtain when closely associated with the administration of justice. I do confess, however, the authorship of an article which was so liberally and wisely sub-edited that a legal journal thought it good enough to pirate without acknowledgement.

The article appeared in the August, 1937, issue of the *Australian Law Journal* and attempted to deal with a constitutional point, the situation in a gas attack, and was an abortive attempt to interest lawyers in civilian defence. I now wish to discuss the peace time situation and to make some suggestions.

The desirability of peace time legislation is recognized by at least three Australian States which now have statutory amendments under consideration. The legal aspects are therefore of some practical importance. The urgency of legislation is shown by experience in England and in one Australian State, where some local governing bodies took the stand that their auditors could not pass any expenditure unless it was expressly authorized by statute. Some declined to allow their staffs to be trained in working hours because there was no authorized head of expenditure under which hourly wages could be debited. England had to pass an indemnifying Act confirming the expenditure of the more public-spirited local governing bodies. Until legislation is passed our councils could decline to play.

The next aspect is that all the Great Powers have long appreciated the necessity of having full dress rehearsals in peace time; in 1935 Japan staged the huge rehearsal already referred to, in 1936 Russia had a three-day rehearsal in Leningrad, and in 1937 there was a total "black out" in Berlin and the entire population abandoned for the time being their civilian tasks and got under cover within five minutes.

Obviously in a democracy there must be some statutory authorization for the interference with trade, commerce and intercourse and liberty which even a voluntary rehearsal and "black out" involves, and there are some nice legal problems where street accidents occur in the "black out."

The democracy of France found that the public would not play until the rehearsals were made compulsory, and lesser European Powers have also had to introduce compulsion.

Another aspect is that as the States have voluntarily agreed to be responsible for civilian defence, their own civilian officials rather than the military will be responsible for the administration of the law. It may not be necessary to have martial law. I hope that it is not.

Further, the trials and tribulations of war provide suitable breeding grounds for what one may term advanced political thought of the destructive order. If the people find that the laws of a democratic country will not stand the strain and are a hindrance rather than an aid, then the way is open for the introduction of Communism, Fascism, or some other nasty "ism," and this generation of lawyers would have betrayed the legacy of liberty and freedom it has taken generations to evolve and protect. If the lawyers will not take any interest in safeguarding the law, who will? I speak to you rather as responsible citizens who have influence.

As the Victorian Government is throwing the responsibility of making adequate preparations on the municipal councils, the more important Acts are the Local Government and Health Acts, and a scrutiny of them reveals that they can be somewhat readily adapted provided that a satisfactory definition can be agreed upon.

First if all, the modern fire bomb should not cause any legal difficulty, for already there are very wide statutory powers. Personally, I would like to see the prohibition of the brushwood fence more strictly enforced. The Germans and French appear to be very apprehensive about modern fire research; in France all new buildings of any consequence

must have the ferro concrete floor. The municipal authority of Hamburg ordered the clearing out of litter, debris and inflammable material and in a six months campaign some 40,000 tons of litter were destroyed by order of that municipal authority.

Probably it would be enough if, under Schedule 13, Part VII, of the Local Government Act 1928, the councils had power to make regulations for prescribing the removal, safer storage and/or destruction of inflammable materials.

For high explosive bombs, it is probable that the existing power, reinforced by the definition, for making building regulations would be enough. Already under the Local Government Act there is power to make shelters for cabmen, and probably no auditor would object to the provision of shelters ostensibly for cabmen but which were in reality intended for women and children.

It is the gas weapon which has the nuisance value; it is defence against gas which so piles up the details that Italy found it necessary to codify the law relating to civilian defence.

Great Britain soon found that Air Raid Precautions could not be financed out of ordinary revenue. Local governing bodies were given power to levy rates and the Treasury made a fund of £20,000,000 available. No doubt, if defence ever be taken seriously in Australia, some such financial arrangements will have to be made here. There is the added complication as to whether State Governments can look to the Defence Department for reimbursement of expenditure that is bona fide and solely incurred for defence.

It does not matter whether gas, fire, or high explosive bombs be used, the military have to look to the civil authorities to clear roads of debris, to put out fires on civil and military property and to decontaminate certain areas, otherwise their own mobility may be seriously impeded. The military as yet have no fire fighting organization and no specially trained decontamination squads.

Already in England some local governing bodies have, it is stated, shown considerable ingenuity in attempts to wangle

grants out of the Treasury fund for works that are in reality ordinary municipal activities tinted with an A.R.P. colour. The difficulties of the administrative officials are not lessened by the omission in the Air Raid Precautions Act to provide definitions which will enable a wide variety of officials to administer the spirit of the law.

