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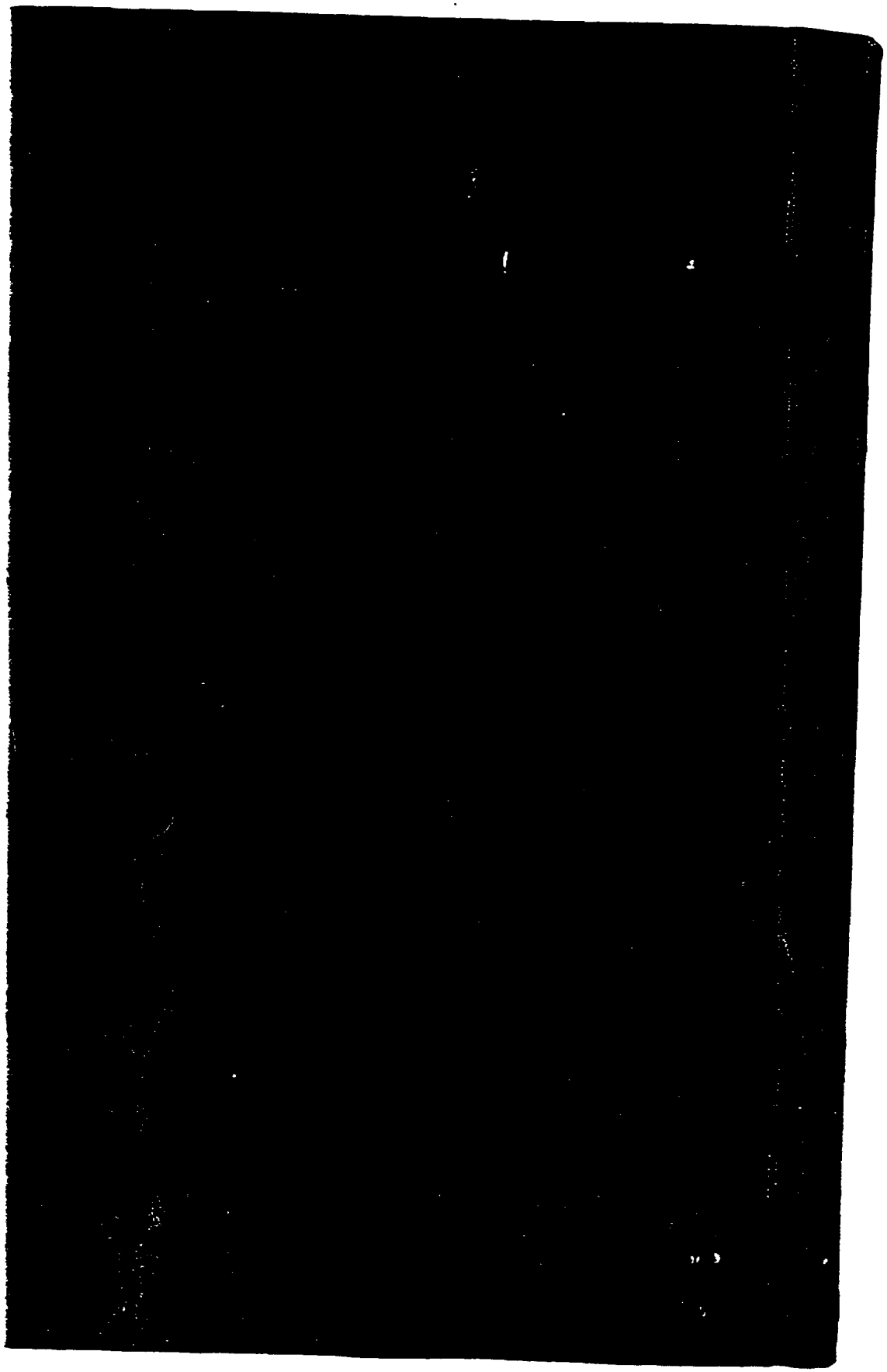


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# AIR HYGIENE FOUNDATION OF AMERICA, Inc.



## SPECIAL MEETING OF MEMBERS

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NOVEMBER 30, 1937

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СУЗЬМЕСТЕ ПВВУВА

PROCEEDINGS

OF SPECIAL MEETING

OF

AIR HYGIENE FOUNDATION OF AMERICA, INC.

NOVEMBER 30, 1937

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# PROCEEDINGS OF SPECIAL MEETING

# OF

# AIR HYGIENE FOUNDATION OF AMERICA, INC.

## NOVEMBER 30, 1937

Pursuant to a notice given to each member, a special meeting of the members of Air Hygiene Foundation of America, Inc., was held today, November 30, 1937, at Mellon Institute, Pittsburgh, Pa.

The meeting was opened by Roger A. Hitchins, Chairman of the Board of Trustees, who said:

> "It is very gratifying to note the interest in Air Hygiene Foundation as indicated by the attendance at this meeting. Our annual meeting, as you know, is in February, so following the custom inaugurated last year this meeting of the members of the Foundation and others who are interested in its aims and activities is held in November. The purpose is to give an accounting of the work during the year and to make plans for the next period.
>
> "At the meeting a year ago a research program, with which I think you are all familiar, covering work in the medical, preventive engineering and legal phases of the problem of industrial air hygiene, was adopted. You will hear reports today from the Managing Director and from the Chairmen of the three major committees, outlining the advances that have been made during the past year in furthering your research program. The Trustees feel and hope that at the conclusion of this meeting you will agree that a substantial amount of work in the field of industrial air hygiene has been accomplished, especially considering the limited funds at our disposal.
>
> "The completion of the research program depends only upon adequate financial support. We believe the work so far accomplished and the work in progress warrants the continued support of industry and the enlistment of the present members in the securing of additional members for the Foundation among those companies that have problems similar to yours in this field."

The Chairman introduced Dr. E. R. Weidlein, Director of

Mellon Institute, who extended a greeting to the members and guests:

> "Members of Air Hygiene Foundation: I am not going to make a speech. I am not a part of this program today. You have a very complete program and I know that you need all the time available to hear the papers and for the discussions.
>
> "It is rather interesting, as many of you know, that this room actually was dedicated by Air Hygiene Foundation's meeting last year. It was the first meeting that was held in this new auditorium.
>
> "I wish to extend you a cordial invitation to make yourselves at home around this building and to get better acquainted with our organization."

H. B. Meller, Managing Director, presented a report on membership, services rendered to members, and status of research.*

The Chairman then introduced Col. Willard T. Chevalier, Vice President, McGraw-Hill Publishing Company, who addressed the meeting on the subject: "Industry and Its Workers."

After the address by Col. Chevalier, the following reports were presented:

Dr. A. J. Lanza, Chairman, Medical Committee: Recent progress in the medical field toward further improvement of industrial health; the Medical Committee's plans for 1938.

Dr. LeRoy U. Gardner: "Mixed" dusts and "protector" dusts.

Dr. S. Reid Warren, Jr.: Choice of roentgenographic apparatus and technique in industry.

Prof. Philip Drinker, Chairman, Preventive Engineering Committee: Engineering progress toward controlling occupational disease; the Committee's plans for 1938.

D. Harrington, Chief, Health and Safety Branch, U. S. Bureau of Mines: Observations on air dustiness in drilling.

A. C. Hirth, Chairman, Legal Committee: Work of the Committee during 1937.

Theodore C. Waters: Compensation Legislation—a critical review.

H. B. Meller: Correlation of American researches in industrial air hygiene.

General discussion followed, after which the meeting was adjourned.

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* This, together with other reports and the address by Col. Chevalier, is printed in full on succeeding pages.



NOTE: At a meeting of the Board of Trustees, held immediately afterward, it was decided that the scale of dues in effect in 1937 should remain the same for 1938, viz.:

| Group | Number of Employees | Annual Dues |
|---|---|---|
| 1 | 20,000 and over | $1,000.00 |
| 2 | 10,000 to 19,999 | 750.00 |
| 3 | 5,000 to 9,999 | 500.00 |
| 4 | 2,500 to 4,999 | 350.00 |
| 5 | 1,000 to 2,499 | 200.00 |
| 6 | 500 to 999 | 150.00 |
| 7 | 100 to 499 | 100.00 |
| 8 | Less than 100 | 50.00 |
| 9 | Employer Associations | 50.00 |

## REPORT OF MANAGING DIRECTOR

### Membership

At the time of the membership meeting of November 25, 1936, there were in Air Hygiene Foundation 23 company members and 11 association members, a total of 34. At that meeting new regulations regarding membership and the scale of fees and dues now in effect were presented and adopted. Today there are 192 concerns supporting the Foundation in its efforts to help remedy certain occupational ills. This support is derived from the various industries in the following proportions:

| Classification by Industries | No. of Members | % of Membership | % of Foundation's Income in 1937 |
|---|---|---|---|
| 1. Grinding Wheel and Abrasives | 40 | 20.2 | 8.5 |
| 2. Steel and Metals | 15 | 7.8 | 13.9 |
| 3. Mining, Smelting, Refining (Coal and Ore included) | 20 | 10.4 | 20.8 |
| 4. Foundry and Foundry Supply | 14 | 7.3 | 3.6 |
| 5. Machinery (Electrical, pumps, etc.) | 12 | 6.5 | 8.4 |
| 6. Refractories | 18 | 9.3 | 6.5 |
| 7. Glass | 11 | 5.7 | 10.1 |
| 8. Pottery, Clay, Ceramics | 15 | 7.8 | 6.1 |
| 9. Quarrying, Sand, Stone Feldspar, Gypsum, etc. | 23 | 11.9 | 5.1 |
| 10. Manufacturing (Asbestos, Safety equip., etc.) | 11 | 5.8 | 5.4 |
| 11. Chemicals | 9 | 5.2 | 9.9 |
| 12. Miscellaneous | 4 | 2.1 | 1.7 |

During the year one company, in Group 8, resigned because of a misunderstanding as to the purposes of the Foundation.

### Publications

The Foundation has published and distributed the following printed bulletins thus far in 1937:

Medical Series Bulletin No. 1, "Silicosis and Allied Disorders"; the manuscript for which was prepared in 1936.

Legal Series Bulletin No. 2, "A Critical Study of Provisions for Occupational Disease Legislation." This was discussed

by its author, Mr. Theodore C. Waters, at the meeting in November last.

Supplement No. 1 to Legal Series Bulletin No. 1, which brought the statutes and court decisions with respect to occupational disease down to March 1, 1937.

Supplement No. 2 to Legal Series Bulletin No. 1, bringing the information down to September 1, 1937, was distributed to members last week.

Proceedings of the Annual Meeting of February 9, 1937.

Abstracts of current literature. Bulletins have been issued monthly, beginning in January, 1937. To date, 588 abstracts have been sent to members. The practical value of these abstracts is indicated by the popular demand and favorable response they have evoked.

A bulletin, "Concentrations of Volatile Sulphur Compounds in Atmospheric Air." This reported the results of a special study conducted, under supervision of the Foundation, for a group of members who defrayed the actual cost of the investigation.

In press: "Compensation Legislation—A Critical Review." A summary of this will be presented today by its author, Mr. Theodore C. Waters.

Projected: A series (monthly) of articles on pertinent engineering subjects, and a series of medical aspects of industrial disease problems. The Chairmen of the committees concerned will tell more about these in their reports.

### Advisory Service to Members

A major research, arranged and supervised by the Foundation for a group of its members, was completed on October 15th. This was the study of concentrations of volatile sulphur compounds mentioned above.

During the year several short time studies were conducted for members.

In a number of cases, advice was given as to plant surveys, and, where indicated, companies were put in direct touch with physicists, engineers and physicians who not only were qualified to make such surveys, but who could testify in claim cases. In two instances, where member companies wished to develop their own survey units, preliminary training in sampling and dust counting was given to selected individuals. This type of service is growing.

There was also rendered a number of minor services, in the way of advice through the Foundation's technical committees—as any organization such as this might expect. This advice has ranged from where to get a published article to



how to establish and operate a department of industrial hygiene.

### Research

As might have been anticipated, because of the changes in regulations regarding membership and the adoption of a sliding scale of dues, the first part of the year was spent in interesting industrial organizations to affiliate with the Foundation. This action was necessary to determine what the income would be.

In the latter part of the year, however, a start was made on the research program. Work is now going forward at The Saranac Laboratory and at the University of Pennsylvania. Research will also be undertaken at Harvard University, arrangements having been made and an account opened at that institution, when specific problems have been selected from among those being considered and when Professor Drinker has determined who will be the incumbents of the two fellowships. Dr. Gardner will tell of the program at The Saranac Laboratory and Dr. Warren of that at the University of Pennsylvania. As these gentlemen report, it will be noticed that the Foundation is endeavoring to put into practice that which it advocates, namely, avoidance of unnecessary duplication of effort. In these two instances, advantage is being taken of a great deal of investigational work already done, and the Foundation's support is for research to go forward from there.

