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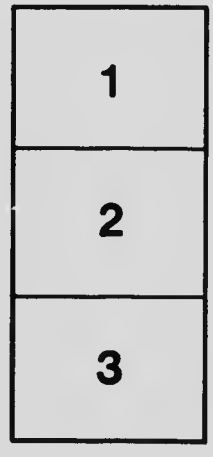

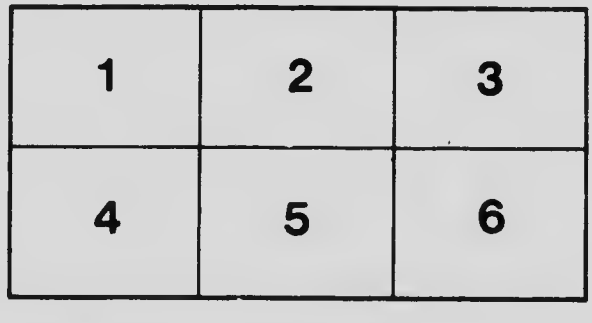

Professor Fields

FROM THE TRANSACTIONS OF THE ROYAL SOCIETY OF CANADA
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With the Compliments
of the Author

PRESIDENTIAL ADDRESS

The Old Knowledge and the New

by

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1917

THE OLD KNOWLEDGE AND THE NEW

This year marks the half century, the Jubilee, of the union of the original Canadian Provinces into what is known as the Dominion of Canada, and which now comprehends one half of America north of the Gulf of Mexico. As a Jubilee year it would, under ordinary circumstances, be fitly celebrated, as the passing of an era in our national history, with a ceremony that in times of peace we would observe at the passing of any lustrum of national life. We will, indeed, celebrate it, but with a ceremony which will not engross all our thoughts, for the advent of our Jubilee year has found us as a nation engaged as one of a group of democracies in a gigantic struggle against another nation with its allies, wholly dominated by palæolithic conceptions of humanity and warfare, a struggle which, unparalleled in history, has already cost enough in blood and tears to make mankind hereafter look back upon it as a time of tragedy and sorrow. The importance of our Jubilee year will, accordingly, be dwarfed beside that in which everything we hold as making life worth while appears at stake.

And yet this Jubilee of our national life, submerged as it is in the thoughts of the titanic struggle, must not pass without some tribute to it for what it signifies to us as a stage in our national life. From the union we have derived all the strength which we exert in the great war of to-day. From it we have received and developed by degrees in the decades as they passed a consciousness of unity of purpose and a high aim which has molded and will mold our will as a people to serve for the furtherance of human happiness and liberty. Because of it to-day we have a steadiness of resolution, an insight as to duty, and a desire to do our part in the maintenance of the forces making for the progress of the world, which have won for our country an unstinted admiration from the best elements in the great democracy which has just entered as a combatant on our side in the great war. It is, indeed, no mean achievement to have gained the prestige of a virile people, endeavouring to maintain at an incalculable cost the priceless heritage of freedom which we have received from our fathers.

Had it not been for this union, we would have been ineffective in this war for liberty. We would have been condemned to be, if not interested spectators, at best only casual and uncoördinated assistants in the struggle, and we would have had in our consciousness the element of helplessness, the feeling that we were playing a very

minor role, while recognizing that we could have done a more worthy part. Our Provinces could not have for the moment engaged all their energies as the Dominion, which they form, has done, and we could not, further, have brought to the motherland the moral force which, with that of the other daughter states, has been of enormous value to her in steadying her in the high courage she has shown in this time of peril to liberty and all else that is dear to humanity.

The event of fifty years ago has had another far-reaching effect, It may be said, I believe, without contradiction, that the example set by the Canadian Provinces has in no small degree promoted the foundation, in other parts of the Empire, of the Commonwealth, the Dominion and the Union that to-day make Australia, New Zealand and South Africa, with Canada, as it were, buttresses of the Empire against whatever may happen, whether it be the tottering or the decay that comes to all things in old age, or the war storms of the world.

