THE DOW CHEMICAL COMPANY

[This extract is taken from the widely circulated translation of the book.] When the attention of the management was called to the display it was at once ordered removed. It was being shown in the booth of another exhibitor without the permission of the management.

FUTURE POLICY

This incident led to the formation of a definite future policy at the annual dinner given by the managers to the Advisory Committee on the last night of Exposition week. No exhibits of other than American origin will be permitted in the future except upon special authorization of the management and of the Advisory Committee. The Exposition will be held true to its original ideals, a setting forth to America of what her chemists are doing for American chemical independence.

It is a matter of regret to all that the Grand Central Palace is soon to be converted into an office building. It is fortunate, however, that there is available a great building, the Eighth Coast Artillery Armory, Jerome Avenue and Kingsbridge Road, easily accessible by the subway and elevated lines, and having much more space on one floor than was occupied by the entire Exposition just held. In this new location the "first floorers" will no longer hold the advantage over those who have had to be content with the higher tiers. Without this new building the Exposition would have had to be abandoned or a great many exhibitors excluded, for it was found that Madison Square Garden with all of its balconies the restaurant, etc., equaled in surface area only the first two floors of the Grand Central Palace, while the two next largest armories in the city contained less square feet for exhibition purposes than the main floor of the Palace.

"On with the Show!" Its stimulating effect upon the American chemical industry increases yearly, while its value as a public educator is inestimable.

OPENING ADDRESS

By Chas. H. Herty

CHAIRMAN OF THE ADVISORY COMMITTEE

The alchemist sought in secrecy his Philosopher's Stone with which to convert base metals into gold—the iatro (drug) chemist who followed the alchemist purposely shrouded his work in mystery, thinking that thereby he could practice best his fancied wizardry. The chemist of to-day, however, casts aside these false standards, takes the public frankly into his confidence and applies in his daily work common sense of the most thoroughgoing quality to every problem in which his talents can benefit humanity. The outward expression of this modern policy, in which America leads the world, is this annual display of the raw materials, the machinery, and the products of our chemical industries. That the story has its popular appeal is attested not only by the thousands who thoughtfully inspect these exhibits, but by the constantly increasing space given by our press to matters chemical.

It is a matter of special interest at the present time to note the amount of space devoted to preliminary accounts of this Exposition by the press of our neighbors in Central and South America. This is clearly indicative of a conviction on the part of the people of these countries that instead of looking to Germany as in the past, they must now look to America for the prod-

ucts of the chemical industries. This great field for export trade can be made permanently ours if we show constant good faith, high quality of products, attention to local desires, and care in shipments. These are better assets than the most elaborate programs of propaganda and subserviency to unrighteous political purposes which once permeated these markets.

PARTICIPATION OF RAILROADS

The most striking feature of the present Exposition is the reappearance of the exhibits by railroads of the natural resources along their lines. These displays locate for the chemist hitherto unknown sources of raw materials or set forth undeveloped resources which singly or in combination under the guiding sense of the chemists can be utilized to increase the national wealth. We are recovering from the blow dealt our industrial development by the absurd policy of the recent Railroad Administration which decreed a cessation of such exhibits. Fortunately, private ownership of railroads takes a more intelligent and progressive view of this important matter. Congratulations to those progressive railroads which have reinaugurated these exhibits! Their example will no doubt be followed by many others at the next Exposition.

AUTHORIZED CAPITAL AND EXPORTS

The possibilities for development of the chemical, drug, and dye industries are indicated by the authorized capital of the new companies organized during the past six years. These amounts, according to the *Journal of Commerce*, September 4, 1920, were as follows:

1915	$ 65,565,000
1916	99,244,000
1917	146,160,000
1918	73,403,000
1919	112,173,000
1920 (8 mo.)	167,992,000

In addition to supplying domestic needs, government statistics show that during the past fiscal year our exports of chemicals have been distributed in all of the principal countries of the world. The total value of these exports was $1,250,000,000. It is of particular interest that the products of our young dye industry were shipped in quantities whose valuation totaled $24,000,000.