A study of anthracosis in the Pittsburgh district, which Dr. Samuel R. Haythorn and others, including the speaker, have been carrying on, was advanced during the year. Several papers have been published. In this work the Foundation has been cooperating, but has assumed no financial obligation.

### Cooperation With Other Organizations

The question has been raised several times as to the relationship the Foundation bears to other agencies in the field.

The U. S. Public Health Service and the U. S. Bureau of Mines are represented on the Foundation's Board of Trustees. There is an agreement that, if data gathered by the Foundation at any time should indicate that standards along some particular line should be set, the data will be sent to the American Standards Association, whose specific function it is to determine and promulgate such standards. There is no direct affiliation with any other organizations, but whenever there is an opportunity the Foundation cooperates in matters

of mutual interest; this activity will be nurtured as much as possible.

### Public Relations

The Foundation continued its educational activities in the field of industrial air hygiene. These activities included presentation of factual knowledge calculated to dispel misconceptions. In these efforts, the Foundation met with hearty cooperation from technical and trade journals, the daily press, and other media of communication.



## INDUSTRY AND ITS WORKERS

COLONEL WILLARD T. CHEVALIER

It has been my observation that when an outsider enters into the councils of a specialized group he would be wise not to attempt to talk to them about their specialty. And that is for two reasons. First, he may betray his ignorance and lose face thereby, and second, he cannot hope to add to the thought and experience of those who are specialists in any field.

The only excuse there can be for my being on your program is the possibility that I may be able to help you see the work that you are doing against a broader background of social and economic significance. I know that today those are blue sky words, which are used to cover a multitude of interferences, but nevertheless they do stand for genuine ideas. It is to develop those ideas that I have decided to devote the time available to me this morning.

We all are very prone to see our immediate concerns as of dominating importance. It is necessary that that should be so. Only because of that is each of us able to do his own job as it should be done. Nevertheless, when we become so exclusively involved in our own particular jobs we are likely to lose perspective. We are likely to see only the day's results of the day's work. We become so absorbed in immediate problems that we lose sight of ultimate objectives.

Sometimes I think that the whole purpose of education and of the exchanging of experience, the whole purpose of the effort that civilization makes to understand itself, is just this task of reconciling immediate necessities with ultimate values, which in the long run are bound to dominate.

This morning I should like to speak of "Industry and Its Workers," not merely as workers but also as a part of the general public that all industry is set up ultimately to serve.

I should like first of all to clear up a few misconceptions. Today we discern in many quarters an effort to sell the idea that we have business on the one hand and the people on the other, that there is something antagonistic between these two elements of our society. Here, we are told are the People, and over here is Business. One group warns us that Business must be protected from the People and another is equally zealous that the People be protected from Business. On this absurd conception we build up many of our phobias and prejudices and, unfortunately, many of our policies.

The fact is, of course, that there can be no such distinction

between the people and business. Business is nothing in the world but the people in the act of making a living. That is all. When the people are engaged in producing those goods and services that they require for their greater comfort, convenience and luxury, they constitute business.

Closely allied with this misconception is a comparable division between Producer and Consumer. We hear producers and consumers spoken of as though they constituted two different races of people, living in different countries, speaking different tongues and once again, cherishing antagonistic ideas.

The fact is, of course, that of the forty odd million people who are gainfully employed in this country every one is both a producer and a consumer. Any business enterprise is nothing more or less than a clearing house for their services. It brings together two groups of people. One it calls customers and the other it calls employees. The business house is a mechanism whereby they exchange their services. The employees put their efforts into the production of some commodities or the rendering of some service that the rest of the people want. The customers, in exchange, give them a certain amount of some medium of exchange that enables the employees to command the services of still other people, who are engaged as employees in some other enterprise. Thereby we effectuate a general exchange of services.

When we are included in some group as proprietors or employees we are producers. When we are customers we are consumers. But we all of us are in both of those capacities all of the time, and in discussing our problems we get nowhere by setting up the notion that there is a distinction between producers and consumers.

All this is elementary, I know, but it is most fundamental to what I would say to you this morning.

Now, of course, it happens that when we are engaged as producers we are prone to forget ourselves as consumers. That is because it is as producers that we acquire the buying power by which we gratify our own wants and desires. That is the reason why every business man likes to sell on a closed market and buy on an open market. That is why we all are so exceedingly sensitive to any efforts made by the producers of whom we are customers to close their markets or fix their prices or in any way increase the price that we have to pay for what we want. We are very sensitive to that.

But, by the same token, we are terribly sensitive to the "destructive effect of unbridled competition" upon our own business and we feel that something should be done about it.



That is perfectly natural and human. It is an instinct that is in us.

Nevertheless, if my concept be true, that in the long run we are just as much consumers as we are producers, it stands to reason that if we all carry such a philosophy of differentiation into our own work successfully then in the long run, as consumers, we all are going to suffer by what we thought for the moment was to our special advantage.

That is the picture that I see of the economic machine in operation, and the effect of some of these misconceptions on our own attitude toward economic problems.

Now you may say, "Well, what about this thing we call the profit motive? What about profit? What about this trend toward socialization and collectivism and toward eliminating profit as a factor in business and industry? Isn't what you are saying in line with that trend?"

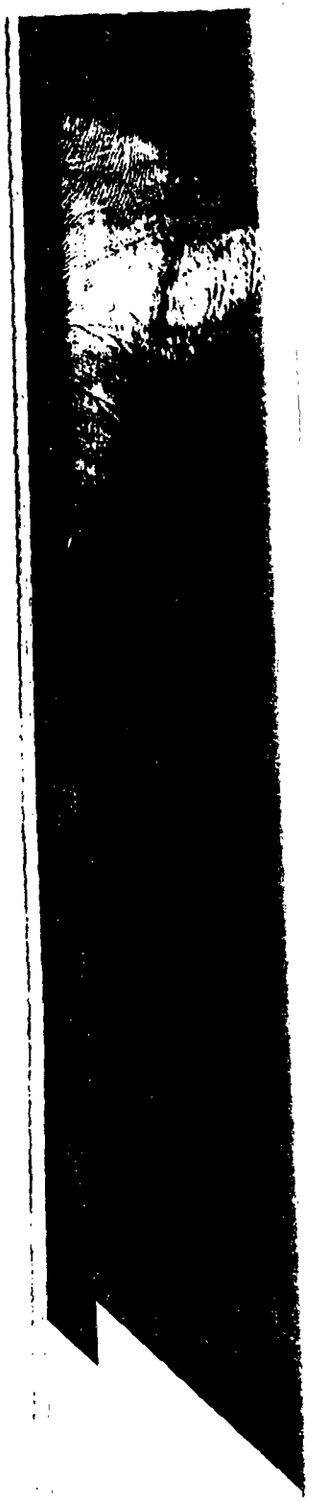
I should like to make very clear that I am not here attempting to argue a case. I am not attempting to plead a cause. I am trying simply to analyze an existing condition and leave you to draw your own conclusions. Furthermore, I am not trying to make a political speech. If what I have to say about business smacks of politics it is only because politics has entered the realm of business and not because business has entered the realm of politics. Today it is difficult to talk about business without getting into politics, not because business wants to get into politics but because business finds politics where it is. So it cannot very well discuss its business problems without involving political problems.

Bearing in mind that this is not an attempt to plead a cause or to make a political speech, what, then, are the facts about this trend toward collectivism and socialization?

The fact of the matter is that profit, as such, is not the objective of business. And before you take that too literally let me qualify it by noting that profit, under our system, is the all important and vital incentive of business. The objective of business is to produce and exchange the great variety of goods and services that men need for their greater satisfaction in living. That is the only reason for its existence.

There is a great difference between an objective and an incentive. Perhaps I can best illustrate by citing the sex instinct, that was implanted in us by nature, having as its objective the propagation of the race. In the individual it provides an incentive making toward that objective. But when the mere gratification of that instinct becomes an objective in itself, subordinating its true objective, it may well become the means by which we undermine and destroy the





race. And by the same token, the perversion of the profit motive from a useful incentive to an anti-social objective may well destroy the economic organism; i. e., capitalism, which it was designed to perpetuate.

But it is just as possible for us to destroy an organism by destroying its incentives as by over-emphasizing them. Today there are those who have become so obsessed over the objective of business and industry—to produce and distribute the goods and services that are needed by the people—that they have forgotten that there never was an objective in this world so exalted as to make necessary an incentive that would appeal to men in all their frailty. In other words, we achieve social ends only in proportion as we are able to stimulate individual incentives.

The idea of self-preservation of self-interest, of having and holding, of property, is a deep human instinct. As we appeal to it by the proper incentives we stimulate men to do those things which in the long run will accomplish the true objectives of producing and distributing more wealth and thereby raising the standards of living of all of the people.

That, in the end, is the objective of business. And only in proportion as business does eventually achieve that objective, will it accomplish the result that is sought and insure its survival and success.

Many of the difficulties of today have come because of those who, in my judgment, have forgotten the importance of the incentive because of their absorption in the objective. They think that by setting up an objective, by simply announcing it or by enacting it, if you please, they somehow or other will do away with the incentives that have driven men through the ages to accomplish even the finest of objectives. On the other hand we have the business man and the industrialist, on whose initiative we must rely for the achievement of that objective, disturbed, bewildered, and wondering where it all is going to leave him. His very human instincts are outraged by the idea that he will be expected to put forth his best effort and intelligence and all of his energy to accomplish a vague objective, which in the ideal may be splendid, but which to him is not a tangible advantage. It is too vague and altruistic. It is nothing on which he should be called upon to expend so much effort for the benefit of society as a whole. And what is true of the business man is true of the investor whose capital is required for the same objective.

There in my judgment, is the conflict that is going on today. On the one hand we see a group insisting, as it should, upon a certain objective, but forgetting, as it should not, the incentive that leads to the achievement of that objective. On the other hand we see a group so absorbed in the incentives and the day's problems and so worried and bewildered over the idea that the incentives they know may be frustrated, that they forget the real objective for which their whole system is designed and for which it exists; viz., the producing of more and better goods and the distributing of them to the largest possible number of the people, thereby contributing to a higher standard of living.

If we could only reconcile the views of the so-called progressives and radicals on the one hand and the so-called conservatives and reactionaries on the other and let them both see the importance of both objectives and incentives we would go a long way, it seems to me, toward settling some of these difficulties, these problems that create so much dissension and that actually are paralyzing the productivity of our people.

To my mind the great hurt of the depression was not the material losses that we suffered. The great hurt was the scar that was left upon the minds and the hearts of men. It shook our confidence and sapped our ambitions. We lost confidence and became bewildered. That is why I think it is so unfortunate that today some people are consciously and deliberately, and with the best intentions in the world, projecting into a period of recovery the bewilderments and worries of the depression. We came out of one set of fears and worries and now we must endure a new lot of artificial fears and worries that arise because of the conditions I described a few minutes ago. Some of our people have forgotten, in their preoccupation with fine objectives, the very practical incentives that are necessary if men are to carry on toward those objectives.

But I can hear you say, "What has all this to do with the subject that we are gathered here to discuss?"

I take my text for all this from a statement that appears in one of your publications, to the effect that this effort, the Air Hygiene Foundation, was "started by industry in behalf of employer, employee and the general welfare." Of course it was, because those three are identical. That is what I have been trying to demonstrate. But even in that statement is a faint hint that there is something antagonistic between those three interests. Evidently the writer of that phrase had in the back of his head a notion that it was a noteworthy achievement to undertake a movement that would be at the same time in the interest of employer, the employee and the general public.

My point is that if it truly is in the interest of the employer

it must be in the interest of the employee and of the general public. If it truly is in the interest of the employee it must be in the interest of the employer, and the general public. And if it truly is in the interest of the general public it must be in the interest of the employee and the employer.

May I repeat: "*In the interest of.*" Not to the immediate profit of. Not to the immediate advantage of. But in the interest of. That means the long term interest, the fundamental welfare, the genuine interest as opposed to the immediate advantage.

A few minutes ago I referred to this trend toward collectivism, this trend toward collective effort in dealing with the problems of industrial production and distribution. I am satisfied that that is a very well marked trend. It is not a matter that we are called upon to decide, as to whether we are going to have it or whether we are not going to have it. We have it! We have had it for a long time; it is a very real trend and not at all a new one.