They, who laboured in bringing about that Confederation, therefore, performed a priceless service. They did not wholly forecast the future and estimate the effect of their action. The result they strove to reach was not one of choice but determined by necessity. They effected it in order to solve difficulties which were intolerable and which threatened to promote such disunion as would ultimately imperil the continuation of the British status in North America. They were not wholly optimistic as to the final effect of their efforts. It is easy now, in examining all the details of the agitation they led to achieve the result they had in view, to detect in their hopefulness a minor note, an overtone derived from their despair regarding the conditions from which they wished Canada to escape, a note of uncertainty as to the full success of the organization they brought about. What they sought to avoid or abolish seemed to them fraught with more danger than would beset the future under any new conditions, and, in consequence, they, with a courage that time has abundantly justified, loyally endeavoured to make the Dominion which they brought into being a success in unifying our scattered peoples and making them a nation with ideals in harmony with the traditions and standards of the British race the world over. That they could not and did not peer far into the future was what might have been expected. Men, and especially those who concern themselves with affairs of national polity, rarely attempt to divine the future, at least, that part of it immediately beyond their generation, and, if they do, they more rarely order their action for that distant time. It is, on the whole, wise that this should be so. "New occasions

teach new duties" and the world would not progress at all if our statesmen were in all cases to cast the future in the inflexible molds of the day.

The Statesmen of Confederation, as we now see, builded better than they knew. Unwittingly in high cabal with Destiny, they founded a nation which is playing in this great crisis a worthy, ennobling part, and which may yet, as we hope, play a greater and supreme part in the world drama of the future as a member of the league of nations, which when this great sacrifice of blood is made, will impose a world peace. To them, for the great service to our country they performed, we pay our tribute of appreciation, appreciation which will be enhanced as the years pass, for the nation in the making of which they performed such a fundamental service will ever hold them in grateful remembrance. O, would that now the import of our tributes in this Jubilee year were borne to them across the Gulf of Silence!

With the commencement of her second half century of existence Canada begins a new age which the war has inaugurated. This new age is not for Canada alone, for the war has made for the human race an almost complete break with the past. The world will never be the same as it was in the old care-free days when it was dreamt that savagery was washed out of the human mind and that we would never again see a resort to the brutality of prehistoric warfare or to the type of it represented in the Thirty Years' War, which is exemplified in the conduct of the German military power in this war. The past with all its hopes and defeats of civilization is secure, but what of the future?

Mankind to-day, as a result of this war, has parted with some fondly cherished illusions. Four years ago he who would have predicted the occurrence of such a catastrophe would have been deemed mad. No one did, indeed, foresee its character and extent. Now, the appalling toll in human life that it has exacted, the degradation of human character to that of the brute beast that the enemy in emergencies exhibits, and the fact that mankind is undergoing a gigantic struggle to save all that is worth while in civilization, have reacted on the minds of all who look before and after, and the result is, if not blank pessimism, at least, a greatly diminished optimism regarding the present and the future of the human race. It is not too much to say that for the next one hundred years less reliance will be placed on the forces that make for sanity in determining right action amongst the masses of mankind than was done in the past, and, accordingly, less will be taken for granted in forecasting the action of races in

conflicts of interests in the future. For many generation to come there will obtrude in the minds of all who will look back on this great war the memory of a nation which, nursed and participating in a civilization at least a thousand years old and boasting of a culture higher than that of its environment, developed after a few weeks of the stress of war a condition of mind and ethical standards that must have characterized the human race in the long night that preceded the dawn of our civilization. This will chasten all high hopes and beliefs as to the permanence of the forces that make for human progress which we so fondly held in the past.

This change in the "climate of the mind" is not to be the only result of the war. At its close Europe will be impoverished, and, with the United States, will have an enormous debt. Already this debt exceeds one hundred billions of dollars, and there are those who estimate it at one hundred and fifty billions. How much more it may be cannot be foretold because the time during which the war is to continue is uncertain. The burden is already a collossal one, far in excess of the wealth of any single nation engaged in the struggle before the United States began to participate, and it will tax the energies of all involved for the next two hundred years. Their financial resources, as one now estimates them, will be but sufficient to meet the annual interest on it, which already in the case of Germany, equals its total annual expenditure before the war.

There is also the waste and ruin which will continue as the war goes on. How much wealth, apart from that expended in munitions, has been destroyed cannot be determined, but that it is enormous seems to be indicated by the credited reports that come from Belgium, Northeastern France, Poland, Roumania and Serbia, and the loss of mercantile shipping through submarine activity threatens to involve many years in its replacement. All this loss, however, is as nothing compared to the waste of life amongst the choicest of the race. The toll exacted may be estimated only approximately, but it cannot, however, be now less than five million men killed or dead of wounds. The total in the permanently maimed is probably larger, while the incidence of disease, which a great war always enhances, is extraordinary, and it will have results extending beyond this and the next generation all over Europe.