NEED OF LEGISLATION

We must not be misled, however, by the foregoing figures. Those referring to capitalization represent *authorized* capital, not actual capital invested; they represent the confidence of American citizens in the great future of the American chemical industry. The magnitude of our dye exports is not indicative of a complete, self-sustained and well-rounded dye industry, but rather it is the concrete expression of the innate ability of the American to do on a large scale that which he has learned to do. Many gaps are yet to be filled before that industry is complete. We must candidly face the fact that during the past six months there has been a decided slowing up in our chemical development. The execution of many completed plans for expansion has been postponed because actual capital has been timid. Why? Because Congress adjourned in June last without enacting into law any one of those several measures whose purpose was the protection and safeguarding of those industries which had sprung into being to fill the nation's obvious needs as affected by the exigencies of war.

A damaging blow has been dealt by our legislative representatives through their inaction. It is not difficult to imagine the satisfaction which this situation gives to those who formerly boasted of their domination of us in matters chemical and who now openly avow their determination to recover their lost markets. To all who have read the revelations of the base use to which that former domination was put through corruption of our industrial life and through the establishment of a complete system of espionage which for a long time in a critical period misled public opinion and crippled our effectiveness by sabotage made easy, this prospect of a recovery of markets can be looked upon only as an impending national curse. The warding off of this peril, however, is not difficult. The case has been fully presented to the Congress, a great majority opinion, absolutely non-partisan in its character, has been developed, the House of Representatives has already acted favorably, but the Senate has failed to act. Public opinion should make itself felt—for the vital interests of the public are at stake—and insist that at the approaching winter session of the Congress this legislation be completed. If this be done, I prophesy a new era in our chemical development, which will make the successes of the past five years pale into insignificance and guarantee forever the economic independence of this country in all lines of chemical industry.

These thoughts apply particularly to our dye industry. Here much has been accomplished, progress has been phenomenal, yet much remains to be done. We cannot afford to delay the completion of this industry, for it is too intimately bound up with a vast number of our other industries and stands too closely knit with that latest development of warfare upon which our country's future safety may depend. It is a short-sighted and ill-informed American who is impatient and complains because our dye industry is not yet completely rounded out.

THE FOOD OF THE NATION

Of the three essential constituents of plant food, phosphorus, nitrogen, and potassium, nature has abundantly blessed us with phosphorus in the form of the great phosphate deposits of our southeastern and northwestern states, but our efforts to provide domestic sources of nitrogen and potassium have proved ineffectual.

Whatever mistakes may have been made in our past efforts on fixation of atmospheric nitrogen, that industry must be established. The use of nitrogenous compounds in peace as a fertilizer and in war as an explosive points clearly to the fact that we cannot afford to continue dependent for such supplies on ship transport from outside our borders. The submarine has demonstrated its ability to destroy selected ship-commerce, and submarines can ply in the Pacific as well as in the Atlantic Ocean.

In potash matters we have played a losing game. In the false hope of a return to the cheap foreign potash of pre-war days, we have withheld that encouragement and stimulation of our domestic potash industry which would have assured the full development of our own resources, and now we are paying tribute to the extent of millions on millions of dollars. Where thousands of dollars have been spent on research on potash and its development, millions could have been spent whose total amount would not be a tithe of the millions we seem destined to pay as tribute unless our policies be quickly changed.

INDUSTRIAL RESEARCH

In other lines, however, the progress of industrial research has been phenomenal. Conservative estimates place the amount to be expended this year on industrial research laboratories, personnel, housing, and equipment, at $25,000,000. Evidently our industries as a whole are passing out of the empirical stage and are realizing that the greatest progress is to be made through scientific development and accurate control. On the journey of the AMERICAN CHEMICAL SOCIETY to San Francisco in 1910 I was shown a new alloy which at that time had found no industrial application. To-day, however, that alloy and similar ones have increased the output of our machine shops threefold, because with the same number of men and the same amount of equipment, machines can be run three times as fast. It is not

difficult to understand how great a role this one development played in the rapid equipment of our armies during the war.