I remember when I first started to work the great industrial question that convulsed the ranks of employers and labor and the general public was workmen's accident compensation. I was told as a young man, by my employers, that to establish workmen's compensation would be a long step toward socialism and that it was too terrible to contemplate.

I remember that about the same time steps were being taken toward the regulation of public utilities. I was told then that if any visitation of that sort were permitted it would mark the end of capitalism and be another long step toward socialism and all that it implied. In those days we hadn't heard of Bolshevism and Communism. Socialist was about the worst epithet that you could apply. I remember being told that the governor of the state in which I lived was a pink-whiskered so-and-so, because he was pointing out some of the evils of unregulated public utility operation and urging that they be controlled. He was one of the most cordially detested men in the United States by big industry and big business. His name was Charles E. Hughes.

Incidentally, while I think of it, I remember that one of the pet arguments against workmen's compensation was the fear that if it were set up, the workmen, knowing that they were insured, would become careless, and the net result would be more accidents rather than less. That was offered very seriously as a major reason why we should not go in for it.

A few years ago when we were discussing the desirability of deposit insurance for the banks, I couldn't help remembering that argument. I heard it said that deposit insurance



would be a bad thing because it would put a premium on bad banking. In other words, because the depositors were insured the bankers would become careless and negligent and we should have a lower standard of banking. It seemed to me, as I listened to that, that history was repeating itself. It sounded very much like the argument that the workman would become careless because he was insured and therefore he wouldn't mind losing a few fingers or a hand because he knew he was going to get a cash benefit, so the result would be more accidents.

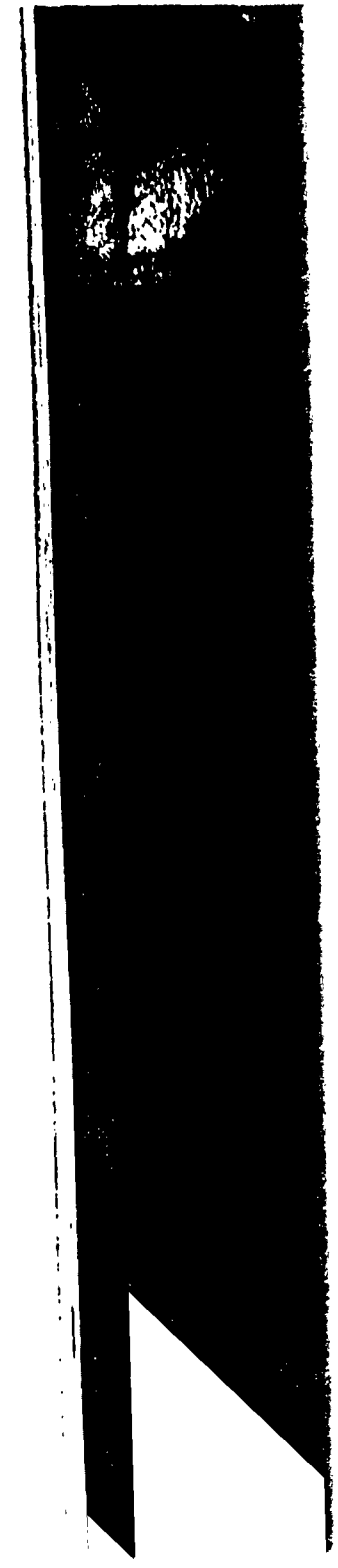
You know the answer. You know that just as soon as injuries to workmen became a factor in the operation of industry, industry went to work to eliminate the chances of injury. From that developed a safety movement; and we soon had a new department of science, safety engineering. Today thousands of people are employed by industry, and profitably employed, because it is to the interest of industry to employ them. Their sole function is to make the workman's job safer and to see that he does those things that are going to make his work safer. Was that a result of workmen's compensation, that frightfully socialistic thing that was wished upon us some thirty-odd years ago? I think that in large measure it was.

That is why I say to you today, without any gooseflesh whatever, that there is distinctly a trend. We have been in it for a long time. The interesting thing about any trend is that as we look at today's manifestations, the trend always seems to be something that has just started. But if we take a back-sight we shall find very likely that we are looking at just another manifestation of a trend that actually has been going on for a long time.

This trend toward socialization or collectivization, or whatever may be the proper noun to describe it, has had a tremendous stimulus during the last few years as a result of the social and economic problems precipitated by the war and the depression. The trend has been speeded up to a higher tempo. That is what has us frightened. You can drive a herd of any kind of animals, even human beings, very nicely until you try to speed them up or to direct them suddenly along some new line. Then you may have panic, uncertainty and stampede. We have been stampeding a little during the last few years, because there has been a considerable change in tempo and a considerable change in the direction of some of these trends.

As I see it, this trend on the part of employers toward recognizing a greater responsibility toward their workers and





the general public may take one of two courses. It may take the course of increasing governmental control. The people may say, "Government is the only means by which we can effectuate the results that we are trying to achieve." They may decide that it is hopeless to do the job in any other way than by setting up governmental machinery by which to achieve these objectives. That is one of the alternatives.

Just to show you how readily the people's thoughts turn to this alternative and to indicate that this is not confined to so-called radicals, I should like to read a few sentences from an address. May I preface the quotation by reminding you that there is no function in our economy, perhaps, that is looked upon by business men as being so distinctly business as banking and finance. The banker, until recently, has been regarded by the business man, as the natural leader of business thinking.

"Banking," said this speaker, "as a business career is dead. Banking as a profession is in its infancy, I might almost say is not yet born. Banking has been included as one of a number of possible business or vocational pursuits." This man was speaking to an audience of young men in a choosing-a career conference. "In my judgment it has no place in a conference which deals with the various possible methods of making money. You need to go into banking not because it may lead you to the acquisition of wealth, power or prestige, but because you want to serve others in that particular field. If you serve them well you can hope for prestige and power, not the kind that comes from wealth but the kind of power and prestige that inevitably accrues to good leadership and wise counsel. If you feel that your desire is for material reward, if your nature is essentially a competitive one, it will probably be difficult for you to acquire that sort of philosophy. The rewards of a good professional career are only in a secondary sense material. The primary satisfaction is that of a job well done.

"I should like to stress the absolute necessity for any kind of banker of lack of bias by reason of personal interest. The banker's primary motive for being in the banking business was the motive of making profit. Upon that conception our whole modern banking structure has been built up, but it is my belief that civilization has advanced to a point now where that conception is no longer justifiable. A banker may no longer regard himself as being in business for his own profit. He is the custodian of the funds of the people, and it is his function to supply credit so that the machinery of production, distribution and consumption can function properly.



"I am convinced that unless we come to this general philosophy among bankers, not by law but by a process of education and public opinion, banking will pass altogether out of the hands of private individuals and into the hands of government."

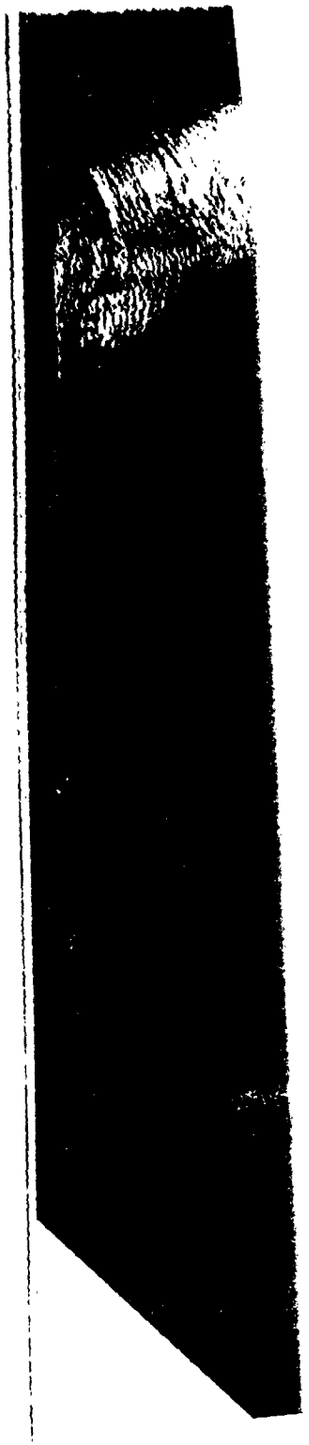
There is a man who very readily points to the alternative that I have indicated. He is not some starry-eyed idealist. He is not a Brain Truster or a New Dealer. Those words were spoken by Mr. James P. Warburg, in 1934, and I don't believe that Mr. Warburg can be accused of being a radical.

Now there is one path along which some of our people say we must go if we are to achieve this coordination of interest between employer, employee and the general public. What is the other one?

The other one is to have business itself recognize this trend and do of its own volition, as Mr. Warburg suggested would be preferable for the banker, those things that are necessary to respect this trend, not by lip service but by actual practice. In response to this need we have today a very definite shift in emphasis on the part of business from having its first responsibility to capital to having its first responsibility to the community as a whole, whether as consumers or employees. This in no sense is incompatible with the basic principles of what we call capitalism. Indeed I should be hard put to it to define accurately just what we mean by that term. Not long ago some one asked me if I really thought that capitalism had failed. I said that I didn't know because I should have to see it really tried before I could tell. We talk glibly about capitalism as though we had it in operation and as though everyone agreed as to how it should work. But I have a shrewd suspicion that very few of us would be satisfied with it if we should let it follow along the lines that we profess to believe in. If capitalism should fail I feel very sure that its failure would be due to interferences that would prevent the system from operating according to the principles that we avow when we extol its virtues. And mind you, those interferences don't all come from government by any means. The most serious interferences with the operation of the capitalistic system come from the capitalists, from those who profess to believe that it is the right answer to our economic needs.

I am not going to debate specific questions here; neither am I going to try to turn back the waves of the ocean. But I would just point out that a protective tariff is not in keeping with the principles of the capitalistic system. Neither is any form of price fixing or price regulation. Any effort to





"mitigate" competition is not in accordance with those principles. That system is built on the assumption of open competition, free enterprise, and economic survival of the fittest. That is the principle.

But actually we don't believe in that principle. We say we do, but we don't. We chip and we hedge and we trim in our effort to modify the operation of those principles in this, that or the other respect.

So it isn't a question today of capitalism against collectivism. It is a question of what kind of capitalism or what kind of collectivism.

I am one of those who believe that it is perfectly possible for us to accomplish the objective that I laid down a few minutes ago through the mechanism that we now have, modified in certain respects, and such modifications need be no more destructive than others which have been made from time to time to meet the exigencies of the time in which we live. I believe that it is perfectly possible to do the job through our present system. I believe that our industrialist and capitalist friends make a mistake when they insist that modification of this institution that we call capitalism verges on sacrilege. It never has been sacred. It is no time now to try to make it sacred.

Again you may reiterate, "What has this to do with what we are doing here now?" Simply this.

Let us assume that the matter of bad air and its effects—and I am using that term to describe all the varieties of air pollution that are covered by your interests—let us assume that the protection of the worker against bad air is left entirely to the individual employer. Do away with your Foundation. Forget it. We are going right back to where we were. What happens?

Immediately the least social-minded producer in any field will set the costs and prices in a competitive market. If there isn't a competitive market he will develop the larger margin of profit at the same price. He dominates the market. No other producer can afford to establish any higher standard than he does. So you go back to dog eat dog. You are going to take whatever advantage you can.

All right. Let us assume that that was possible twenty or thirty years ago. Let us assume that we could get away with it then. But it doesn't follow that we can get away with it now. We have come too far. The people have learned. Science and sociology have been teaching us. We have built our whole economic and social structure on the concept of higher standards of living, and that means higher standards of health



and well being for every one engaged in every capacity. Therefore, just the moment that we decided to abandon this effort we should run into opposition. We should have a demand upon industry. "You can't do that," the people would say. "You can't make us work under those conditions. I don't care what profit there may be in it, you cannot do it. We won't stand for it." For the community demands today that the services rendered to it shall be rendered under conditions that are going to be of maximum advantage to the community and to the people that compose it.

Then what happens? Then you have a public crusade. Then you have governmental regulation. Then you have "interference."

Why? Simply to make you do something that is inherent in our social and economic progress and that you men are here organized to do before you have been made to do it. In other words, the effort of industry to get together and deal with these social problems on their own initiative and of their own accord is, in my judgment, the very best antidote in the world for the agitation of the collectivist and the excessive interference of government.

The only reason why the community is justified in the minds of the great masses of the people in undertaking some of these activities that are being urged upon it is that private business has failed to do these things. In some cases it has failed even to recognize them and to sense its responsibility with respect to them.