It is, indeed, a very sombre picture of the world situation as it is now and as it will be in the future. I have not, however, applied the darker pigments too freely, for in the original there are many fewer high lights and the shadows abound. I purposely refrain from using the dark colours as they might justifiably be employed, more than is required to show that with the new "climate

of the mind" there are to be conditions of life on the globe which the old world never experienced and which will put in the crucible of sorrow, suffering and toil all the old conceptions, except those of right and wrong, by which the world guided itself in the past.

It will, indeed, be a new world and a new age in which all the shibboleths will be discarded and mankind will see things as they are. Free trade and protection, the laissez-faire doctrine, individualism, socialism, collectivism, all the old creeds and counter-creeds will be only memories of the past because the conditions to be will refuse to be solved by doctrinaires and idealists. The colossal debt which each of the nations must carry, not to speak of what will be required for the restoration of the old order in the districts devastated by the Germans, will compel the adoption of new policies and of new methods to enable them to carry their staggering loads. Great Britain's debt of £5,000,000,000 must be paid, principal and interest, and this, will involve a resort to resources and methods which have never hitherto been tested and not even contemplated to that end.

Germany, it is hinted in official sources in Berlin, is already planning to nationalize all her industries and it is proposed that the German state only shall for the nation export and import, in other words, buy and sell abroad for its own people. In this way she might hope eventually to pay her debt. The nation would thus become a gigantic bartering organization, seeking to increase its resources at the expense of its neighbours who would thus be compelled to recast all their methods for dealing with foreign competition. Whether this ultra-revolutionary proposal will be adopted remains to be seen.

Already extraordinary measures are being taken in Germany to replace the life wasted in the war. A German statistician has stated that during the last three years there have been three million illegitimate births in that country, and the authorities have made such provision for these and those which will be added to the number as will inevitably encourage a continuation of this factor after the war on a large scale. This will not be without its effect on the rest of the world. There can be no violation of a widely recognized moral convention in one nation, without disturbance in the equilibrium elsewhere, especially since the female part of the population in England, France, and Italy, which was in excess of the male before 1914, will, because of the slaughter on the battlefields and in the trenches, exceed by as many millions more the males in those nations. Here will be a factor which will exert an enormous influence on the social order.

What the other nations will do to enable them to carry their burdens and to meet the new conditions which will obtain after the

war cannot be predicted, but it is certain that the keen rivalry in production and trade which will begin as soon as peace is declared will demand measures of an exceedingly exceptional kind. It will compel the speeding up of the production from all the industries and a competition in the world's markets that will involve unremitting toil on the part of the masses unless these industries are organized in a way they have never been hitherto.

The keenest rivalry will come from the German industries, supported as they will be by all the forces of the German state. They will, of course, depend for their success on cheap labour, and labour has been and will be cheaper in Germany than in any of the allied nations except Italy and Russia. She has won her pre-eminence in a great many of the industries by the application of advanced science to them. It is not too much to expect that she will apply science as it has never been applied before and by that application and her cheap labour she will endeavour to capture the world's markets, and thus make the other nations pay her enormous debt as well as their own. There are some who maintain that, while striving to this end, she will prepare for another struggle in the near future. This, however, postulates that the human race, or even a part of it, will not learn wisdom from ineffable suffering and sorrow.

The rest of the world must, to bear its burden even with some measure of relief as time passes, also apply science to its industries as it never did formerly. Labour can never be as cheap in our Empire, France and the United States as it is or will be in Germany, and let us hope that no solution of the problem of international competition sought will require a reduction in the reward for daily toil, that will deny the hope of millions to lead a life in which sordid care shall not wholly destroy the soul. What relief and advantage in this competition may be had must come from a resort to a policy which, outside Germany, has never yet been tried, and to follow it to the utmost will involve on the part of the Empire and its allies a revolution in national life.

We have, of course, natural resources in our world-wide Empire that Germany cannot command and these will constitute an advantage in our favour. They are not inexhaustible, for the only inexhaustible resource of the globe is the sunlight which is the source, ultimately, not only of all our motive power, but also of the energy in all its forms which the world of life manifests. It is not only inexhaustible, but illimitable, for the sun will radiate its energy as unstintedly as now for many millions of years, and mankind may, when other resources of power are exhausted, have to depend wholly on it for all the energy it requires.

