

SCIENCE AND CIVILIZATION ¹

SCIENCE is the patrimony of humanity, the torch which gives light to the world.—*Pasteur*.

It is a great pleasure, Mr. President, to meet your academic family and their friends under any circumstances; to meet them in this beautiful court and on this festal occasion is delightful. I thank you for the privilege, and congratulate you on the success of the session concluded this day. We are happy to know that it has been a year of progress in academic development, as well as in physical upbuilding. As citizens of Houston, we are witnesses that it has been a year of noble service to this community and to the cause of learning and science to which its far-seeing founder dedicated it. We are proud of the leadership that Rice has taken in education and science, and of the distinction it has brought to Houston. I am sure, therefore, that I express the sentiment in the hearts of this company when I tender to the President, Trustees and Faculty the grateful acknowledgment of the people of Houston and their wishes for your continuous success.

Promoting lives of luxury and pleasure, the industrial and commercial development, which has made Houston such a prosperous and wealthy city, makes such an institution devoted to the higher aims of life, all the more necessary. Older cities have their histories, traditions and customs to help maintain the cultural life, but new cities like this must develop their ideals of culture through their own institu-

¹Address delivered by Charles William Dabney, formerly President of the University of Cincinnati, at the ninth commencement convocation of the Rice Institute, held Monday morning, June 9, 1924, at nine o'clock.

tions. Such institutions as Rice are vitally necessary, therefore, not only for the training of youth and the advancement of science and learning, but for the esthetic, moral and spiritual development of the community.

Two great currents of civilization have flowed down the ages. One current has borne on its tide the people of the West, who have devoted their energies chiefly to the development of the material world and the production of wealth and power. This they did by the use of science and invention through the agencies of industry and commerce.

The other great current of civilization, originating in the East, has borne the men who since the most ancient days have looked into their own minds and hearts rather than at the material world, seeking through meditation to develop the soul of man. This civilization professed, at least, to think more of man's principles than of his possessions. It has, therefore, produced less science and fewer inventions, but more philosophies and religions. Its industries have been domestic and simple and its commerce limited.

In a way each of these civilizations complements the other. Each was incomplete and unequal to the all-round development of man. The two currents were never entirely distinct, though the main drift of Western civilization has always been towards materialism as that of the Eastern has been towards humanism. Small streams from each have mingled with the other all down the ages, and where they have joined we have had the most complete civilization. Though the distinction is not strictly accurate, it is customary to describe modern Western civilization as political and the old Eastern civilization as cultural.

The chief characteristic of the Western, or political civilization, is the struggle for power;—first, between class and class, and later between nation and nation. The

struggle within the nation goes on until one class secures control and proceeds to arouse the national spirit among its people and to make wars on other nations. These wars, made first for territory, are continued from time to time to keep what has been already conquered and to extend the influence of the nation. A balance of power may be established for a time, but it is always liable to break down, causing more wars.

This Western civilization has been greatly aided, especially in modern times, by physical science and invention, to which, therefore, it has given large support. By discovering raw materials and how to use them and by teaching men to employ natural forces, like water, steam and electricity, the scientist and engineer have greatly increased man's power. By forming great organizations for manufacturing and for trading, by pushing transportation and communication and sending armies of merchants and agents close behind its soldiers, Western civilization has now spread over nearly the whole world.

Because it has so nearly conquered the world, are we to conclude that the Western civilization is the better? We are so accustomed to the political type and so saturated with the habits of thinking which have grown out of it, that we cannot judge. Moreover, no pure examples of cultural civilization are left in the modern world.

By the aid of science and invention, industry and commerce, organized and supported by militant nationalism or imperialism, the Western nations have reduced nearly all the other lands to the position of provinces. In doing so they have conferred some great benefits upon them, especially by sanitation and modern medicines. These benefits are not questioned, neither do we question the benefits of education and religion given them by the churches. But we

may seriously question the wisdom of forcing our science and mechanical practice and even our culture and philosophy upon so-called uncivilized peoples to the destruction of all their own knowledge and culture and of their arts and philosophy. Are we so sure that our boasted American civilization, for example, has always proved of benefit to the people to whom we have given it? It is said that when the authorities gathered all the Hopi Indian children for the first time into the boarding school provided for them by a benevolent government, their mothers made tragic protest by riding around the school building singing dirges as if their children were dead: "We do not wish our children to ride the whiteman's road," they cried. Just a natural feeling for primitive mothers, you say. But does it not express both a natural right and a fundamental truth? May we not seriously question the right and the wisdom of teaching all primitive peoples our inventions and practices, our industries and arts, even if we do not question the benefits of our education and religion? If we take the American Indian as an illustration, we have undoubtedly made a great mistake somewhere. Was it not in trying to give him our civilization completely? Their love of nature and artistic sense, their conception of virtue as a trust from one's ancestors, their sense of social obligation, their love of ordered liberty, their natural dignity of manner, their reverence for the unseen are precious things not to be lightly thrown away. The same applies to many people of the East. Why teach them our science and our mechanic arts and so destroy their poetic philosophy of nature and their beautiful domestic arts?

Is it not time that we stopped to ask whether science and invention in and by themselves are always beneficial? There are, it appears to me, serious reasons why we should do so.

Many thinkers are, in fact, doing so, and it is to a few of their strictures that I invite your attention.