I am not arguing the justice of that contention. I am not saying that it is true. I am simply saying that if you analyze every interference by the community in the operation of business you will find that the case for it was based on that predominant argument.

Consider the railroads. Turn to the enactment of the Hepburn Act, which was one of the earliest of the efforts to regulate business and industry. To this very day railroad operators must labor under the handicap of close governmental regulation. But what started it? The failure of the railroad managements of that day to recognize their responsibilities, their economic and community responsibilities as common carriers. So they got governmental regulation.

To me the tremendous significance of this movement—I don't like to call it a movement—of this new type of industrial activity lies in the implied recognition of social and community values. We may lay aside for the moment economic values, although they are important, and look only at the human or social aspects. Here we have a recognition by

industry of these social values as a very definite concern of its stewardship.

If the purpose of industry is to produce most efficiently all of those goods and services that are required by the people, and if the profit motive is but the incentive that drives them to undertake and carry through with that process; then it becomes necessary that industry take into account all of the elements that are involved in such community service and not those alone that have to do with its immediate profit. It is necessary for industry to think not only of how much it costs them to get a day's work out of a worker regardless of what may happen to him, but also how long a useful life will that workers have, what kind of health will he enjoy, what kind of consumer will he make in the markets of the nation for the goods and services produced by other industries. In other words, will employment with us make of him an asset or a liability to the community?

It means that we look beyond today's cost sheets. And beyond this year's profits. It sets up industry as an institution rather than a mere catch-penny device engaged in by men for their own immediate advantage and with no responsibility to the community. And that as I see it is in keeping with the trend.

Now then, gentlemen, if I have taken up matters that seem far afield from your immediate responsibilities, I hope that you will forgive me. I hope that you will attribute it to an excessive zeal on my part to extend and project the sort of thinking and activity that you are putting into this effort. I should like to see this sort of thing strengthened and extended. I should like to see it go farther into some of the economic as well as the physical concerns of our people.

I am profoundly convinced of the trend of which I have spoken and of the existence of the two alternatives. And I am certain that unless enlightened business and industry sees the problem in these terms and does those things that are indicated in its own interest to grapple with that problem, we shall inevitably be headed for a solution through some form of collectivism or socialization. To my mind the losses that might be realized through any such shift in our progress are so heavy as to far more than offset the benefits that might be derived.

Yet it is not what you think, or what I think, that will determine that. It is what the great mass of the people will decide. They it will be who will decide whether they can rely on the sense of responsibility of industry or whether they must invoke governmental control to get what they want. And in the sort of effort here represented, I feel that you are taking a long step toward moulding that decision.



## RECENT PROGRESS IN THE MEDICAL FIELD TOWARD FURTHER IMPROVEMENT OF INDUSTRIAL HEALTH

A. J. LANZA, M. D.
Chairman, Medical Committee

I am merely going to try to give you, in a brief and somewhat diagrammatic fashion, certain high points during the past year with respect to those phases of industrial hygiene in which the Air Hygiene Foundation and my Committee are interested.

There is a great deal of work being done in the field and there is a clearer understanding, I think, of the problems of industrial hygiene. There is a tendency, and a very good tendency, toward the development and application of precise methods rather than generalities, a tendency toward exploring physiological reactions of a definite nature and toward research as compared with less definite types of surveys.

A very interesting development has been the creation in State Departments of Health of divisions of industrial hygiene. Such departments have been set up in the states of Alabama, California, Connecticut, Illinois, Kansas, Iowa, Massachusetts, Michigan, Mississippi, Missouri, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, Washington, West Virginia and Wisconsin. This indicates a trend that is unmistakable. In all these states but two, namely, Massachusetts and New York, these divisions of industrial hygiene are located in the State Departments of Health. In the other two states they are located in the State Departments of Labor. The tendency to center this phase of public health in the State Departments of Health is obvious.

Three cities have created divisions of industrial hygiene: Baltimore, Detroit and St. Louis.

Several of our universities have plans under way to inaugurate a division of industrial hygiene which will attempt teaching and research work on the one hand and be of direct service to the industries in their immediate neighborhood on the other hand. I know of three such.

The American College of Surgeons, which is a professional body of high attainment and somewhat restricted membership, has interested itself in the question of industrial health and industrial medical service. In October of 1937 the American College of Surgeons presented a report on industrial medical service in the United States.

Another interesting development is that in Detroit. The Uni-

ted Automobile Workers have set up a medical and research clinic of their own for the purpose of determining the physical condition of their members and the detection of occupational diseases.

Various tests are coming to the fore in the effort to determine the presence of possible occupational illness. I won't go into detail on these except simply to mention them rather briefly. There has been developed a fairly accurate test to determine whether the individual is being exposed to dangerous quantities of benzol, known as the "urine sulphate test." Skin tests for allergic reactions among workers exposed to various substances are being developed more and more. Blood tests, particularly those which depend upon the differential counts of blood corpuscles, are becoming more and more important and more widely used. Research work is still being done in the effort to develop means of detecting the degree of functional impairment in pulmonary dust diseases, a very important phase, of course, of the compensation question.

A group of hazards that has been attracting a great deal of attention, particularly in the last year, is that large number of chemical substances that are grouped under the name of solvents. At least two large corporations in this country engaged in the manufacture and production of chemicals have set up their own research laboratories and facilities for establishing the toxicity of compounds and substances, drugs and chemicals that they produce. Incidentally, bear in mind that particularly in these poisonous substances as a rule it is not the manufacturer of them that gets into trouble, because he knows how to take care of them. It is the small and casual user.

The Massachusetts Department of Labor and Industry, I understand, is about to develop a rather comprehensive list of permissible concentrations, in the atmosphere of working places, of these various substances that are grouped under the head of solvents. At the Northwestern University Medical School in September a symposium on industrial health was held, at which Dr. Alice Hamilton read a notable paper on the newer solvents and their effects. There was also a symposium on the same subject at the Harvard School of Public Health in June of 1937, dealing particularly with certain chlorinated hydrocarbons.

There was a notable article by Van Oettington, of the duPont Laboratories, in the Journal of Industrial Hygiene in October of 1937, and by McConnell in the American Medical Association Journal in September.

The Medical Research Council of Great Britain has just



published a book on the toxicity of industrial organic solvents. They are classed in eight groups and ninety-eight important solvents are listed. Another English author in his book lists 220 solvents by various trade names, which in themselves are often meaningless, and the same could be duplicated without doubt in this country. From the Detroit Division of Industrial Hygiene and the Detroit City Health Department also comes a new publication dealing with one of the solvents, tetra-ethyl-orthosilicate.

So this question is a very live one. It is growing in importance, because the manufacture of chemicals in this country is on the increase and has been ever since the World War.

Another phase of hygiene which is getting more and more attention is the subject of air conditioning; and the installation of air conditioning equipment both in office buildings, homes and in workrooms, is continually on the increase. The American Medical Association set up a Medical Committee to study air conditioning and this committee has made three very good reports, of interest to everybody who is concerned with this question. These reports were published on May 15, September 18, and November 27, in the Journal of the American Medical Association. Some notable work has been and is being done in air conditioning of deep mines, not merely the cooling of the air, but actually an air conditioning. There is a most interesting article by McWilliams and McIntyre on the ventilating system of the Robinson Deep Mine in South Africa, which was published in the Chemical, Metallurgical and Mining Societies of South Africa in March, 1937.

In the field of dusts there is not much that is new. But of course the interest in our old friends, silica and silicosis, is still very much to the fore; also a considerable amount of work is being done in silicate dusts. You know we have always had some question about whether the dusts containing combined silica might possibly be harmful. We have generally taken this position and said, "No, they are not harmful. At least there is no evidence to show that they are harmful, with the possible exception of one." But research in this field is still being carried on and some interesting facts are being developed.

There is some evidence that such dusts as mica, feldspar, talc, if inhaled in sufficient quantity over a sufficiently long time, will produce some pulmonary reaction of a fibrotic nature. Whether that has any great importance clinically or actually to the health of the person affected remains to be seen.

There is evidence too that combinations of dusts act differ-

ently from any of these dusts when inhaled by themselves. That opens quite a field for speculation. The same thing has been observed, for instance, with gases. Dr. Mayers, of the New York Division of Industrial Hygiene, has shown that, for instance, carbon monoxide when inhaled in combination with hydrogen sulphide is more dangerous than either carbon monoxide or hydrogen sulphide when inhaled alone.

Again this year The Saranac Laboratories, under the guidance of Dr. Gardner, held one of their notable symposiums on dust disease of the lungs. The general field of dust and dust diseases is still active, and there still remains a very considerable amount of research to be done.

There is also a growing interest in the subject of cancer as a possible result or as possibly being associated with industrial hazards. With respect to dust inhalation, all the evidence is negative, that there is no particular relationship between the inhalation of dust and the incidence of cancer. Other forms of irritants, gases, fumes, and so forth, may have some such effect. That topic is a live one and is being investigated, as is also the possibility that fungus diseases of the lungs perhaps are more common than we have supposed.

With respect to the specific activities of our Foundation, I am very happy to report that the Air Hygiene Foundation has been able to assist and help set in motion two definite lines of research. One is being carried on by Dr. Gardner and his colleagues in Saranac and the other by Dr. Warren and his colleagues at the University of Pennsylvania. I won't describe them because these two gentlemen are going to speak for themselves.

Finally I might say that it is the hope and expectation of your Medical Committee to produce or sponsor during the coming year some bulletins or pamphlets dealing with pertinent matters coming within the realm of their work and of interest to yourselves. We hope that you will find these useful.

Your next speaker will be Dr. Gardner. I don't have to introduce Dr. Gardner to this audience. He is well known to industry from one end of the country to the other. He has done more work, more research in the fields of the occupational diseases with which he is concerned than any man in this country.

It gives me great pleasure to introduce Dr. Gardner, the Director of The Saranac Laboratories.



## "MIXED" DUSTS AND "PROTECTOR" DUSTS

LeROY U. GARDNER, M. D.

It is my privilege to report to you upon certain investigations in the field of silicosis which have been in progress at The Saranac Laboratory for a considerable period of time. With your help I hope that these studies may continue.

In 1933 we undertook a field study for one of the gypsum companies and were impressed by the fact that men who had been exposed for many years to atmospheres containing gypsum dust mixed with apparently hazardous quantities of silica dust showed no evidence of silicosis. Experiments were then inaugurated in which animals were compelled to inhale high concentrations of quartz mixed with gypsum dust. Both guinea pigs and white rats failed to develop the silicotic reactions which would have been expected from the amount of silica introduced into the atmosphere.

Subsequently field studies in the iron ore, cement and other industries furnished evidence that other non-silicious materials might prevent or at least retard the inhalation of silica dust. Animal experiments with mixtures of hematite and quartz dust have shown very definite evidence of protective action against silica. Calcium fluoride apparently falls in the same category. Granite, a natural mixture of quartz and various silicates, is known to cause silicosis in human beings but its action is so slow that fifteen or twenty years of exposure is necessary before disease develops. Inhalation experiments with this dust have invariably failed to produce silicosis in animals. Recent injection experiments have demonstrated that tissue reaction to quartz in this combination is long delayed. The same quantity of quartz that would provoke specific tissue changes in two months, if it were injected in pure state, is held in check for two years when it is administered with the silicates of granite.

Such observations in animals are not new for experiments have frequently failed to reproduce disease with mixtures of silica and other substances which are well known causes of silicosis in human beings. Either the experimenter claimed to have caused the "early stages" of the disease, although his illustrations indicated that such was not the case, or he condemned the experimental method. In many cases he concluded that associated irritations of the lungs due to infection, mine gases, etc., were essential. It seems much more probable that the failures were due to the presence of protectors which delayed the rate of reaction to silica.

Quite recently the Banting Institute has published a report

of experiments in which it was shown that metallic aluminum had prevented the development of silicosis in rabbits. The observations covered a period of six months during which time controls subjected to pure quartz dust developed early silicotic nodules. Animals breathing a mixture of quartz containing one per cent. aluminum formed no nodules. These observations would seem to furnish another example of the same general principle. This protector is apparently active in very small quantities. Whether it will continue to prevent silicotic fibrosis from developing over a period of several years remains to be demonstrated.

The evidence now available makes it seem improbable that a silica hazard is defined solely by the number and size of the silica particles in an industrial atmosphere. The other components of a dust modify its action. Some may inhibit, others retard and perhaps some will be found to prevent its injurious effects. Because these possibilities are recognized it becomes difficult to set up definite standards of permissible dustiness in industrial atmospheres. A concentration of quartz particles which may be extremely dangerous when associated with "contaminating" particles of one type may be quite harmless when mixed with some other material.