All other resources of our continent, and, for that matter of the globe, may be exhausted before civilization is much older, and, in some cases, before two or three generations have passed. The annual production of anthracite coal in the United States, it has been claimed, has already passed its maximum and the output will from now on continue to decline to a vanishing point in the not far distant future. It is also claimed that the coal supply of Great Britain will be exhausted in three hundred and fifty years. No estimate can be given of the duration of the supply in our maritime provinces, but it is maintained by some that coals and lignites in Western Canada are sufficient in quantities to supply its needs for many centuries to come. If that is so, and there is abundance evidence to support the claim, the fuel supply of the West is one of the richest of our resources.

They are, however, not inexhaustible, and, let me repeat, none of the natural resources of the globe, except the energy of the sunlight, are, humanly speaking, inexhaustible. Mankind has, therefore, been for the last century spendthrift, prodigal, living wastefully on its capital, instead of carefully conserving it to the utmost. It has acted as if it had the purse of Fortunatus, giving no thought to the future and swayed only by the needs and the illusions of the hour. It has not yet begun to recognize that its resources are not inexhaustible, but it experienced a shock when it faced the diminished food supply of the last three years, and it is, in consequence, more inclined to-day to give serious attention to problems which it would not consider when under the influence of some of its cherished illusions. It has not wholly emerged from these, but they distort its outlook less and it is anxious, and rightly so, as to how in the new order of things the merciless trade competition between the Teutonic nations and the other nations, that is to come, is to be met. This is, indeed, all material and, therefore, from the purely intellectual point of view, gross, but such materialism determines the course of history as it did when Rome overthrew Carthage, Corinth and Rhodes, as certain historians maintain, not from a lust of power, but from a desire to destroy her keenest competitors in the then trade of the world.

The enormous sacrifices that this war has entailed and will entail until it closes can never be equated by way of compensation with any product or result of it. Whatever else befalls, liberty and the right to happiness will be maintained, but these are fundamental, for life without them is unthinkable, and we do not rank them as compensations. Amongst the very few results, however, which may have ultimately a markedly beneficial effect is the altered point of

view regarding the utilization of science, the new knowledge, as a force in determining solutions of the gigantic problems that will face the allied nations after the war. With the help of this new knowledge, applied rigorously and universally, it is possible that the nations may not only bear their burdens with some degree of ease, but attain a position which will make the occurrence of another war of this character absolutely impossible in the near or more remote future. If that should be the ultimate result, the blood and tears of millions in this war will not be shed wholly in vain.

It is my firm conviction that, had the allied nations cultivated the sciences as they must do henceforth, there would have been no such war as this. It is beyond question that Germany and Austria are, relatively, poor in natural resources. The one great resource which Germany possesses is to be found in the Strassfurt salt beds, which contain an enormous quantity of potassium salts, a supply without a parallel elsewhere. In all other resources she cannot compare with the British Empire or with France or the United States. Had she not developed her industries, through the rigorous application of science to them, and, had she contented herself with the methods and policy which Great Britain had followed in the last forty years, it is extremely doubtful if her ambitions would have driven her to adopt a policy of world conquest, or that, if they had, she would have been able to stand against the world in arms as she is doing to-day.

Forty years ago Germany began to develop her industries along scientific lines, not as a result of policy then expressly understood, but simply because those in the control of them recognized that it was only by applying all the scientific lore then available that they could find markets for their products, not only in Germany, but abroad. That they should have been so advanced in this respect must be attributed to the excellence of the German university system, which encouraged research along all lines, in the humanities, in philosophy and in the sciences. The graduates in science of these universities, doctors in philosophy, began to find their way into the industries in the "seventies" and their participation in them soon began to give results. It was due to their activities that Germany succeeded in capturing the control of the aniline dye industry, which was originally an English one. It was through their activities that the German chemical manufacturers began to dominate the world's markets. In the great industries, that of steel production, for example, the German pre-eminence was rendered possible by the utilization of the highest skill and expert knowledge that investigators, originally trained in the universities, could bring to bear on the subject.

During the last twenty-five years the various German governments came to recognize that direct aid to their universities was a powerful factor in furthering the industrial efficiency of the nation, and, in consequence, they made provision for the expansion of these institutions on the scientific side, with results which made Germany not, indeed, as wealthy as Great Britain or France, but, it has been claimed, more than five times as wealthy as she was in 1875.