It has become plain that the legal aspects of this paper relate to the need for statutory amendments. It is statutory law and I repeat that I appeal to you as responsible citizens who have had experience in the administration of the law to do what you can to see that the inroads into our legal system are not greater than necessary—in other words, are proportionate to the needs of defence, and fair and just-dealing. Rightly or wrongly, the public looks to the doctors to help in medical matters, to the chemists in chemical matters, to the engineers for structural matters and to the lawyers to safeguard their liberties by influencing the law. Yours, however, is the more difficult task.

I had attempted to formulate a definition, but have decided against inflicting it upon you. I can, however, give you a couple of examples the definition had been designed to meet.

In England, great use is expected to be made of grandstands at sports grounds for first aid and personal cleansing posts. Some structural alterations will be required in many instances.

Suppose two municipalities apply for a grant out of the central fund; the applications are identical in terms. In one instance it is for alterations to a new building situated in the heart of a built-up area; in the other, it is for a country course grandstand with no houses anywhere near it and the building is old.

It is fairly plain that one is a bona fide request and the other an attempt to repair an old building at the public expense for private purposes—but obviously between these two extremes there is room for many baffling cases. To prevent the central fund being abused and squandered away will not prove easy.

Back in 1934, Switzerland had no difficulty in deciding

that the provision of 50% extra stop cocks and shut-off valves for existing water mains was a proper defence expenditure. The motive was purely defence and the objective to minimize the damage an uncontrolled supply of water could do when gushing forth from a broken main, and a further objective was to conserve water for fire and decontamination purposes. But an application to increase the bore or size of a water main in a growing district would be motivated by the objective of serving ordinary peace-time needs and of obtaining revenue. It would have a value in war, but that would be incidental.

The subject is not at all easy, and some means have to be found which can be applied with reasonable accuracy by suburban councillors and shire secretaries in allocating expenditure; by State Government officials in determining whether a proposed expenditure is authorized and very likely by the Commonwealth in reimbursing the States. Moreover, in an actual raid it would be the ultimate source of authority where persons have to use skilled judgment in depriving people of the use of contaminated roads and ordering the destruction of private property.

The definition, though framed for peace-time needs, would overlap into a war period.

As I mentioned, the British Act does not attempt a definition and I can find no help in the *Law Quarterly Review*, the *Cambridge Law Journal* or the *Journal of Comparative Legislation*.

I now take briefly a situation in a gas attack. Suppose mustard gas in liquid form to the extent of a few tons be dropped in Bourke Street. As it takes a gang of six men some hours to get rid of 50 lb. of mustard and the unevaporated liquid would be dangerous for some days, it at once becomes clear that an area will have to be placed out of bounds and, following English teaching, roped off. Who is to determine the area so roped off? It carries the implication that the shops within the area roped off cannot trade. What legal authority will he have to close a street?

So far as the practical question of determining the limits



of the area roped off are concerned, it is a matter of skilled judgment, taking into account temperature, wind direction, velocity quantities, absorptive capacity of surface, volatility and so on.

Our system of training gives no opportunity for the persons who would have to make the decision of developing skill in judging.

Further, if the vapour of mustard penetrates the shops, it will contaminate merchandise, and if that merchandise were sent to the country the recipients might be gassed. Someone must have the authority to quarantine the merchandise; some classes of goods can't be decontaminated, others can if the degree of contamination is not too great. Who is to decide that degree? What training has he or they had?

A further aspect is how long an area is to be roped off, what is the duration of time of the quarantine? It will vary according to the variable factors.

It is plain that some group of untrained persons have to exercise judgment which has very serious commercial consequences. To shut up Bourke Street shops, which rely on a daily turnover, is a big responsibility; it is probably to be undertaken by unpaid persons. As the persons have not been appointed, I can mention the bribery aspect. If one trader can persuade the responsible person to close his rivals' premises for a week and condemn his goods, huge sums would be involved—sums perhaps great enough to tempt the integrity of the unpaid person who has to exercise judgment he has not been trained to use.

Human safety being the first consideration, it is submitted that, on the day of the raid, the good faith of the unskilled persons in attempting to exercise judgment must be presumed. It must be presumed that they are motivated by the objective of saving life. My submission is, on the day of the raid the law can offer no redress for the unskilful exercise of judgment. I think that it is otherwise when the question is the length of time an area must be roped off; as to

whether it will be a week or a fortnight, and also when the problem is what goods are to be destroyed.