Not enough is known about the action of protector substances to warrant the recommendation that they be employed to prevent silicosis in industry. Our aim should be to reduce existing dust concentrations rather than to increase them by adding more dust. Even though it may be shown that the health hazard is slight or non-existent, excessive dust concentrations are at best a nuisance; they often interfere with effective production and in extreme cases they add a safety hazard. I would very strongly oppose the recommendation that protector dusts be used to attempt to prevent silicosis at the present time.

But I do believe that we should attempt to discover more about their action. At present our knowledge is fragmentary. We know that many apparently unlike substances may act as inhibitors. Some are more potent than others. Some seem to exert their effects within the body, preventing the silica from acting on the tissues. Some, like gypsum, seem to combine with the silica in the atmosphere, forming clumps which are too heavy to remain suspended in air and too large to pass the barriers of the nose and upper respiratory tract.

We should know more about the underlying principles which govern the behavior of different mixtures. We should investigate the action of various substances commonly associated with quartz in industrial atmospheres. If they have



protective action we should discover in what proportions they are effective. We should know whether their effect is permanent or temporary. We should discover how and why such substances influence the reaction to silica by the body.

With such information at hand it may be possible to apply the knowledge in a practical manner. If it cannot be used to prevent silicosis it may well explain why certain individuals in a particular industry develop the disease and others do not. It will very probably be discovered that certain industrial dusts which have hitherto been considered hazardous because of their free silica content are in fact relatively harmless. This has already been demonstrated in a few industrial processes like the manufacture of certain gypsum products and of cement, which involve the use of silica. Codes and legislation have taken cognizance of the fact and have been less rigorous in their standards for these industries. When the facts are fully known, other manufacturers, whose operations involve the generation of relatively harmless mixtures containing free silica will likewise benefit. While everyone should keep dust concentrations within reasonable limits, it is only the hazardous dusts which require the more elaborate and expensive measures of prevention.

To solve these problems it is necessary to have elaborate apparatus for the long-time exposure of animals and a personnel especially trained in the fields of experimental pathology, chemistry, physics, and petrography. All these sciences must be brought to bear upon the question. We must have very accurate information about the minerals with which we work, their behavior when suspended in air, in fluids and in contact with the tissues. We must know their effects upon the living body both singly and in combination with one another. The factor of time cannot be too greatly reduced in the study of a chronic disease like silicosis. To attempt it will only defeat one's purpose. While this program may seem expensive, it promises results which will be profitable, from both the scientific and practical aspects.

# PRACTICAL ASPECTS OF THE CHOICE AND USE OF ROENTGENOGRAPHIC APPARATUS AND TECHNIQUE IN INDUSTRY

S. REID WARREN, JR.

A roentgenogram placed on the uniformly illuminated diffusing glass plate of a film viewing device presents to the observer a pattern of areas of different brightnesses. Of two contiguous areas which differ in perceived brightness, that one which is brighter is said to be less dense. The difference in density is called the contrast of the two areas. The border between the areas is characterized by its sharpness, which depends upon the x-ray apparatus and technique as well as upon the position, shape and material of the object edge of which the border is the shadow. Density, contrast, and sharpness are the three measurable characteristics of the roentgenogram upon which scientific analysis of the roentgenographic process is based.

The roentgenologist learns by experience that film patterns having relative densities and contrasts within certain limits probably represent normality of the part of the body which has been exposed to x-rays; deviations of relative densities and contrasts beyond these limits, on the other hand, are interpreted by him as a result of abnormal conditions within the part.

The process of diagnostic interpretation is largely subjective. The conception of a normal roentgenogram has not been defined rigorously in terms of quantities which can be accurately measured. Therefore each roentgenologist has his own standard of normality. In addition there has been no general effort to define standards of density, contrast and sharpness for roentgenograms of various parts of the body. This prevents the development of accurate diagnostic criteria, uniform for all roentgenologists.

*There are three methods of making roentgenograms.* Two of these do not produce roentgenograms which are diagnostically comparable. Unfortunately, these two procedures are the most generally used. The third method produces comparable roentgenograms. Only a very small fraction of all the roentgenograms made at the present time is produced by this accurate reproducible process.

The first procedure may be described as the "hit-or-miss" *method.* The technician hopefully guesses the exposure factors and the factors for processing the film, and the result may or may not be useful from the diagnostic point of view.

Films made in this manner differ greatly in density and

contrast. Many roentgenograms are being made now by this wasteful and inaccurate method.

The second procedure has been developed by many able roentgenologists based upon training and experience. Each of these physicians chooses technical factors which produce roentgenograms having density and contrast which his observation has shown to be best from his diagnostic point of view. This may be described as the "rule-of-thumb" method. Roentgenographic techniques used in this country are in large part determined in this manner. Occasionally, accurate observation and careful correlation enable a physician to arrive at technical procedures which produce roentgenograms of excellent quality by this method. A far larger number acquire the ability to use films which are not of optimum quality from the physical point of view. Films produced in a given laboratory by this method are often comparable.

The third procedure is the scientific method. The determination of roentgenographic techniques upon a scientific basis depends upon an accurate quantitative measurement of all of the factors which contribute to the exposure, processing and examination of the roentgenogram. This method is the only one which permits standardization of roentgenographic technique. Such standardization fosters the development of accurate diagnostic criteria; legal proceedings in which roentgenograms are offered as evidence may be concluded quickly and justly only if roentgenographic technique is standardized; finally standardization reduces the cost of roentgenography by eliminating waste of time and materials.

In order to develop standard roentgenographic techniques with a view to producing comparable films in all laboratories at all times, the following problems must be solved:

1. What kind of roentgenogram, described in terms of density, contrast, and sharpness, has the greatest diagnostic value? An investigation of this problem requires accurate methods for measuring density, contrast, and sharpness. The quality and intensity of the light by which the film is observed must be measured. It is necessary also to investigate the psycho-physiological phenomena of visual perception.

2. What technical factors such as x-ray tube voltage, x-ray tube current, exposure time, focal spot-film distance, produce these standard roentgenograms? The data of a scientifically controlled investigation of available roentgenographic apparatus



are the prerequisites for the solution of this problem.

3. How may roentgenographic techniques be transferred from one laboratory to another, and how may the quality of roentgenograms in a given laboratory be maintained constant?

These problems have been studied at the X-ray Laboratory of the Moore School of Electrical Engineering of the University of Pennsylvania for the last fourteen years under the direction of Dr. F. M. McPhedran and Professor Charles Weyl of the Moore School. The technical details of this work have been described in papers published in the roentgenological journals. It is relevant for my purpose today simply to list in broad outline the methods which have been used to solve the problems. The Moore School X-ray Laboratory has been equipped for making comparative tests of roentgenographic apparatus and for producing roentgenograms under all conditions which may be encountered in clinical x-ray laboratories. By close collaboration with the manufacturers of x-ray apparatus and auxiliary materials, practically all of the devices used in the production of chest roentgenograms in this country have been tested. It has been necessary in the course of this work to devise special methods of physical measurement. These methods are described in published papers and in a book entitled Apparatus and Technique for Roentgenography of the Chest, published in 1935. These investigations have led to the definition of roentgenographic standards in terms of density, contrast, and sharpness. Comparative analysis of roentgenographic apparatus has formed the basis of methods for producing roentgenograms of standard density, contrast, and sharpness.

There are many interdependent factors which affect the quality of a roentgenogram. The most important factors are the x-ray absorbing characteristics of the roentgenographed objects, the x-ray tube voltage, the x-ray tube current, the exposure time, the focal spot-film distance, the size and shape of the focal spot, the characteristics of intensifying screens, the sensitivity of the x-ray film, the developing time and the developing temperature. Each of these factors has been investigated by controlled experiments. For example, the x-ray tube current is determined by the value of the x-ray tube cathode current and the x-ray tube voltage. These factors are in turn affected by the characteristics of the supply transformer and line and of several auxiliary devices included in the roentgenographic machine.

This work forms the basis of specifications of the apparatus

and technical methods by means of which roentgenograms having a scientifically pre-determined density, contrast, and sharpness, may be produced at minimum cost. These specifications are applied to clinical practice by means of a consultation service organized by the National Tuberculosis Association. Members of the staff of the Moore School X-ray Laboratory consult with roentgenologists concerning the choice of new equipment, and calibrate apparatus now installed with a view to recommending modifications of the equipment and technique which will permit the production of roentgenograms of standard quality. It is important to note that the work which has been done in this laboratory has always been directed toward practical application in clinical roentgenography. The standards which have been developed are based upon accurate experimental data. The factors of convenience and cost are always considered, if they do not compromise accuracy.

There are problems of roentgenographic procedure which require close collaboration between roentgenologists, physicists, and engineers. They require for their solutions three factors: (1) scientific control of apparatus and technique based upon accurate physical measurements; (2) accurate diagnostic interpretation of roentgenographic results; (3) a large number of patients to test adequately the methods which are devised.

The Air Hygiene Foundation has asked Dr. E. P. Pendegrass, Roentgenologist of the University of Pennsylvania Hospital, and the Moore School X-ray Laboratory to collaborate in work upon some of these problems. This work has been started.

One of the most important examples of these problems is the question of whether or not the use of a photographic emulsion suspended on the surface of paper will produce ronetgenograms which are adequate from the diagnostic point of view. This problem is particularly important to industries who want to protect their employees and themselves. It is a simple matter to determine that the density range and the contrast obtained with paper roentgenograms are inferior to those obtained with transparent films. However, to the best of my knowledge, no scientifically controlled test has been conducted to show whether or not the results obtained with paper are adequate for diagnosis. Methods for investigating this problem are available, and are now being applied at the University of Pennsylvania under the auspices of the Air Hygiene Foundation. This is to be the first of a series of investigations of problems which require cooperative clini-



cal and technical analysis. The results of the cooperative analysis of paper and film will show whether paper is adequate under all conditions or under some special conditions which will be specified upon the basis of the experimental data. Industrial physicians, insurance company physicians, and lawyers rightly demand standardization in this important field.

Compensation laws in some states require of industrial employees a roentgenographic examination in conjunction with other medical examinations. Is it more effective and more economical to permit a local roentgenologist to do this work, to purchase apparatus for permanent installation in the factory or to contract for the services of one of the companies which make roentgenograms with transportable roentgenographic apparatus? This problem also must be studied by close collaboration between those who understand the physical aspects of the problem and those who are interested chiefly in the medical aspects of the problem.

At the present time the practice of roentgenography is much more nearly an art than a science. The methods for producing roentgenograms upon a scientific basis are available. There remain two problems—first, the dissemination of descriptions of the scientific methods; and second, the investigation of problems which depend upon the close cooperation between physicians and physicists. High quality roentgenographic service is of course important to diagnosticians; high quality roentgenographic service at low cost is necessary if industry is to cope successfully with the problems with which it is now faced. I hope sincerely that you will plan further cooperative studies of these problems.

## REPORT OF PREVENTIVE ENGINEERING COMMITTEE

PROF. PHILIP DRINKER, Chairman

My report will be brief and consists in what I might call news items in the engineering aspects of air hygiene.

One of the most significant developments in the field of occupational hygiene during the past year has been the adoption, on May 1, of New York State's code governing dustiness in rock drilling. This code divides all rock formations into two classes, I. being those with less than 10% free silica by weight, and II. being those with more than 10% free silica. If drilling is done in class I. rock, dust counts must be below 100 million per cubic foot, and below 10 million if the rock falls in class II. This means, in effect, that dry drilling can only be used with local exhausts and adequate air cleaning. It happens, also, that wet drilling without ventilation will not achieve adequate air cleanliness in the case of the high quartz or class II. rock.

At this writing it seems very likely that other states will copy this code almost verbatim. After all, New York adopted it as the result of extensive investigation and hearings and it is unlikely that other states will assemble better information on which to base their codes. It is probable that substantially this same code will be adopted for dust exposures of all kinds. If so, it will mean that the upper limit of dustiness in any kind of work and in any kind of dust will be 100 million particles per cubic foot.

Many states and insurance companies are adopting or approving non-silica parting compounds for use in foundries. There is the same tendency in other industries to substitute for silica non-silicious substances. So far, the silica and sand producers apparently have not attempted to devise or promote methods of using silica that will pass hygienic codes, such as that cited from the New York Law.

Considerable interest has been expressed by the report from Toronto and by another report from London on the use of protective dusts to nullify or reduce the potency of quartz in causing silicosis. The research back of this suggestion and the appraisal of the suggestion itself belongs to the Medical Committee, but engineers will be asked how the proposed protective dust should be applied. This Committee does not feel that the use of protective dusts has yet emerged from the academic, and they should not be used in practical problems. The literature on the subject is, however, very interesting and

well worth reading. It can be obtained through the office of the Managing Director.