And this bit of history suggests the possibility of overcoming the present inefficiency of labor through research on improved methods of operation of all lines of industry. Increased production through greater utilization of chemistry is a phrase which America should take deep to heart.

ALCOHOL EXCISE TAX

In this survey of present-day conditions, may I direct your attention to one anomalous situation? Alcohol is one of the most important reagents used by chemists. Congress recognized this fact in the enactment of the National Prohibition Act, which, while providing for the abolition of alcohol as a beverage, nevertheless made distinct provision for stimulating the production and facilitating the distribution of tax-free alcohol as a chemical reagent. And yet a recently enacted law in the state of New York, the very heart of chemistry in America, imposes an excise tax of thirty cents per gallon on that alcohol which the Congress provided should be, from the federal standpoint, tax-free. No other chemical reagent bears a similar tax. That law constitutes a hardship upon our industries and our universities, and it is sincerely to be hoped that the State Assembly will promptly repeal such a crippling and unjustifiable measure.

COÖPERATION WITH THE CHEMICAL WARFARE SERVICE

Now let me make an announcement of greatest import to our country. The Congress, during its last session, in framing the Army Reorganization bill, constituted by an overwhelming vote the Chemical Warfare Service a separate and independent unit of the Army, in the conviction that it could thus be developed most effectively. At its head the President has placed that brilliant soldier, Brigadier General Amos A. Fries, who led the field forces of that Service with the American Expeditionary Forces. Upon invitation of General Fries, the AMERICAN CHEMICAL SOCIETY has pledged the active aid of its 15,000 civilian members in the successful development and prosecution of the work of the Chemical Warfare Service. The connecting link between that army of 15,000 silent workers in the laboratories of America and the official service in the War Department will be a committee consisting of:

W. D. BANCROFT, Dept. of Chemistry, Cornell University, Ithaca, N. Y.

E. P. KOHLER, Dept. of Organic Chemistry, Harvard University, Cambridge, Mass.

A. B. LAMB, Dept. of Chemistry, Harvard University, Cambridge, Mass.

R. C. TOLMAN, Fixed Nitrogen Research Laboratory, Washington, D. C.

F. M. DORSEY, Nela Research Laboratory, Cleveland, Ohio

W. K. LEWIS, Dept. of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, Mass.

L. T. SUTHERLAND, Sutherland Industrial Research Co., New York City

BRADLEY DEWEY, Dewey & Almy Chemical Co., Cambridge, Mass.

L. C. JONES, National Aniline & Chemical Co., Inc., New York City

C. L. REESE, E. I. du Pont de Nemours & Co., Wilmington, Del.

W. H. WALKER, Division of Industrial Coöperation and Research, Massachusetts Institute of Technology, Cambridge, Mass.

REID HUNT, Dept. of Pharmacology, Harvard Medical School, Boston, Mass.

A. S. LOEVENHART, Dept. of Pharmacology, University of Wisconsin, Madison, Wis.

JULIUS STIEGLITZ, Dept. of Chemistry, University of Chicago, Chicago, Ill.

CHAS. H. HERTY, Journal of Industrial and Engineering Chemistry, New York City.

In this list are men whose brilliant work accomplished such wonders in the manufacture of gas masks for defense and gases for offense. The laboratories of our universities and of our industries are both represented. So, too, are the representatives of our dye plants included. I count it the highest honor of my life that I am to be permitted to serve my country through the chairmanship of this committee. I feel no hesitation in pledging to General Fries not only the united coöperation of the chemistry personnel of the country but also that of our industrial chemical plants.

Chemical warfare has come to stay. The effectiveness of gas in warfare has been proved by the fact that one-third of the total hospital cases in our Army were due to gas; its inhumanity has not proved itself in the light of history, for of this third our medical records show that the very great majority completely recovered, a far greater proportion than of those who were wounded by shot and shell. The fear of tuberculosis development among our gassed wounded has been proved baseless.