My submission is that there should be a court of chemical appeal, armed with summary powers to hear and determine then and there appeals by property owners who believe themselves to be continuing to suffer from errors of judgment. The need for such a court is proportionate to the quantum of expert training. To-day we could make no more than a rough guess—there has been no opportunity of giving experts practice in the exercise of judgment.

I could, of course, multiply the illustrations both of the very high nuisance value of gas and also of the necessity for adequate training, but I fear that already I have overtaxed your politeness in attempting to appear interested in a heavy subject.

I would, however, ask you to take home with you a recollection of some of the aspects I have attempted to deal with and, in particular, would suggest that you make and draw some comfort from the inference that the Great Powers believe that Air Raid Precautions are worth while, the work can be done. It is incredible that in a time of financial stringency, and when an armament race is on, the Great Powers would spend millions of pounds and divert the energies of millions of their people from war-like preparations to mere defence unless the job could be done—that civilians need not be at the mercy at the hit-and-run raider who eludes the armed forces.

I would suggest to you that there are aspects which should be a source of apprehension to doctors and lawyers both from the professional and private points of view, which cannot be diminished by sitting back and doing little.

Finally, I would ask you to join with me in taking the stand that, if the danger to Australia be great enough to warrant the doubling of the militia for service in Australia and to warrant the expenditure of £63,000,000 on active defence, then that selfsame danger is also great enough to warrant the creation of a properly trained civilian organization to be administered by civilians for civilians.

## DISCUSSION

The President: Gentlemen, I am sure you will all agree that we are indebted to Mr. Brooksbank for outlining to us the many problems that concern the subject of Air Raid Precautions. Of course, for those who say there is no risk and therefore nothing need be done, no problem arises, but if the risk of attack upon Australia is recognized as a reality, then I think we must all agree that in the first place there are problems for the medical profession which have been indicated by Mr. Brooksbank in the way of the identification of the gases or the mixed gases used, diagnosis, and treatment; and how many doctors are there who are at present in a position to deal with such matters in Australia to-day? Then he has also shown us that in order to deal with the matter from the point of view of society it is necessary to recognize that in this matter, as in many others, "No man liveth to himself alone." The man who does not look after himself becomes a burden and a hindrance upon the community. Therefore, if there are to be effective provisions for dealing with this new menace, it is obvious that there must be some legal provisions which will compel the individual to recognize social exigencies and necessities, and, as has been shown, very real legal problems are involved in that matter. I think we are all very greatly indebted to Mr. Brooksbank in developing this subject before us, and it is now open for discussion.

Mr. D. C. Robertson: I agree that we are all greatly indebted to Mr. Brooksbank for bringing before us, in the very illuminating way in which he has done, the problems associated with gas. The danger of a gas attack is proportionately greater or less according to the precautionary steps that have been taken to provide against it in peace time. He has also made it clear that in war time, when the whole population is liable to attack, to secure a victory in war, not only is the morale of the troops necessary in these modern days but the morale of the community itself; so that any defensive measures which are used to counter the gas attack must have in mind, firstly, the elimination of the danger from gas; secondly, the treatment of the casualties both from the physiological and psychological point of view; thirdly, the maintenance of all public essential services.

The documents in relation to gas attacks show that if in peace time a community receives instruction and also has the opportunity of putting the advice and training into practice, it is then in a position to reduce to a minimum the

casualties from gas. Precautions can be taken against the incendiary bomb if the morale of the members of the community is such that they are prepared to act instantly without any panic, for panic is one of the objectives of a gas attack. Then there is needed an organization to deal with the effect of high explosive shells by which, of course, the real damage is done and the community has to do the best it can. I feel myself that no harm is done in acquainting the public of the necessity of being prepared against gas attacks.

The problem can be dealt with adequately if the public can be fortified in two respects, firstly, by knowledge, and, secondly, by confidence in the leadership of those persons who have been appointed to deal with the matter, either local authorities or State or Commonwealth authorities. No new poison gas of primary importance has been discovered since the War, and that fact should reassure the public in view of the fact that we had experience in the last War on the medical side. Mr. Brooksbank refers to the Abyssinian instance, when pools of mustard gas were laid down; but that was against an enemy that had no knowledge as to how to combat the gas. The public should also be informed that effective means can be prepared against all forms of gases; and that in a city as large as Melbourne the quantity of gas which would have to be put down, to be effective, is so great that any gas attack would be restricted to a relatively small area, so the chances are that in the population of a little over one million, relatively a few hundreds of people would be affected by any particular gas, and mustard gas is the only one that will remain about and will have the persistent effect that is referred to.

But the most important matter to reassure the public is that plans have been prepared and precautions taken, and that if a gas attack comes the authorities will give orders that must instantly be obeyed. There is no opportunity to approach either an administrative tribunal or a court, but the action must be taken immediately.