At the present time, there is being developed commercially an ever-increasing list of organic compounds that were laboratory curiosities five or ten years ago. In many cases, the effects of these new substances upon men are not known. In spite of this lack of knowledge, the engineer is often called upon to estimate their concentration in air and to devise methods for eliminating or controlling health hazards in connection with their use. Several firms engaged in the manufacture of such materials are now attempting to devise means for the routine appraisal of the health involving their use.

The Bureau of Mines has released a new code, Schedule 19A, under which hose masks, air masks, abrasive blasting helmets will be examined and certified for approval. This schedule follows the same general lines as their previous schedules and fills a very important industrial need. Industry will do well to take advantage of the schedule by demanding that only Bureau of Mines' approved equipment will be purchased. It is likely that the various states will accept for approval only such equipment. It would be entirely in accordance with what has happened when the Bureau's other schedules for dust respirators and gas masks were first published. States, instead of setting up their own bureau, say, "If you get the Bureau of Mines' approval that is all we want."

Our Committee proposes to issue a series of bulletins on such subjects as the following: Dust control in rock drilling; design and operation of paint-spray booths; design and installation of local exhaust hoods; routine dust sampling and control; design and care of dust arresters; design of duct work for exhaust systems; bench marks in control of dusts and fumes; use and care of protective equipment; determination of gases, specifically benzol, chlorinated hydrocarbons, and probably an acid gas, such as sulphur dioxide; probably two bulletins on the identification of dusts, that is, combined microscopy and chemistry.

These bulletins will be short, not over 1,500 words and preferably not over 1,000. They will contain a few simple illustrations, but there will be almost no references and no controversial matter. They will not illustrate or extol any particular article or machine. Both the outline and the finished bulletin will be criticized very thoroughly by our Committee. Our program is tentative, and we may expand or contract it, as circumstances warrant.

As Mr. Meller pointed out, we are to have two fellowships



from the Foundation at the Harvard School of Public Health next year, in matters of interest to this group. The men will be candidates for either the Doctor of Science degree in Industrial Sanitation, or for the Doctorate of Public Health in Industrial Hygiene. These men will have at least two years at the school, possibly three, and will be available for employment to the members of this group or to any one else who is interested in their services at the conclusion of that period of work. Their thesis subjects will, we hope, be matters which can be printed and made available to all of you.

I have been asked to comment briefly on the Bausch & Lomb dust counter. We are frequently asked "Should we buy it or should we not?" I own one and use it on industrial problems.

From the nature of the Bausch & Lomb instrument and the way it operates it cannot possibly imitate the impinger apparatus. However, a slight modification in the construction has made the conversions possible at comparatively low dust concentrations. But if one wants a short cut to the impinger data as obtained by the Public Health Service, do not buy the Bausch & Lomb instrument.

The other question is, if one uses the Bausch & Lomb counter can one adequately control dustiness in a plant or a mine? My answer is that generally the instrument is satisfactory.

A year or two ago our laboratory published a description of an instrument not unlike the Bausch & Lomb counter. That instrument is applied today with great success in appraising dust control equipment in a granite cutting establishment. It gives no trouble at all, but again the results cannot be converted directly to impinger counts. If one wants results in terms of impinger counts the only certain way to get them is with an impinger.

## OBSERVATIONS ON AIR DUSTINESS IN DRILLING

D. HARRINGTON

Probably the reason for asking me to appear on this program today is that drilling is primarily one of the difficulties in connection with dustiness in mines, and probably also one of the reasons is that the United States Bureau of Mines, with which I am associated and have been associated for a number of years, was one of the pioneers in this matter of trying to find out what it is all about, or at least what something of it is about in connection with dust disease.

Early at the beginning of the Bureau of Mines, in 1910, the Bureau got under way in this matter of trying to see first of all what was the situation and what could be done about the occurrence of dust in mines, with particular reference to metal mines, as far as health was concerned. Early in the game Dr. Lanza, Dr. Sayers, Mr. Higgins and a number of others of us started out on it, I getting into it as early as 1916, which you will admit is a long time ago.

Oddly enough, some of the problems which were confronting us at that time in connection with drilling and air dustiness confront us yet. The problems of twenty years ago are largely the problems of today. As proof of this I have before me a publication issued by the Bureau of Mines in March, 1922, the subject being "Drilling and Dustiness in Metal-Mine Air." I am going to read a few paragraphs from that publication issued in 1922—fifteen years ago—as illustrating that while progress has been made, nevertheless the problems still remain largely as they were.

> "Notwithstanding all the effort made to introduce wet drills to prevent dustiness of air of metal-mine working places, there has during the past few years arisen in Australia and South Africa an impression that wet drills, including the Leyner type, actually cause undue quantities of finely divided ore and rock to rise into the air, these fine particles being chiefly attached to particles of fog or spray escaping from holes using water drills. This is said to have created consternation in the ranks of the mine operators who have complied with drastic wet drilling regulations, and purchased and operated various types of wet drills at no inconsiderable expenditure in both money and effort.
>
> "In view of this situation and the fact that wet stopers are being rapidly introduced with considerable success in many of the metal mines of the

United States, the writer, who has for the past five years been engaged largely in studying the dust problem in the metal mines of the West for the U. S. Bureau of Mines, has compiled the dust sampling of air of drilling places in 214 working places in 13 mines at time of drilling, using various types of wet and dry drills with upper, inclined, horizontal and some down holes.

"The result of these tabulations indicates that irrespective of the conditions in South Africa and Australia, the use of wet drills in the United States results in a decided decrease of dustiness of the surrounding air as compared with dry drilling, whether the holes are upper, inclined or horizontal, and practically irrespective of the types of drill used. Nevertheless, there are some dangers from dust in air surrounding wet drilling operations unless certain precautions are taken."

The final paragraphs of this paper are these. As I said a minute ago, this paper was published in 1922.

"The dust studies to date in metal mines of the United States by the U. S. Bureau of Mines indicate definitely that wet drills as used in drilling of all classes of holes aid decidedly in reducing dustiness of air in drilling places. However, it has been found that wet drills whether of the Leyner type or stopers, if not operating satisfactorily or if out of repair, may throw into the air of working places a mist or fog, laden with minute mineral particles which when breathed has the same effect as dry dust and is fully as dangerous. In addition to danger when wet drills are not efficiently used, if water or compressed air and water forced through the drill is under excessive pressure, say over 100 pounds per square inch, there may be danger of escape of mist or fog laden with mineral particles, hence these pressures should be held below 100 pounds per square inch, which in general is the practice in the United States.

"Wet drills must be kept in repair and must be operated with intelligence. As far as proved by the sampling of the U. S. Bureau of Mines, the wet drills, even when at their worst, still give conditions much more healthful than do dry drills."

Practically all of the statements contained in that article obtain today.



Still going into the history, I have before me also a publication of the Bureau of Mines issued in July, 1922, entitled, "A Summary of Investigations of Dust and Ventilation in Metal Mines," as given by the Bureau of Mines, with bibliography. In that is a list of some fifty odd papers published by the Bureau of Mines up to that time on the subject of dust and ventilation in metal mines. Throughout that list are the names of Dr. Sayers, Dr. Lanza, Mr. Yant, and others who are still writing on the subject.

Now for the matter at hand.

The Air Hygiene Foundation Committee on Preventive Engineering had before it five problems—at least five problems which were announced. Two of those five problems were assigned, indirectly at least, to the U. S. Bureau of Mines, and those are the problems on which I am going to talk today.

Problem II of the Preventive Engineering Committee's report states: "Study of dustiness created by drilling in different kinds of rocks. The U. S. Bureau of Mines has underway a series of experiments in an experimental rock tunnel. The study indicated can be included in this program."

Problem III is "A study of the difference in dustiness from blasting with and without dust control during rock drilling. This project will be included in the program of the U. S. Bureau of Mines in its experimental tunnel."

The Bureau of Mines for years carried out studies in connection with silicosis, dust disease, dust and ventilation in mines, health affected not only by dust but by gases, and other health phases which occur chiefly in underground mines. A few years ago, when the economy program came on us, we were confronted with the necessity for discontinuing very largely that work, and it was recessed for several years. A little over two years ago Congress gave us $50,000 with which to resume that type of work. About $25,000 a year was allotted to laboratory work and about an equal amount to field work.

In connection with the laboratory work, persons doing it were assigned partly to do their work in the laboratory and partly in the field, it being felt that the laboratory technician should become familiar with the conditions, difficulties, trials, and tribulations of the fellow in the field who has to apply the results of any research which might be undertaken and if there might be results obtained. Accordingly we had our research men go into the field in the western part of the United States and also in the Lake Superior region and in other parts of the country as well.

On the other side of the picture the field men, who were

going to tackle this problem also, it was felt should obtain the point of view of the laboratory men. They should at least have some knowledge of what the laboratory man was doing and what it "was all about" as far as the instruments and instrumentalities in connection with taking of samples and determining of air dustiness were concerned. Therefore we brought in a number of our engineers and had them spend considerable periods of time in the laboratory in Pittsburgh. We also brought some of them into the mines where the laboratory men were working when in the field. In other words, we tried to get a pretty firm foundation for our men who were going to do this work.

It has taken us a considerable length of time to do that. We feel now that we are about ready to capitalize on some of the work which has been thus undertaken.

One of the numerous things which we have tried to do in connection with this research on silicosis, or whatever you wish to call it—I prefer to call it pneumoconiosis or dust disease, which is much more simple and much more expressive, as a matter of cold fact—is that we are now preparing to issue and in a relatively short time will issue a series of short papers on various phases of what has been found. Some of those papers are going to be on drilling, many of them will be on dust. At the present time there are in process of publication in mimeographed form two papers, one of them entitled "Relation of dust concentration in mine air to depth of hole during wet drilling." That paper is now in stencil form and it should be issued any time within the next few weeks. Another paper entitled, "Effect of drilling angle on dust concentration in mine air" is pretty well along toward completion and probably will be issued within the next few weeks or at least by the first of the year.

In addition to these papers we have probably half a dozen other papers which are written, have been submitted, and are now undergoing editorial scrutiny. They also will be published. They are not so definitely concerned with drilling as the first two, although some other papers are going to be published in connection with drilling.

These papers embody only a small amount of the data available. We are trying to have one or two papers issued per month for the next several months, probably for the next year, on some phase of the research which has been done in the laboratory and in the field on dust.

As far as drilling is concerned, the studies have been undertaken and have been carried out not only in going mines but also in an experimental tunnel which the Bureau has opened



at Mount Weather, Va., outside of Washington, in a quartzitic formation. A considerable amount of the work is going to be done there under controlled conditions. Much of the work, however, has been done in going mines, under working conditions largely, but also in isolated places in working mines under more or less controlled conditions.

One of the studies which we undertook and on which we thought we had some results, but on which we have not as yet seen fit to release the data, is the effect of sharpness of drill bits on dust produced in drilling. South African authorities have issued some data on this subject and have indicated that the duller the bit the greater the amount of dust likely to be obtained in the wet drilling. We tried it out and to our amazement our results were definitely opposite, as far as we have been able to ascertain so far. We are not going to tie ourselves very tightly to these findings however at this time because we feel that there are some variables which we have not yet taken into consideration. As far as we have been able to ascertain so far, the sharper the bit the greater the air dustiness produced. We may modify that—we probably will modify it sooner or later. At any rate we are not able to give out anything of a definite nature on it now.

There are so many different factors which enter into this matter of drilling and air dustiness that it would take much more time than I have now to give you any intimation as to what it is all about. In the first place it is obvious that dry drilling gives much more dust than wet drilling. It is also obvious that under some circumstances wet drilling produces air dustiness. We are now of the opinion that a considerable amount of that air dustiness produced by wet drilling is due to the fact that the starting of the hole, the collaring of the hole as it is called, is responsible. In other words, the collaring is very often done practically dry, and that collaring dry is very often done even when the drill operator doesn't purposely restrict the amount of water going through the drill steel. The fact of the matter is that we are pretty well assured now that until the hole has a depth of approximately a foot, the water which is delivered through the drill steel does not have sufficient amount of time or sufficient amount of contact with the fine rock material to mix with it in such a manner as to hold the dust in connection with the water.

In other words, the time element enters into the matter. It may be necessary before wet drilling can be made as successful as it should be that some sort of extra precautions, either in the form of the use of a foam or of some external apparatus which will introduce the extra amount of water or mist

or something of that kind, be provided until the hole gets a depth of six inches to a foot at least.