Great Britain also increased her wealth during the last forty years, but not at all in proportion to her opportunities. Her industries did not avail themselves of the highest skill and expert knowledge, nor did they, except in rare cases, employ a staff of investigators to indicate the way in which advances could be made. They were, on the whole, content to go on the old lines and to ignore what science was doing. Nor did the Government view matters differently. For many years it gave an annual grant of £4,000 to the Royal Society for research in pure science and for ten or more years £7,000 annually to the National Physical Laboratory. It gave grants to various universities, colleges, and technical schools, but in no case was it obligatory that any of these should be spent on research, and, indeed, they were largely expended for ordinary academic and technological courses of instruction, Research, when not opposed, was expressly ignored. It was, indeed, often sneered at, and the two great universities of Oxford and Cambridge were brought with difficulty to recognize that science and the advance of it by research are objects worthy of the attention of institutions supposed to teach the best that is known or thought in the world. Cambridge in the last twenty years has by the support she has given to scienctific research done loyal service to science, but it was not easy to efface the impression given to thousands of alumni of both Oxford and Cambridge who imbibed reactionary views regarding the claims of science, and who from their numbers in Parliament or in the learned professions, and even in mercantile and industrial establishments, controlled the trend of opinion on the subject.

For the last thirty years British scientific men have been uttering warnings against apathy regarding, and hostility towards, science. Again and many times again it was pointed out that the control of the basic national industries was passing into German hands. The warning was unheeded, or when it was heard it was met with the plea that it was quite natural, and that, if the Germans could manufacture in these lines so much better than the British, it was to the advantage of the latter, for the balance of trade was and would remain in their favour, as they were the greatest trad. g

nation, and so on *ad nauseam*. It is depressing to-day to read, or to remember, all the outpourings on this subject in the past of laissez-faireists, and of doctrinaires with a constitutional inability to look beyond the very immediate and often parochial question of the hour.

All this is changed now in Great Britain. The war found the nation unprepared and lacking in very many of the materials vitally necessary not only for carrying it on, but for the continuation of some of the important national industries. The revelation gave a shock to the nation and dispelled, it is hoped, forever, the beliefs and cherished illusions which made it indifferent to research as a factor in national progress and development. The Imperial Government at once set about to organize a movement for fostering research in pure and industrial science. The Honorary Advisory Council for Scientific and Industrial Research, appointed in 1915, was given a grant of £25,000, another of £40,000 in 1916, and this year it has been voted £1,038,000 which it will use to further research during the next five years.

Henceforth liberal assistance to research in Great Britain will not be lacking, and, though it was grievously delayed, it has not come too late to be of service. One cannot, however, but think sadly of what might have been, if the leaders of the nation had earlier taken occasion by the hand. Had they encouraged the sciences as its interests required, its industries would have attained such a position of superiority that those of Germany could not have developed to any degree that would have made them competitors, and, accordingly, Germany could not have become through them wealthy enough to enable her to finance a war such as she is now carrying on. To assist her scientific development during the past thirty years Great Britain should have given annually nearly half a million pounds, or, about fifteeen millions in all, a very great sum indeed but a bagatelle to the £5,000,000,000 of debt which this war is imposing on the nation, to say nothing of the ghastly legacies it is now leaving. It was, indeed, a German dramatic poet, but of a former and saner generation, who makes one of his characters exclaim that "The gods themselves are helpless in the face of man's stupidity!"

It was not only in Great Britain that the old point of view prevailed. In all other parts of the Empire the laissez-faire doctrine was inculcated, and, in consequence, an apathy regarding research in pure science and its application to industry, like that which charaterized Great Britain in the forty years before 1914, paralyzed all attempts to make the universities develop on new lines. In Canada this was particularly the case. I have heard it again and again maintained that our universities should follow the lead of Oxford

and Cambridge, more particularly the former, rather than those of Germany, in the part they should play in national life, and that the *literæ humaniore* constituted the only subjects worthy of the attention of a great university. This had its effect in delaying the recognition of research in our universities which are, in this respect to-day far behind those of the United States. The latter have developed very largely along the lines of those of Germany and because of the large endowments at their disposal, and because, also, of the recognition on all sides in that country of the part that research is bound to play in national development, will soon become, if they do not so rank already, the greatest universities of the world. This trend of university development in the United States cannot be explained as due to the fact that many of the American universities are older than our own, for research, except in the case of Johns Hopkins, did not enter to any notable degree into their activities until after 1890. Their faculties in the "eighties" were being recruited from graduates of German universities and from Americans who had studied in German universities, and thus the leaven of research began to ferment not only in the universities, but in the industries, which in this respect, when the war began, were not very far behind those of Germany. There are over fifty great industrial establishments in the United States which expend annually for research amounts ranging from $50,000 to $500,000, and one of these employs constantly a staff of 150 to conduct research in pure and applied science.