The last point which I would like to emphasize is the fact that there must be co-ordination between the different bodies that are responsible for this work. The majority of those bodies are under the control of the State or indirectly under that control, such as the fire brigades service, the local government bodies, the water and sewerage board, and so on. The State really must take the responsibility, and it does seem as if the only chance of obtaining real co-ordina-

tion is to show that the work undertaken by the State is one essential of defence.

Dr. Johnston: After following with great interest the exposition we have had from Mr. Brooksbank, I feel that any comment I ought to make should deal with the medical aspects of this subject. I think there are some which interest medical men particularly, and that raises the question of the education of the public. I think it is very important that the question of gas and what is meant by gas should be carefully studied. I think a great many of us still have the idea of gas conveyed by its being used in the War, and that a great many people have taken their impressions of horror from the inhuman type of gas which created such a tremendous disturbance in 1915. The casualties then were enormous and quite out of proportion to the numbers that were caused subsequently. Later on, when preventive measures were used and gas machines were used to deal with phosgene, etc., and when the methods of protection against them came into being, the number of casualties was reduced, but even then I think the mortality was something like eleven per cent. over a considerable period of time; later on, mustard gas came in, and during the later days of the War it was the principal type of gas that was used, and the mortality rate was only two per cent. So that apparently we come to the rather curious position that gas, which at first sight seemed inhuman at the time of warfare is, after all, when we take the mortality into consideration, not so remarkably effective, because the rate of high explosive mortality was more than five per cent. as against two per cent. of mustard gas warfare. So that I think it should be taken into consideration that mustard gas is a problem that is being gradually solved.

Another matter that does affect the medical profession, though it is not germane, is the question of the subsequent effect of gas upon a person who is gassed; and it is very interesting from the point of view of people suffering from gas that, following up the people who have been gassed, the effects have not been so ugly as expected at the time, and only a comparatively small number afterwards have been casualties. This applies particularly to mustard gas. The effects are nearly all in the earlier stages, and later on the effects are not very great. Those facts were learned in the War and after the War. The Repatriation Department of Great Britain examined the percentage of cases which were receiving compensation, and they worked it out at about one per cent. of the gas cases. Here we have taken a more

liberal view than the English Repatriation Department. I think I can say that we have four or five times as many cases in the same category. It does seem to me that high explosive is the much more potent weapon, and that if we have a raid, high explosive being so much more potent and the number of aeroplanes and warships being limited, I think they will make use of the more potent weapon rather than one which is less effective. No doubt it is highly probable there would be a certain amount of gas as well as the high explosive methods. I think that ought to be stressed. It has been stressed that the protection against one ensures protection against the other.

Another aspect is the question of the position of civilians, and of civilian casualties in the event of hostilities. That is a problem which has exercised the nations of the world, and particularly the International Red Cross Society, in regard to the use of the Red Cross emblem. That body has for some considerable time past been urging that some places should be set aside as safety zones or large establishments which should be free from bombing, and the question arises as to whether they should be marked by the Red Cross emblem or some other emblem. Of course, the immediate difficulty about that is the question of keeping these places free from bombing, and I am inclined to think that Mr. Brooksbank's idea of the distribution of shelters is better. It would be difficult for the enemy to distribute shells in a geographical fashion; bombing could be done if there is no protective force, but, after all, we have a protective force, and I think it would be difficult with planes coming over for enemy shells to be distributed exactly on the Red Cross establishments, if we have some protection.

The question of the Red Cross personnel who will look after civilian casualties also arises. What is going to be their position? Is it right to give them a Red Cross emblem? The Red Cross personnel are those who are associated with armed forces and can that emblem be extended to civilians? It is an important point and it is one that the International Red Cross Society is working on at present. In practice I suppose it does not matter very much, because I do not suppose the enemy would take very much notice whether a man was wearing the Red Cross or not, but I think theoretically it does raise certain questions.

Finally, I would commend Mr. Brooksbank's exhortation in regard to the stressing of this problem and the education of the public, because there is another aspect that is most important, namely, that if we do prepare ourselves in this

way it will be known by other nations through their intelligence departments, and those particular countries concerned will be very chary of attacking a country that is prepared to meet that attack.