That is one of the main problems confronting us at the present time. We in the Bureau of Mines have done a little—not much—and we are going to do more experimenting with the use of wetting or foam agents with regard to drilling. A considerable amount of work has been done on that in foreign countries, particularly in Great Britain, and to a limited extent in South Africa. We have not as yet been able to get anything which would give us any intimation as to what may be the effect of the use of foam, or at least we have not seen or heard of any foam agent which, as far as we have been able to find out, is an unqualified success.

There appears to be no doubt whatever that the amount of dust which may be expected from wet drilling is largely dependent on the amount of water forced through the drill steel. In other words, if you restrict the amount of water going through the drill steel you are likely to get an increase in the amount of dust; conversely, by increasing the amount of water going through the drill steel there is likely to be a definite lowering of the amount of dust coming into the air.

We have done a little—not as much as we expect to do or should do—in connection with the use of dust traps with dry drilling, and we have made some observation where types of dust traps are being tried in wet drilling. Sooner or later we expect to get some data for publication on that subject as well. We have also done some work and will do more in the near future with the so-called South African dustless type of drill, which tries to prevent the use of compressed air with the water through the drill steel. That drill has been utilized a little in the United States, particularly in the western part, but has not as yet been considered to be successful. To put it differently: The mine operators where the drill has been used feel that it is not necessary, that by the use of common sense methods with present day types of wet drills and wet drilling, air dustiness can be held within suitable limits without going to the extreme of adopting the South African type of drill. On the other hand, in Ontario two of the large mining companies, we are informed very definitely, have gone completely over to the South African type of drill. They are the Dome Mine, and the Hollinger Mine, both in Northern Ontario.

I had a chance to talk to one of the mining men from that region about two months ago, in Vancouver, B. C. He said that this particular type of drill not only does the work with much less air dustiness, but that it also is fully as successful



from the viewpoint of upkeep and cost per foot of drill hole as the other types of drills. That may be true, of course, in connection with their type of ore or conditions, and it may not necessarily be true in the United States.

The whole matter of drilling, as far as we can find out, may be summed in this way. Dry drilling is, of course, very much more a dust producer than wet drilling—probably in the ratio of six, eight, or possibly ten to one. Wet drilling produces some dust. Particularly is that true unless the collaring is very carefully done and the amounts of air and water through the drill steel are not controlled. But if reasonable precautions are taken with wet drilling and suitable precautions are also taken as to ventilation, as to the wetting of the muck pile, as to the time at which the blasting is done, as to the precautions which are taken after going back to the face after blasting, we feel—in fact we know—that under present day conditions mines can be conducted with air dustiness at the working faces, including dustiness due to drilling, such that there need be no particular harm to workers in those places as far as dust disease is concerned.

# REPORT OF LEGAL COMMITTEE

A. C. HIRTH, Chairman

The position of industry insofar as the legal aspects of the occupational disease problem is concerned has not changed since this subject first received consideration by the Foundation. The admonitions and warnings that we have frequently voiced during the past two years are as applicable now as they were then, and the mere fact that there is less litigation than heretofore does not mean that your problem is solved. We are still faced with a problem of a more permanent nature, that is, the problem of occupational disease legislation. Labor is becoming increasingly insistent that legislation covering this subject be passed, and that the content of such legislation be formulated by them. In some few states manufacturers have been successful in securing the adoption of their ideas with respect to such legislation, and it requires only a comparison of these laws with those in which no participation on the part of industry occurred to show the tremendous importance of our active concern in this matter.

It may be interesting to very briefly summarize the work of the Legal Committee to date.

During the first year of the Foundation's existence your Committee issued Bulletin No. 1 of the Legal Series prepared by the law firm of Williams, Eversman & Morgan of Toledo. This bulletin included a survey of existing statutes and court decisions relating to the rights of employees for compensation for injuries caused by occupational diseases resulting from air pollution. It analyzed the Workmen's Compensation Acts and Occupational Disease Acts of every state in the Union with respect to their provisions for compensation for occupational disease injuries, and reviewed the state decisions dealing with the rights of employees to maintain actions at common law against their employers for such injuries. On two different occasions this bulletin has been brought up to date.

The statement of the result falls far short of describing the monumental proportions of the task. So far as we can ascertain no similar work has ever been compiled. It was therefore necessary for us to blaze our own trail. Few law libraries contain all of the necessary information. Men were sent to the largest and best equipped of such libraries in the country. Even so, we were frequently unable to find the latest legislative enactments. In such instances, and there were many of them, it was necessary to communicate with state

officials to procure those statutes which had not
published. It was even necessary in some cases t
public reporters to make typewritten copies of the
enacted legislation.

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We are now ready to submit Legal
prepared by Mr. Theodore C. Waters, Chairman o
land Occupational Diseases Commission. In the cou
Mr. Waters' experience in such capacity, he actively
pated in one of the most thorough surveys that has e
made on this subject. Innumerable witnesses testifi
the Commission and every possible source of inform
thoroughly explored. His opinion, therefore, as to
lative aspects of our problem should be given car

ation by you in determining your policies on this subject.

ur Committee has read the bulletin with a great deal of and interest. It might aptly be described as a "road " on occupational disease legislation. I shall not attempt, ever, either to name it or review its contents, as its author with us today.

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# COMPENSATION LEGISLATION—A CRITICAL REVIEW

THEODORE C. WATERS

In reviewing the activities of Air Hygiene Foundation, I have been impressed with its progress and accomplishments. When the organization was originally conceived, those of us interested in its activities felt that it had a definite purpose to serve in the field of industrial hygiene. Its officers, trustees and committees have devoted their efforts to the solution of many of the problems that have served to perplex our modern industrial society, and I feel that the Foundation is to be congratulated upon its various activities, which have proved to be of material assistance to its member organizations. For the past several years we have all benefitted by the research work done by the distinguished scientists who have served upon its committees and I know that I express the sentiments of the member organizations when I thank these committees for the signal services that they have rendered.

At the last annual meeting of the Foundation, we discussed some of the problems presented to industry by the contemplated enactment of legislation compensating occupational diseases. Since that time many new laws have been enacted, creating new problems for those who may be concerned with their administration.

I have been asked to discuss briefly the bulletin prepared by the Legal Committee, which is now being printed and will shortly be submitted to the membership as Legal Bulletin No. 3. In the time that has been allotted to me it would be impossible to present an intelligent analysis of this bulletin, but there are several subjects treated therein that I desire to call to your attention for careful consideration.

During the past year occupational disease amendments to existing Workmen's Compensation Laws have been enacted by the States of Delaware, Indiana, Michigan, Pennsylvania, Ohio and Washington. Therefore, today there are twenty-one states whose laws now provide compensation for occupational diseases. In the following states Commissions have been appointed for the purpose of studying and recommending compensation legislation:

| | | | |
|---|---|---|---|
| Alabama | Georgia | Maine | New Mexico |
| Arizona | Kansas | Maryland | Oregon |

It is apparent that a new emphasis has been placed upon the need for compensating occupational disease injuries, and

in the course of the next few years all of the industrial states will have probably enacted laws for this purpose.

In choosing three of the subjects discussed in the new bulletin, I do not mean to minimize the importance of the other subjects treated therein. However, in view of the present trends of occupational disease legislation, the following subjects are of special interest at this time:

(a) Provisions compensating partial and total disability from silicosis.

(b) Limitation provisions.

(c) Provisions dealing with pre-employment and periodic post-employment physical examinations of employees.

### Compensation for Partial and Total Disability from Silicosis

Occupational disease laws generally award compensation for partial and total disability in the same manner and under schedules similar to those for disabilities caused by accidents. In several of the laws recently enacted, compensation for partial disability caused by silicosis has been denied. The basic theory of the Workmen's Compensation Acts is to provide compensation solely for disability, and the legislatures of certain of the states have come to recognize that many employees who have some presently determinable evidence of silicosis are engaged in trade, not knowing of the existence of the disease in them, showing no noticeable disability, and fully capable of performing their regular duties. Precedent for the denial of compensation for partial disability was established by the method of awarding compensation for silicosis in South Africa, where medical classification of the stages of the disease were provided in the law. In the first stage (ante-primary), relatively low compensation was payable, so that the employee would be compensated for the time that might elapse from the date of his removal from his hazardous employment until he could find employment in some other trade.[1] The West Virginia law follows this idea and defines three stages of the disease, providing compensation in the amounts of $500 and $1000 respectively for the first and second stages of the disease, with full compensation in the same manner and at the same rate as is provided for permanent disability or death from accidental injuries when the claimant is suffering from the disease in the third stage.

1 The original Ontario statute contained similar provisions.



During the year 1936, New York State amended its occupational disease compensation statute to deny compensation for partial disability due to silicosis or other dust diseases, while during 1937, Ohio, Pennsylvania and Michigan passed laws denying compensation for partial disability from the dust diseases.

The Medical Committee of the Foundation, in its Bulletin No. 1 of the Medical Series, has recognized the difficulty of evaluating partial disability. Similarly, the summary report of the Committee on the Prevention of Silicosis through Medical Control of the National Silicosis Conference has recognized the intricacies of the problem.

In many instances employees have been advised by physicians, untrained and inexperienced in the diagnosis and effect of silicosis, that they have the disease and thereby have sustained disability. Acting on this advice, the employee, now concerned about his condition, leaves his employment, even though that trade may be the only one in which he is able to earn a living. He may then find himself unacceptable for employment elsewhere and becomes unable to earn a living wage, with resulting hardships to himself, his family and eventually to his community, which might have been avoided had he been properly advised that he had suffered no actual disability and that the risk of continuing in his employment was negligible. Employers likewise suffer from improper diagnoses, with the resulting persecution of common law suits or unjustified compensation claims. Not only is this litigation excessively expensive, but it may have a far reaching detrimental effect upon the entire employer-employee relationship, tending to destroy public confidence in an industry which may, as a matter of fact, be well managed, properly equipped and operated with full consideration for the health of its employees.

There are persuasive reasons both for and against legislative provisions denying compensation for partial disability from silicosis, but until an approved method is devised for the purpose of evaluating such disability, the denial of compensation for partial disability is not only equitable, but desirable.

With respect to total disability, the problem is much simpler. When the disease is accompanied by active pulmonary tuberculosis, the employee should be removed from the hazard of dust, not only for his own protection, but for that of his fellow workmen, in order to remove them from the possibility of infection. An employee so injured should receive the full total disability benefits of the law. Adequate protection should be afforded to employers to determine the actual cause

of disability so that compensation may not be awarded unless the claimant is determined by competent medical examination to be suffering total disability. Pre-employment examinations will enable employers to avoid the employment of tuberculars and tubercular suspects in industries wherein silica is a hazard, and by this method they may relieve themselves from a considerable portion of the potential total disability benefits that may be awarded under our compensation statutes.

### Limitation Provisions

One subject that has not received merited attention is the period of limitations after exposure or injury within which formal proof of claim for compensation must be filed. Our state laws vary widely with respect to this problem, but generally speaking they relate to:

(a) A period of employment within the state as a prerequisite to the filing of claim for compensation and/or

(b) The time within which claims for compensation must be filed after injury or the termination of employment.

The following states require exposure in employments within the state as a prerequisite to the right to file claims:

Illinois—sixty days exposure (all diseases)
Indiana—sixty days exposure (all diseases)
North Carolina—two years exposure (silicosis and asbestosis)
Ohio—five years exposure to silica dust; for other diseases, employee must be resident for ninety days
Pennsylvania—two years exposure (silicosis and asbestosis)
Washington—three years exposure (all diseases)
West Virginia—two years exposure (silicosis)
Wisconsin—ninety days (silicosis)

Another important provision is the requirement that the disease should have been due to the nature of the employment and contracted within a fixed period of time previous to the date of disablement. The following are examples of such provisions:

Michigan, Minnesota and Ohio—one year
Illinois, Indiana, Nebraska and Pennsylvania—two years
North Carolina—three years (silicosis and asbestosis)

All of the compensation acts specify procedure relating to



the filing of claims and fix the time after injury or last exposure within which claims must be filed, and in order to determine the rules of each state, it is necessary to examine the particular state statutes applicable thereto. These statutory provisions lack uniformity as to procedure, and unfortunately, in many instances, the period of limitations runs from the date of injury or manifestation of the disease rather than from the date of last exposure to the disease hazard. This is objectionable to the employer because he is unable to determine his liability in the case of diseases that do not manifest themselves or cause injury until many years after employment or exposure to disease hazard has been terminated. To determine liability, it is essential that the period of limitations run from the date of last exposure.