When the universities of a nation become permeated with the research spirit, as in Germany and the United States, its industries become endowed with it also. What seems to be clearly indicated by this is that, if the British Empire is to organize its industries on the research basis, it must promote research first in its universities, and, apparently, on the German plan, as the example of the American universities seems to demonstrate.

I hope that no one will suppose for a moment that I am an uncritical or ardent admirer of the German university. It has faults, some of them very grave, one of which is that its professors are but in effect civil servants, and they are, accordingly, at the nod and beck of an autocratic government, whose word may be academic life or death to a teacher. This explains the egregious folly of the manifesto of ninety-three professors, who, immediately after the outbreak of the war, fulminated against Great Britain for entering the lists against Germany.

[1]Journal of The British Science Guild for June, 1916, p. 25; also: Science and Industry, Industrial Research in the United States, by A. P. M. Fleming, published for the Department of Scientific and Industrial Research, London, 1917.

That the German university however, was not, and is not, lacking in one valuable qualification is shown by the fact that Oxford by a nearly unanimous vote in Congregation a few weeks ago decided to establish the Ph.D. degree on practically the basis on which it is given in German universities, an innovation which three years ago would have been regarded as impossible because of the strongly entrenched conservatism of that university.

I must also make it plain that in crusading for scientific research the object aimed at is not only to develop the industries of the Empire, although in view of the superhuman task that Great Britain, the Dominions and the Commonwealth must undertake, the attainment of that object is vitally urgent.

The international competition in trade, which will follow this war, as already pointed out, will be a pitiless one, and it may be that the future of the Empire, though unaffected by the war, may be jeopardized in the trade struggle. Industrial research is, therefore, of imperative urgency, but it can only be furthered by research in pure science. The two are, indeed, inseparable, for the practical is only the application of the knowledge which has been acquired in the vast majority of cases without any practical result in view. It would be very rash for any one to-day to predict that any discovery in pure science would not in some way be of service in practical life. Hundreds of instances of the futility of so predicting could be cited from the history of pure science.

But while research in pure science should be supported because of its utility, proved and possible, the most powerful plea for its advancement comes from the purely intellectual side. The world of nature and the physical world teem with problems of profound interest, some of them involving mysteries that will stimulate the human intellect till life on earth ceases after countless millions of years. There are, physiologists claim, certain portions of the frontal "association areas" of the human brain in which the full development of function has not yet been attained, "association areas" in which also the highest intellectual activities of which man is now capable have their location. In these "fallow fields" of the brain cortex are possibilities which can only be realized by the exercise, in all the ages to come, of the intellectual powers in earnestly facing these problems in the quest for ultimate truth. The solution of some may never be attained. The phenomena we designate under the terms *life* and *energy* are the profoundest of these. What life itself is has engaged and will long engage the interest of the scientific philosopher, and it is maintained by some thinkers that it involves an ultimate mystery. Of vastly profounder mystery is the element

we call energy, and which under its manifestations we call heat, electricity, gravity, chemical attraction, and so on. Our familiarity with these manifestations has led us to ignore the reality behind them and to assume that it is in itself not only knowable but known, but many a mind in the long ages to come will attempt to grasp the significance of this ultimate element, the great enigma, which in the end may be found to be one with the very Immanence of the Universe. The age-long quest for solutions of such problems may thus develop functions which will bring the human mind nearer and nearer to "the imperious lonely thinking-power." To any one seeking the purpose of existence, that, it may be believed, may appear the predestined reward for mankind for laboriously, unflinchingly following the path to the far-distant Altar of Truth.

The advancement of pure science then has sanctions deeper and more sacred than those derived from its utilitarian ends, valuable as these are in serving our physical life. Every agency that can promote this advancement ought to be engaged as in the performance of a high duty, of a duty with a religious significance. In this promotion human life may shed, as time passes, more and more of the dross, the gross and the sordid, that now thwart the march of the intellect.