Dr. Adey: A great deal has been said by Mr. Brooksbank and others on the subject of educating the public in Air Raid Precautions, but I should like to say that the medical profession should educate themselves. As far as I know, a series of half a dozen lectures given by the Army Medical Corps are the only lectures that have been held on gas warfare for the last two or three years. I may be mistaken, but those are the only ones I have any knowledge about. But those lectures do not give us any more than a very superficial knowledge of the subject and the pathology and treatment of severely gassed cases. A Collins Street consultant physician the other day asked me for literature to give him a knowledge as to what he was to do with a severely gassed case, and I am ashamed to say I had to admit I did not know of any. I suggest that it is the duty of the B.M.A. to give facilities for teaching the people, not only military officers, but any member of the B.M.A. who wishes to make himself conversant with the treatment of gassed cases; possibly medical students could be given information on the subject, and probably a series of articles could be written for the A.M.J. by people having some knowledge of the subject.

Dr. Weigall: Dr. Adey has relieved me from saying what I had intended to say. Mr. Brooksbank has raised a subject that I would like to know a good deal more about. I do think that if, as Mr. Brooksbank said, he addressed this audience because it was supposed to be composed of influential citizens whose word went for something, that it is up to us to do something. The suggestion of Dr. Adey, in my opinion, is the only practical suggestion that has come from this meeting, and I would like to say to you, Mr. President, in one of your many other official capacities you might arrange for the University to give some sort of lectures which might even be held at night as a sort of extension course that we can avail ourselves of. I am past any military age to be of any use outside, but I might be in Melbourne and very reasonably be asked to help in case of a raid, but I would be no more use than my housemaid as to knowledge of the actual pathology of the cases. I think it is a disgraceful thing that we should be of so little use. I certainly personally would attend any such lectures that were given and would try to gain something useful from them. I think

as part of the National Emergency scheme, universities would very properly consider it within their powers to educate their students further in a subject of such national importance. I am very glad Dr. Adey had the courage to say what he did say; but I do not think the medical profession does know much about it at present.

Mr. Bloomfield: I think that this is a subject which may, before we know where we are, be of the greatest importance to all of us, and what Dr. Adey and Dr. Weigall have said seems to be so fundamentally important that it is a matter that we might very easily and usefully take a great deal further. Some little time ago I was wondering, and probably we were all wondering, what medico-legal significance the subject of this evening's paper could have, because it seemed to me to be entirely a subject of medical importance and a matter which required State organization. As far as legal rights are concerned it seems to me, as it must have seemed to all of us, that in a time of war all the usual rights, liabilities, duties and obligations of citizens go by the board. Well, when it comes to the question of the dropping of bombs on opposing towns, in such cases as we read of this morning at Chungking, where one thousand casualties were caused by an air raid, all those questions appear to go by the board, and it resolves itself, from the point of view of the inhabitants of any cities which may be bombarded, into a question of organizing the best defence and equipping those who are treating the sufferers as well as possible. I think all our legal members were appalled, as was I, to hear that the medical profession had done nothing to equip themselves to deal with the conditions in question. As Dr. Weigall pointed out, the University and the B.M.A. and various medical bodies appear to be in a state of blank ignorance as to what is actually going to be done. It might probably be a recommendation from this Society to the University, or to the various interested bodies, to institute some branch of study among their members to enable them to learn up this subject and do something to equip their members. We must have people who are capable of taking the casualties away and treating them, and seeing that they suffer as little as possible and recover from their sufferings as soon as possible.

The point that has been made by Dr. Adey and Dr. Weigall as to the treatment of these cases seemed to me to be of the greatest practical importance; and it has been rather shocking to hear that there is no practical course of study in times which are really times of danger and emergency to instruct doctors as to what is to be done in the event of any



bombardment in regard to any general sufferers from gas. I think it would be a very good idea, although this body cannot be very large numerically, if we did something in the way of directing the attention of the medical profession to this very grave and real possibility of their services being called on in future to deal with something about which, apparently, they know nothing whatever at present.

Dr. Gardner: I should like to say that quite a false impression has been given in regard to medical men, namely, that we are not able to treat gassed cases. I consider that it is not the treatment of the cases at the time but the organization that ought to be available that is of importance. In France it was not a question of the medical profession being unable to treat gas cases, although it may have been difficult to diagnose cases. But the whole question involved the existence of an organization to get such cases put away in the hospitals, and that was achieved by the general organization and the co-operation of the medical and other people. The suggestion that medical men are not capable of treating gas cases is erroneous. I hope you are not under the impression that we will be up against something that we cannot handle, because that is quite untrue. The real difficulty of the medical profession will be one of hospitals, and the question of affording hospitals is a question of organization. I hope the impression does not get abroad that we are not capable of treating gas cases, because that is not so.