This happy outcome as to recovery removes in no wise the stigma which will always attach to Germany as the introducer of gas warfare. The heinousness of her offense against civilization lay in the breach of good faith in international agreement that gases would not be used in warfare. By this treacherous initiative she was enabled to destroy thousands of men of those nations who in good faith had provided no means of defense against such a means of warfare. America proposes to see to it that should her armies ever be called upon to take the field again, which God grant may never come to pass, those armies will be furnished immediately with the best means of defense which American ingenuity can in the meanwhile devise, and with an abundance of gases which will be immediately forthcoming, limited only by the resources of our land. These steps will constitute no tax upon our people in time of peace, but preparedness along this line of warfare will be thorough.

The *New York Times* of to-day discusses the subject of chemical warfare in an editorial entitled "A Chemists' War." In this editorial there are two noteworthy errors; one as to fact, the other as to national policy as I see it.

As to the question of fact, the *Times* states: "It was difficult to interest Congress in the establishment of a permanent Chemical Warfare Service Bureau, to be attached to the War Department." The fact is, as the public records show, there was no difficulty in convincing Congress on this point. The difficulty lay, however, in the objections by the Secretary of War and the Chief of Staff in statements made before the Senate Committee on Military Affairs. The action of Congress in establishing the Chemical Warfare Service as a separate unit of the Army was taken in spite of these objections.

As to the question of policy, the *Times* at the conclusion of its editorial says:

> It cannot be impressed upon civilized peoples too much that a chemists' war would be incalculably more disastrous to the nations engaged in it than the struggle of 1914–18. The American people must ask themselves whether they can afford to disregard the conviction of the thirty-nine countries now forming the League of Nations that it offers the best safeguards against the horrors and waste of modern war.

This recalls an interesting colloquy which took place between General March and Senators Chamberlain and Sutherland in the Hearings on S 2715, pages 95 and 96.

GENERAL MARCH—Here they are, sir. That is my best thought on that subject. If the provision in the so-called league of nations, which prohibits the use of poison gas is carried out, all of that will disappear.

SENATOR CHAMBERLAIN—If the provisions of the league of nations were carried out, we would not need any Army.

GENERAL MARCH—I do not see that.

SENATOR CHAMBERLAIN—We are going to have peace; the millenium is going to be here. I have not any idea it will all be carried out.

SENATOR SUTHERLAND—We have already had some agreements about humane warfare, but none of them were carried out.

GENERAL MARCH—That is true, but this provision specifically says that, the use of poison gas having been prohibited, Germany is forbidden to import into her territory any of the elements

which make for poison gas or liquid gas, which is forbidden, the thought being that Germany was the only nation in the world that would start any such thing.

SENATOR CHAMBERLAIN—Well, I think there are others, if they had had the chance.

The provision in the Peace Treaty by which, according to General March, "Germany is forbidden to import into her territory any of the elements which make for poison gas or liquid gas" doubtless gives to the Germans the same sense of despair that America would feel if, at the conclusion of an unsuccessful war, it were forbidden "to import" cotton for use in the manufacture of guncotton or iron ores for making steel for guns.

COÖPERATION IN CITY DISASTERS

Coöperation should, however, not be confined to national affairs. Within the last few days a terrible disaster has occurred in New York City. As a result of the work of perverted minds, many citizens were instantly killed and many more horribly mangled. The evidence which would determine the cause of such a disaster and trace its perpetrators is largely chemical. The time to utilize the chemist in such a situation is immediately after the disaster takes place. In the New York Section of the AMERICAN CHEMICAL SOCIETY more than two thousand chemists are numbered, among them men who are specialists in explosives, in metallurgy, and in cement. No one of these men, no matter how prominent or how immersed in his own laboratory, could as a patriotic citizen decline an invitation to serve on a committee advisory to the city authorities in such cases of great disaster. Provided with official passes through the police lines they could be of invaluable service through their special knowledge and acumen. For such public service they would desire no pay. There is a civic asset here which is lying neglected and which can be quickened into dynamic aid by a simple request from the municipal authorities.