To the admirers of the older knowledge all this may appear as portending its ultimate eclipse. There has been in the past a conflict between the two, arising from the claims of the older knowledge to monopolize the intellectual domain, a claim which the men of science during the last fifty years have resented. The representatives of the older learning have been exceedingly unwise in decrying the value of the conquests that the modern mind has achieved over the unknown and in failing to recognize that the great thinkers of antiquity, regarding the ultimate constitution of the cosmos, would, if they returned to the world to-day, be of the brotherhood of the great explorers in the sciences of Physics, Chemistry, Astronomy and Biology. Heracleitus, Democritus and Lucretius would be colleagues of our Newton, Dalton, Faraday, Young, Thomson, and Helmholtz, while Empedocles and Aristotle would claim kinship with the great Biological thinkers of the last fifty years. Would not also the great founder of Stoicism claim intellectual fellowship with the Romanes Lecturer in his thoughts on Evolution and Ethics?

The old knowledge and the old literature derived from the Greeks and the Romans have been of inestimable service to mankind. If it had not been for the diffusion of all this learning and literature after the fall of Constantinople, the civilization of Western Europe on the intellectual side would in all probability not have advanced

beyond what it was in the thirteenth century. That old knowledge and old literature helped to sweeten life and to cheer and renew the minds of all those weary of the subtleties of the Schools and the dogma of the Middle Ages. Our outlook to-day has been enormously influenced by the great thinkers, poets and philosophers of antiquity, and we would be failing in our duty, were we not to acknowledge this debt.

The acknowledgment must not, however, be undiscriminating as our classical friends would seem to postulate. The ideals of the past are not wholly those of to-day. When Socrates was crusading for wisdom amongst his fellow Athenians thousands of slaves, chained in the underground mines of Laurium, not thirty miles from Athens, lived a wretched, degraded life from which death was the only release. One must also remember the slaughter of the prisoners at Aegos-Potami, the starvation of the captive Athenians in the marble quarry of Syracuse, the holocaust of non-combatants when a Roman army attacked a hostile town or tribe, the strangling of the prisoners after a Roman Triumph, the Gladiatorial Games, the atrocities of the Servile War, and other incidents and examples, countless in number, of old world inhumanity, to which some German writers have referred in justification of the cult of "frightfulness,"

Man will not for ever go to the past for all the life which does not depend on bread alone. His course is still in the early dawn of civilization. If, then, progress means the realization more and more of the ideals of liberty, justice, kindliness of spirit and truth, which he to-day ardently cherishes, he must resolutely march towards the full morning light and not linger in the twilight, however beautiful a glow it may give to the world. The splendor of this dawn will, nevertheless, always be a memory of wonder even in the old age of the earth, it will always chasten pride and foster the belief that behind the mask of man's fateful and changing history there is an unchanging Chorus teaching him to be wise and to bow to Destiny.

The ancient learning, the old knowledge, will not be eclipsed. There will be always those, perhaps a very few, who will go back to it to look out on the world through the eyes of the great thinkers, poets and prophets of the past. The old tales, the old legends, therefore, will never be forgotten, the old setting of the hopes and fears of humanity will then be renewed for each generation, and life will thus be dowered with an interest that will transcend all merely temporary values.

It will, however, be only in sympathy and co-operation with the new knowledge which will be the ever-increasing endowment in the age now dawning. Indeed, whether the ultra-reactionaries on the one

side or the extremists on the other will it, or not, this blend of the old and the new will come to pass, for while mankind, disillusioned by bitter experience, must turn to the future for new hope and for new courage, it will remember and cherish the lore, the wisdom and poetry of the childhood of the race, but it must, and inflexibly will, develop and expand its knowledge of the world of nature and the physical world, and, if driven to it by necessity, sacrifice the past to that end.

Even in that event it will not suffer, for there is in the mind of man the unquenchable desire for the beautiful, born of the unseen, which the new knowledge will render keener as the centuries pass. In the future, then, with all its burden of fate,

> —how oft shall morn's pellucid ray
> Stir the high heart on the unknown wondrous way!
> How oft shall evening's slant and crimson fire
> Inmix the earthly and divine desire!
> What yearning falls from twilight's shadowy dome
> For the unchanged City and the abiding Home!