Dr. Dickson: To reassure the audience, I can say that quite apart from this meeting the question of the education of the profession in the treatment of gas casualties will be discussed at a meeting of our scientific sub-committee next Thursday, and I had intended to suggest that a course of lectures would be arranged, but I might say that we have had very little encouragement in this matter. Something over two years ago I saw in the press one day that a meeting had been called by the Chief Secretary of this State and various organizations had been invited, but the B.M.A. had not been; but I managed to make my way into that meeting and everybody seemed to be there. There were lifesavers and representatives of every possible body in the State, and a very high staff officer of the Defence Department, since retired, spent some fifteen minutes resenting my presence and suggesting to the audience that the question of gas measures was no concern of the medical profession. Why, I do not know. (Laughter.) Then, that meeting resumed about six weeks later and it was decided that a cable should

be sent to London to obtain the Air Raid Precautions of Great Britain, and that is the last word I have heard of it.

Dr. Farran-Ridge: I agree with Dr. Adey and Dr. Weigall about the gas poisoning problem. I have asked questions of my medical friends and I found that none of them knew anything about the pathology, and hardly anything about the symptoms, and very little of the treatment, of gas casualties. The idea abroad in Victoria is that the danger from gas attack is so remote that the doctors have not taken the trouble to become used to it. Mr. Brooksbank's address has been a very great shock to me, and it shows something will have to be done.

It seems to me that even greater than the danger of gas poisoning itself in a widespread city like Melbourne is the danger of panic, and in the prevention of panic readiness is all. To immunize the people against gas attack is to give them an actual knowledge of what they will have to face. Certain people will have to be allotted a certain duty and they must know that there is a scientific organization behind them and doctors who know how to treat cases. There was in the Press in Sydney recently an article by a chemist in which he said that he thought that country would be successful in the next war that first of all discovered a really efficient narcotic, and with that I entirely agree. The loss of sleep in raid after raid would demoralize any population, and if officers could have a narcotic so that they could get a few nights' rest they would be more likely to last out a long series of air raids.

Dr. Kingsley Norris: War has always been waged first of all by shock and then by contact. The method of shock was varied first of all by throwing stones at people and then by using other forms of missiles. Gas is just another method of shock; there is nothing new about gas, and the effect of gas, or in a broader sense the effect of bombing, as Dr. Farran-Ridge has pointed out, is not so important as the effect of panic. Development must take place in the way of protection against shock from gas attacks; and as Dr. Farran-Ridge pointed out, the only way to do that is by education. I will join issue with those who have thrown down the challenge to the medical profession. There has been a host of literature available to any medical man for years. Last year there was a course of gas instruction, referred to by Dr. Adey, which had equipped people with some knowledge of gas, as to what gases were and the control of gases. That course was attended by an average of eighty medical men. The difficulty is to get co-ordination. That,

as I understand Mr. Brooksbank, is the greater problem, not individual effort, not individual enthusiasm. The enthusiasm is there, the money is there, but there is no co-ordination of effort, and I think that Mr. Brooksbank's appeal to us as citizens was the right appeal—that everybody must know something about the subject and, knowing something about it, we will not be afraid. The biggest damage is done by shock and panic.

Dr. White: I endorse the remarks of Dr. Adey but as far as the work is concerned and the knowledge of the doctors who went to the War, it is very considerable. I dare say that many of us had experience of gas battles during the early years of the war; but in the later years I was consultant at the No. 2 Australian Hospital at Boulogne, which was the second largest in France. Of course, there were large numbers of casualties and there were various forms of gases, and particularly mustard gas. I would not like you to go away with the impression that nothing was known about the treatment for gas casualties. Facilities were very well organized and very well prepared, and gas treatment did not seem to give us very much concern or trouble when we had it all going very well. I have seen a large number of cases subsequently, and I have a knowledge of the casualties that occurred after the War. As Dr. Johnston has already pointed out, the percentage of casualties that we had were very much higher. So many cases were attributed to gas casualties that we are now paying pensions because we take a very generous idea of what the effects were. Generally, most people put it down to gas, and that covers most conditions of neurosis and other features that crop up in war pensioners. Gas treatment can be organized. I cannot discuss that matter with you, but I think I know a good deal about how to treat gas cases, and I should say that there are a good many others who have a knowledge of gas treatment also. The question of psychology of gas is entirely a different matter. The question of treatment is easily managed—it is merely organization, and that is a different matter altogether.

Dr. Weigall: I rise to make a personal explanation. The three gentlemen, Drs. Norris, White and Gardner, who have spoken already have had military records and they had ample opportunities of studying gas and know a lot about it, but there is a large number of medical men who belong either to the generation that was too old to go to the last war or to the generation that has come on since the war who have not had any practical experience of gas, and not

having come into contact with it, they have not studied it. The course that was given, I understand, was for military men and I had not the knowledge then of the importance of this question that I have now. My only belief is that it would be well for those who will be left to look after the civilian population to know something of the conditions which they will have to face.