The refusal and reluctance of representatives of labor to recognize the necessity for physical examinations of employees has impeded the successful administration of these laws, but the question of limitation provisions could be readily solved by the physical examination of employees upon the termination of their exposure to disease hazards, whereby it could be promptly determined whether or not they have suffered disability.

### Pre-employment and Periodic Post-employment Examinations of Employees

The medical profession generally, including the Medical Committee of the Foundation, recognize and recommend pre-employment and periodic post-employment examinations of employees for the prevention and control of occupational disease. In spite of the misunderstanding that has arisen regarding their use, pre-employment examinations have served a valuable purpose in avoiding the employment of men in certain industries having hazards to which they may be peculiarly susceptible, as for example, preventing the employment of tuberculars in those industries having silica hazards.

Periodic post-employment examinations have already proved their merit. They make it possible for employees to be advised of conditions not due to their employment that need treatment for the preservation of their general health. Competent medical advice is given, resulting in the treatment and cure of conditions which, undiscovered or unattended, might later cause irreparable damage to an employee's health. From the social standpoint, the benefits of examinations properly conducted may render to the employees invaluable assistance and the workman and his family, as well

as the employer, will reap immediate and obvious benefits therefrom.

Time does not permit a discussion of the legislative provisions of the states dealing with this problem but the Legal Bulletin that will soon be available to members discusses these statutes in detail. Suffice it to say that pre-employment and periodic post-employment examinations of employees are of vital importance to ascertain the incipiency of diseases when employees are or may be exposed to hazards. When a disease is permitted to develop to the stage where it becomes manifest or disabling, it is generally too late to avoid its ultimate disabling effects, and the employee is then limited to the compensation benefits that the statute provides. By prevention, the health of the employee is safeguarded and the employer relieved from the liability for compensation. Therefore, a complete and comprehensive program for medical control, with routine examinations, is essential for the successful administration of these laws.

In the beginning of my remarks I referred to the problems that have arisen and will arise in connection with the administration of occupational disease laws and, for your consideration, I would like to make brief reference to some of the provisions of these laws that will inevitably lead to difficulties. We have been discussing specific provisions of occupational disease legislation common to all laws and I would like to call to your attention some instances of problems that will arise in the future in connection with the administration of these laws. Due to the limitation of time, I can make but brief reference to these problems, without detailed discussion thereof, but I hope that these references will emphasize their importance.

As you know, the New York Workmen's Compensation Act was originally amended to compensate a scheduled list of occupational diseases. In 1935 the Act was again amended to compensate "any and all occupational diseases." There is now pending before the Court of Appeals of the State of New York the claim of Shirley Goldberg against the Marcy Corporation and the Maryland Casualty Company for an occupational disease alleged to have been sustained by the claimant during the course of her employment. The duties of the claimant were to sell tickets for a motion picture theatre in a sidewalk booth which was heated by a small electric heater. Her claim sets forth that her legs were weakened by the heating and that she fell, breaking her ankle and sustaining injury. I quote the following averments from her claim:



> "My condition was caused by the electric heater in the cash box. It drew the blood out of my feet and caused blotches and veins to come out, making my feet weak."

The accident whereby she sustained a broken ankle did not occur during the course of her duties so that her claim was based solely on an alleged occupational disease of inflammation and weakness of the legs caused by her employment. The Referee before whom the matter was heard awarded compensation, which was affirmed by the Appellate Division and, unless reversed in the present appeal, the case will stand as a precedent of what may be expected in the course of the administration of the New York Occupational Disease Law.

I cite this case to bring home to you the hazard presented to industry by those state laws providing general coverage. There are claims now pending under general coverage laws for diseases such as tuberculosis, pneumonia, boils, scarlet fever, flat feet, and countless other diseases not peculiar to or characteristic of the trade or employment wherein a claimant is engaged. I do not mean to imply that compensation will be awarded for all of such cases, but I repeat the warning that general coverage laws may in the future be construed to provide general health insurance for employees. If our present society desires this to be accomplished, our legislatures should say so and not hide the purposes of the proposed legislation behind the name, "occupational disease compensation."

Another instance of immediate interest is the provision of the Pennsylvania Occupational Disease Act that becomes effective January 1, 1938. You are all familiar with the problem of so-called "accrued liability" common to all occupational disease legislation. The Pennsylvania law attempted to take care of this problem as it related to certain diseases by apportioning this liability between the employer and the Commonwealth over a period of ten years, by providing that if disability or death from the disease occurs within the first year after the Act becomes effective, the employer shall be liable for and pay one-tenth of the compensation for such disability or death, the remainder of such compensation being payable by the Commonwealth. For disability or death occurring each year thereafter, the employer assumes an additional one-tenth of this liability until the ten year period is past, after which time full liability is imposed upon the employer. The Act does not specify the diseases to which this provision applies, leaving this for the determination of the

Workmen's Compensation Board. The Board is empowered to determine those diseases that develop to the point of disability only after five or more years of exposure. At the effective date of the Act, therefore, neither the employer nor his insurance carrier will be apprised of the diseases to which this provision applies. It is apparent that such confusion must react detrimentally to all industrial interests and, in a sense, makes the risk imposed by the law uninsurable. Assuming that the disease of silicosis is one of the diseases that the Board will find to be within the terms of this section, we have a limitation of the employer's liability in the law in the amount of $3600. Does the section providing for the apportionment of liability between the employer and the Commonwealth limit the employee's right to compensation to $3600, or does it mean that during the first year the Act is effective, the employer pays one-tenth of the disability or death benefits, not to exceed $3600, and the Commonwealth pays the remaining benefits granted by the general law? Such a construction is possible and would result in claimants becoming disabled the first year after the Act becomes effective receiving substantially more compensation than claimants becoming disabled ten years after the Act becomes effective. If this is the proper construction of the Act, I hazard the guess that during the first few years it is effective, there may well be an avalanche of claims thereunder.

I regret that time does not permit the discussion of many of the other important legislative provisions that are treated in the Legal Bulletin upon which I have been asked to make report. In closing, I believe it proper to express the warning to the Foundation, its members and supporters, that during the next few years careful attention should be paid to the administration of the occupational disease laws now effective, so that unjust and inequitable construction may not be placed upon the provisions of these laws. I believe that the members of this Foundation are ready, willing and able to accept their responsibility for occupational disease injuries to their employees, but will seek to avoid unjust and inequitable claims that may hereafter be asserted against them. It is important that those industries having occupational disease hazards should carefully scrutinize all proposed rules and regulations adopted by administrative agencies and that false and improper claims should be contested to the utmost. The next few years may well determine the ultimate course of the administration of these laws and your continued attention to this matter is vitally necessary to the protection of your own interests.



## CORRELATION OF AMERICAN RESEARCHES IN INDUSTRIAL AIR HYGIENE

H. B. MELLER

The rapid expansion of interest and activities in the field of industrial health necessarily has resulted in a certain amount of overlapping of effort. One of the functions of Air Hygiene Foundation is to unify and correlate activities in this rapidly-developing field so that the sum total of our knowledge on the subject may be efficiently advanced.

In line with this objective, the Foundation recently set out to compile a rough directory of institutions and individuals engaged in researches on those occupational diseases in which Foundation members are interested. In other words, we attempted as a preliminary move to take a partial inventory of institutions and research specialists working in this field.

A test list of 200 such institutions and individuals was carefully prepared. We did not include research by individual companies or corporations for their own advantage, nor did we include the work of independent consultants nor the excellent and valuable studies being conducted in particular industries by some of our national trade organizations. Our survey was concerned only with the broad, fundamental problems affecting industry as a whole.

Of the institutions and specialists contacted in the survey, more than half sent answers to the questionnaire. It was most interesting to note that in every case the question, "Are you willing to cooperate by supplying reasonable information and other advice looking toward coordination of research in the field of air hygiene?" was answered in the affirmative.

An analysis of the replies revealed that there is an increasing number of specialists entering this field of research; that more hospitals, through their pathological and roentgenological departments, are broadening their activities; that more institutions of learning are inaugurating departments of industrial medicine or industrial hygiene; that many states and some cities are including regulation of industrial disease hazards in their program. And, of course, there is the continued broad, valuable work of the U. S. Public Health Service and of the U. S. Bureau of Mines.

These findings are convincing evidence of an increasing regard for the health of workmen, and cognizance of the advantages that will accrue to employers as well. A pertinent query now confronts us, namely: How can the greatest advantage be taken of the opportunity afforded by these

increasing facilities, so that they may be directed, through cooperation and coordination, toward securing in the shortest practicable time authoritative answers to perplexing questions that are serious in their importance and in their need for early solution.

Let us consider briefly some facts of relevance.

There are the Federal and State agencies with their prepared programs.

There are outstanding institutions whose sole, self-imposed responsibility is the conduct of research. These institutions either are endowed entirely or in part, partially supported through private grants, or are entirely dependent upon outside funds. That the interest, research and support of this group should be encouraged cannot be gainsaid.

The number of departments of industrial medicine and of industrial hygiene in educational institutions is increasing, and it is hoped will increase more rapidly. Such departments will undoubtedly be a tremendous asset to labor and industry in training physicians, engineers, chemists, and physicists for this field of research and control.

But in the programs of proposed research activities which have come to us from these sources, there is implied a large amount of unnecessary duplication, if all are able to proceed as they indicate they wish to do; which brings to mind a logical question: Should industry be asked to pay over and over again for the same research projects? Or should it, instead, use a central control to aid in direction of scientific effort and financial support in order to minimize wasteful duplication and spur research progress on a long list of problems crying for attention? Obviously, far more could be accomplished and for far less money if the expenditures were so directed.

We are not discussing the research being done by individual companies or corporations for their own advantage, the work of consultants whose laboratories are industrial plants, nor the excellent and valuable studies being conducted in particular industries by some of our national organizations. All such studies are desirable and valuable, but have no direct bearing on the program under discussion except insofar as the Foundation, in its turn, is able to cooperate with these organizations to steer clear of those researches whose results will be made available to industry through the efforts of others. This will be a move of progressive type toward reducing unnecessary duplication in research.

Nor is there included research in educational institutions where it is conducted for the purpose of benefitting industry in particular districts, in which case appeal for research support from local industries is natural and proper. But where problems affect industry broadly and/or where support is sought from a widely distributed group, it is our opinion, which we hope will be shared by others, that the best interests of all concerned will be served and the greatest return secured from the investment if the problem is considered part of a comprehensive program devised for the benefit of all; and if the place at which the work is to be done is chosen with that broad outcome in mind. This action in itself will prevent considerable duplication that otherwise would likely occur.



We refer in the discussion here only to the broad program of investigation for application in which industry as a whole is interested. The results of the survey carried out by us so far give definite indication that the men directly engaged in this field are willing to aid in coordination of the work. They realize that duplicate effort is costly, not only in money, but—what is of greater moment—in time. The scientist, we are convinced, can therefore be depended upon to do his part; but there must be evolved a plan, which can be preliminary in its nature, as the basis for consideration of such timely and essential questions as who should do what, who should refrain from which activities, and why. Scientists engaged in this field can work out a practicable arrangement of inestimable value in hastening the clearing-up of many uncertainties which have had their effect upon current legislation. These scientists must however be stimulated to bring about this result through a central agency.

The coordinated program should be made up of basic problems, the solution of which is needed by all industry, or at least by groups of industries. As rapidly as answers are found they can be used to practical benefit, not only in plants but also in clearing up uncertainties that have affected legislation. It is one thing to comply with regulations under an existing law; it is quite another to attempt to clarify and add to existing facts so as to clear up controversial points considered in formulating that law.

Industry knows more or less clearly what needs to be accomplished. Industry is aware that, in addition to researches on problems of special or immediate interest, a long-range program is necessary to supply incontrovertible facts that then may be woven into sound laws, fair to employers and employees alike.

The path to this goal will be made very much shorter if executives in industry will work closely with scientists who would welcome a comprehensive program, equitably distributed, carefully coordinated, and adequately financed.

On the one hand, interested scientists would be spared in large part service as salesmen to secure necessary financial support for their investigations. (Bear in mind what has been said about local service, or services or studies carried on by or for specific industries or groups.) These specialists would be able to devote all their attention to constructive effort.

Industry, on the other hand, through its executives, would be able to keep in close touch with the program as a whole as well as with parts that might be of special or immediate interest, and this connection would accelerate the progress by thus getting a maximum return for the money spent in research. Industry should definitely pool its interests, helping in the formulation of the program, and supplying the necessary sinews of war. Science will cooperate to the full in solving the problems of industry, if industry is a part of the army in the field and is prepared for a vigorous attack.



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