COÖPERATION IN THE ALLEVIATION OF HUMAN SUFFERING

Fortunately the future energies of our chemists are not to be confined to increasing the wealth of the country and providing means for its defense. There is a higher goal ahead for American chemistry, it is the alleviation of human suffering. The normal, healthy, vigorous human being is a mass of chemical reactions which can be called normal. When these become abnormal we speak of disease, and disease entails suffering. About many of these subtle changes we know little. In our blind efforts to restore normality we try this and that drug, sometimes with success, many times with utter failure. Eminent authorities inform me that of the many synthetic medicinals sold by Germany to this country only from three to five per cent have proved of real value. We know in general terms the results from the use of drugs, but of the fundamental reactions induced by their use we know but little. These changes in the body effected by drugs are chemical changes, but in their study in the past the chemist has played but a minor part, and we have been content to continue the "cut and try" process in our efforts to heal. It is now proposed to give the chemist the leadership in this his own line of research. But he is not qualified to work out the problem alone, for the conditions are very complex. He must be associated with the pharmacologist and the experimental biologist. With the focusing of these three types of mind upon the problems of health, under conditions of constant association and adequate experimental facilities, real progress can be made, even though slowly, in the alleviation of suffering. It is a task worthy of the best efforts of our very ablest men. Funds will be required for its prosecution. Fortunately the Chemical Foundation, Inc., which under its charter must spend all above six per cent of its earnings on scientific research, sees in this direction the channel through which it can best perform its mission. It has therefore pledged a sufficient amount for immediate use to insure the inauguration of this work. It is confidently believed that as the work takes definite shape and progresses it will make its own appeal to those generous Americans who have never yet failed to respond to the cause of humanity when convinced that the right way to aid has been shown them.

PROGRESS OF THE AMERICAN COAL-TAR CHEMICAL INDUSTRY DURING 1919

By Grinnell Jones

CHIEF CHEMIST OF THE U. S. TARIFF COMMISSION

A year ago, the annual census of dyes and other coal-tar chemicals, prepared by the Tariff Commission, was published on June 11. This year it has been unavoidably delayed owing to the fact that a general census of manufactures of all kinds is being taken by the Bureau of the Census. In order to avoid having two different branches of the Government each send its questionnaire to every manufacturer, it was arranged that the collection of the reports should be undertaken by the Census Bureau, whereas the tabulation and interpretation of the reports on dyes and coal-tar chemicals would be done by the Tariff Commission. The Census Bureau has secured reports from a number of small manufacturers who were unknown to us. However, the collection of the reports has been much delayed by the coöperative arrangement, and the reports of over a dozen firms have not yet been turned over to the Tariff Commission. However, the missing reports are all believed to be of small firms. I am confident that our records are sufficiently complete to show clearly the progress made during the year, but any figures given are subject to revision upward.

The Geological Survey has recently reported that the production of by-product coke and the by-products obtained therefrom during the year 1919 shows a slight decrease, as compared with 1918. This was due to labor troubles in the steel and coal-mining industries and to railroad congestion. There appears to have been a small decrease in the amount of tar distilled and a large decrease in the output of pure benzene, and especially of pure toluene. This means that a much larger proportion of the output was sold as mixtures for solvent purposes or as motor spirit, instead of in the purified condition. Of more significance in considering the future of the coal-tar chemical industry is the fact that the productive capacity of the by-product coke ovens in the United States increased 17.2 per cent during 1919. There is no question that, with the possible exception of anthracene, adequate supplies of the fundamental raw materials of coal-tar origin will be available from American sources for the growth of the industry.

THE PROBLEM OF ANTHRACENE SUPPLY

In the case of anthracene considerable progress has been made during the past year, but the problem of securing adequate supplies is still unsolved. In 1918, the anthracene content of the crude anthracene produced was about a quarter million pounds, but very little of this was refined. In 1919 the output of crude anthracene was about three times the 1918 record, and a much larger fraction of it was refined. Although this shows great and encouraging progress, a much greater increase in output must be secured before there will be enough American anthracene available to supply the American demand for alizarin and vat dyes. It may be roughly estimated that the 1919 production of crude anthracene contained less than one-fifth of the amount of anthracene which would be required to supply the American needs. The difficulty is not primarily an actual lack of anthracene in the tar or purely technical difficulties in its recovery, but rather