The President: I will call on Dr. Ostermeyer to move and Dr. Coppel to second a vote of thanks to Mr. Brooksbank.

Dr. Ostermeyer: I have much pleasure in moving a hearty vote of thanks to Mr. Brooksbank for his most revealing paper to-night. I am sure it came as a great shock to us all to learn how far Great Britain was behind, and that it was not until 1935 that she came to consider the two aspects, the actual treatment of gas patients, and the air raid precautions. When I got notice of the meeting I thought I would have a look at the literature on this matter and I went to the *Medical Annual*, which gives the literature issued each year from all the medical journals in the British Empire and throughout the world, and I got one published in 1939, and there was no gas poisoning mentioned in it. There were about ten lines in it on the Air Raid Precautions Act. The whole field has been covered by Mr. Brooksbank in his very excellent address and he shows what an immense problem this is. It gives me great pleasure to move this vote of thanks.

Dr. Coppel: I have very great pleasure in seconding the vote of thanks which has been moved to Mr. Brooksbank for his lecture. I am rather sorry that the discussion seemed to me to go off at somewhat of a side-track because I was hopeful that there would be at this meeting members who had had some interest in the problem which Mr. Brooksbank has raised, which seems to me to be a problem rather of concern to the citizen as a citizen than a problem of medicine for the medical man or a problem of law for the lawyer. I quite realize that the title of Mr. Brooksbank's paper to-night was to some extent calculated to draw us off the track, but the subject matter did seem to me to be one which in spite of his valiant efforts to make it suitable to the technical requirements of this gathering, still had its main appeal to us as ordinary members of the community, no matter how we may make our living. I could not help feeling that the most appalling reflection that came to my mind, and no doubt to the minds of many others of us, was that civilization should have come to this: that in the twentieth century Mr. Brooksbank should

regard it as necessary, and I for one do not venture to challenge him in the slightest degree—I entirely agree with him—that every man, woman and child in this and every other community, because there is no part of the world that is entirely free from the fear at the moment, should have some training, some knowledge and some familiarity with the kind of damage that may be done by gas and high explosives, and should be trained to look after himself and as far as possible co-operate with his fellows in avoiding the damage that may be done by raids of this kind.

As I say, it seems to me to be the most appalling commentary on our present civilization that every boy and girl that is born “into this world alive,” as Gilbert said, should have to be trained to duck into an air raid shelter. For my part I do not deny the necessity for it, but that seems to be the most appalling feature of the subject which has been put before us to-night. It is because of its universal appeal that I am sorry the discussion went off upon the capabilities of the medical profession to deal with the purely medical side of gas casualties. There might, of course, have been, in spite of Mr. Bloomfield, some corresponding discussion of what the lawyers could do. I agree with Mr. Bloomfield to this extent, that the individual who practises law for a living may know that he cannot be so easily assigned a job of skill, or requiring special skill in these matters; but I felt that Mr. Brooksbank did intimate that the job of regulating air raid precautions was one which required regulation, whether by State Statute or Commonwealth Statute, or statutory regulation; but the task of framing those regulations is a task which I gather Mr. Brooksbank thinks, and I would respectfully agree with him, is one which not only can be performed by a lawyer but should be performed by a lawyer. But that, I think, brings one up against the difficulty which Dr. Norris spoke of. You may, amongst the legal profession, find a sufficient number of individuals who have got both the knowledge and enthusiasm to be of real assistance in this matter, but the individual barrister or solicitor is to some extent helpless without an invitation from those bodies who must take the lead; and while I know it is very easy in a democracy to say “Let us leave it to the government,” it does seem that in a matter of this kind the lead has got to come from the government. If the legal profession are asked by the government to constitute a committee to devise appropriate means of regulating the kind of things that Mr. Brooksbank speaks of, I should not doubt for a moment

that the legal profession would respond readily and capably, but I think the initiative has got to come from the government. My intention is not to put my own views before this meeting; it is a much more pleasant one, to ask you to carry a hearty vote of thanks with acclamation to Mr. Brooksbank for a lecture which combined information with stimulation in, I think, equal degrees, and I am sure we are all very grateful indeed.

The President: Gentlemen, it has been moved and seconded that Mr. Brooksbank be thanked for his address and I ask you to carry the motion with acclamation. (Loud applause.) I convey to you, Mr. Brooksbank, the thanks of the Society for your most interesting and informative address.

Mr. Brooksbank: I am very grateful indeed to you all for listening so attentively and for the discussion that has been provoked. There are some points I would like to deal with. I am asked specifically, what are the gases which caused the dire effects on the nerves? There were ethyldichlorarsine, ethyldibromarsine, ethyldicyanarsine. It is a process of changing the "radicals," then came methyldichlorarsine, methyldibromarsine, and then instead of methyl or ethyl, di-phenyl was substituted and there was di-phenyl chlorarsine and so on. Some of these substances were liquids and some were solids. It is perfectly true, as Mr. Robertson says, that there are no new elements; but, by a process of changing the radicals and adding additional ones, we now have highly complex gases which have multiple effects. The developments have been along the lines of making detection more difficult—there is now a colourless "mustard." This notorious gas is dichlorethylsulphide. By changing the radical—chlorine—and substituting bromine—giving di-bromethylsulphide—a blister gas with a different odour is produced.

It is a very fortunate fact that the more complex a gas is the easier it is for the respirator to keep it out, but that is a long story, and here it is enough to say that we can rely on the modern respirator to keep out all warfare gases under field conditions.

I think that doctors could learn the treatment part of the medical aspects very quickly, provided that the doctors know in advance with what chemicals they have to deal. The real problem is preliminary diagnosis.

If a person has mustard gas on him and the proper treatment be applied within ten minutes, that person will not become a casualty. With many gases, if they be treated in their "incubation period," as it were, no harmful results

will ensue. That does not involve the necessity for an elaborate organization with well-trained personnel.

On the subject of medical learning in Victoria and shortage of literature, I have some twenty inexpensive medical booklets, but did have to go outside Victoria for enlightenment, when I came across problems I could not understand; I also had to go to another State for explanations of engineering difficulties.

The question has been raised as to the after effects of gas. Persons are now being admitted to St. Dunstan's for blindness due to injury by mustard gas twenty years ago. America had 70,000 gas casualties and very exhaustive tests have shown that the incidence of T.B. is lower amongst the gas casualties than any other section of the community. The after effects have been much less than was anticipated.

A wrong impression has been given as to the number of gas casualties. The mortality was much reduced after 1915-1916, when the delayed action of phosgene was better understood, but in the last sixteen months of the war the British Army was sustaining 10,000 gas casualties a month. The total recorded gas casualties of all armies exceeds one and a quarter million.

I am unable to decide which is the worst weapon—gas, fire or high explosives. It depends on the area attacked. Take the area from St. Kilda to Brighton—out to Caulfield, across to Heidelberg and back, following the river to South Yarra—tens of thousands of fire bombs could be dropped in that huge area with very little harm; and there is hardly a target to warrant the expenditure of the demolition high explosive bomb. The relative costs of the bombs are, roughly, gas 1, fire 15, and demolition H.E. bomb 300. Gas is the cheapest of the weapons.

The fire and high explosive bombs have actually to hit the targets, but with gas we are not so much concerned with where it lands but where it is going to drift. On a north wind day, if a ton of the arsenical derivatives were dropped in Melbourne, they would drift in a casualty-producing, not lethal, strength down to Brighton and everyone in the line of drift would have to do something.

Mention was made of detector paints and papers, being substances giving a chemical reaction to indicate the presence of colourless odourless gases, which, having the delayed action, give no immediate warning of their presence to the uninstructed. There is a yellow paint which will turn red on contact with mustard gas in its liquid form, but it is not sensitive enough for vapour, and if the radicals

be changed, it does not follow that it will give any reaction even to liquids causing similar injuries. There is a specially treated paper which will indicate the presence of phosgene and afford a rough measure of the concentration by the different shades of colour different strengths of gas produce.

We are forced back to the position that we must depend on skilled judgment of highly trained persons, and my complaint is that neither the course of training given in Victoria is enough nor are a sufficient number of persons being trained.

I confess that Dr. Coppel is right in saying that the legal aspects are nearly all concerned with the law originating from municipal by-laws and State and Federal Acts of Parliament. The constitutional point, as to whether the States or the Commonwealth were liable for civilian defence, has been waived by voluntary agreement. I can put the case no higher than this, that the chemists are attending to the chemical aspects; the doctors, the medical aspects; the architects and engineers, the structural aspects; and ask what about the lawyers, both in their capacity as responsible citizens and lawyers, and repeat that other countries have for some years been studying the legal aspects and have built up a body of law. Lawyers ought to be able to appreciate the value of the rule of law. If nothing be done to adapt the law, then the law may cease to govern our dealings one with another.

Finally, I wish to say that there are medico-legal aspects of gas defence and A.R.P. generally which should be faced with courage, energy and enthusiasm.