The aid science has rendered to civilization has been enormous and grows greater with every year. But many thinkers believe that there is another side to the question. Does science always promote morals and culture, as well as industry? Some people even doubt the benefit of many scientific inventions. The moving picture, for example, is denounced by some good people as causing more evil than good. An admirable thing in itself, the picture machine has been put to bad uses by being commercialized. I predict that it will have a noble rôle in the future. It will make amends for the harm done by its absurd and immoral stories. In teaching the sciences it will show the plant growing, the flower blooming, the animal's heart beating, the insect and the bird flying. All the technical industries will be passed before the eyes of pupils. The great men and women of history will live before us again, and teaching will be improved by putting the object behind the word.

The phonograph and the radio are being abused in a similar manner. Never so much debased as the moving picture, the phonograph with its voices out of the past and the radio broadcasting those of the present will be made more and more the instruments of education and religion. Why may they not become like tongues of fire and voices of angels proclaiming the Gospel to the world?

What shall we say of science and industry? In economic production as developed in modern times there are three steps. First, there is the discovery of some new force, of some new material, or of some new law of nature. The scientist is not primarily interested in the application of his discovery. He seeks to learn the truth of nature, regardless of its use. So the technician, always on the lookout for

a way better to perform some task, takes the second step and studies the bearings of the discovery upon his problem. The average business man or manufacturer does not see and cares little at first for these first two steps. What interests him is the third step, namely, the product, the process or the machine, which makes money for him. In the scientist and his discovery he has at most only a distant and romantic interest. But the fact remains that industry is created and made successful, not by the raw material, not by the products, but by the scientists and the engineers in its service. It is the mind that makes the values, not the materials or the machine. A mind found the right material, a mind devised the right machine and a mind discovered the right force to operate it.

Intelligent business men recognize now that industry cannot advance without science, and they are therefore devoting a large portion of their earnings to maintaining laboratories. The production of aluminum is an illustration. This desirable metal has been known for some time, but was not produced economically until Charles M. Hall, after long study and experiment, made its manufacture an established industry and its use universal.

Most industrialists, as well as many states and cities, now recognize their duty to support the pure and technical sciences by providing them facilities and endowments. For this reason, therefore, as well as for the sake of the education it provides for their youth, it is the duty of the people of Houston and of Texas to see that this Institute is fully equipped and manned. Wealth derived from scientific investigation should be regarded as held in trust for the advancement of science and the welfare of mankind. Its possession is a stewardship for the benefit of institutions of learning—the advancement of civilization and improvement

of life. It is most encouraging that individuals are learning this and great gifts for universities are becoming more numerous every year. Hall, for example, gave his entire fortune to Oberlin College, his Alma Mater. But the nations must learn that they also are stewards for all the world. In this service of the world the Carnegie and Rockefeller Boards are noble pioneers. Their missions to many countries are splendid illustrations of what the beneficiaries of science and invention can do for mankind. By such methods and not by war, western civilization may win the world.

But what shall we say of these vast industrial and commercial companies reaching out into all lands? By many, like Bertrand Russell, they are considered the greatest menace of the age. Science and invention, he says, have made it possible to build these organizations on an ever larger scale.

"Wherever expensive fixed capital is required, organization on a large scale is, of course, necessary. In view of the economies of large production, organization in marketing also becomes of great importance. For some purposes, if not for all, many industries come to be organized nationally, so as to be in effect one business in each nation."¹

"Science has not only brought about the need of large organizations, but also the technical possibility of their existence. Without railways, telegraphs and telephones, control from a centre is difficult." In this way, Russell explains, science has promoted a selfish grasping nationalism and imperialism. Such vast national organizations of business become oligarchical. "In consequence of scientific inventions which facilitate centralization, groups become more organized, more disciplined, more conscious and more

¹ "Icarus, or the Future of Science," Bertrand Russell.

docile to leaders." The control by leaders becomes more marked.

"In all this," Russell continues, "there would be nothing very tragic but for the fact with which science has nothing to do, that organization is almost wholly national."

"The harm that is being done by science and industrialism is almost wholly due to the fact that while they have proved strong enough to produce a national organization of economic forces, they have not proven strong enough to produce an international organization." Here I think Russell is wrong; national organizations of industry and finance made possible by science are only the first phase. As a matter of fact, international organizations of industry and commerce exist already on a large scale and are growing and multiplying rapidly. Like the international postal system of the governments, international systems of telegraph and wireless communication, of trade and exchange, of shipping, etc., are growing up to counteract these nationalistic organizations and take their places.

No, it is not true that science itself promotes trusts and selfish national organizations and so retards a proper internationalism. As Pasteur has said, "Science has no nationality because knowledge is the patrimony of humanity, the torch which gives light to the world."

It is a much more serious thing, it seems to me, that associations of men are by such grouping given more power to indulge their purposes and passions. Having eliminated the individual conscience and responsibility, the purposes of these great companies are most profitable to their members while often injurious to mankind in general. The alcohol industry is an illustration. Science and invention made it possible on a greatly increased scale and its vast commercialization made it a fearful menace to man. This industry

became so strong in our country both politically and financially that it took forty years to overthrow it. The opium trade and cocaine production are still growing with the aid of science. At least one foreign country is said to be making a business of the manufacture of these poisons for illicit export.

The world still stands aghast at the horrors wrought by science in the war. So Galsworthy appeals to scientific men to refrain from releasing any further discoveries until they are certain they will be used for helpful and not for hurtful purposes. The discovery of poison gas should never have been revealed. The aeroplane, the greatest achievement of our age, ought never to have been used in war. The suggestion that the possible release of atomic energy or the liberation of the forces in the ether may even destroy the whole world, alarms him. "Destructive Science" should, he says, be stopped by the concurrent action of civilized nations.

This solution appears to be impracticable. We can never put a stop to the instinctive urge in men towards discoveries and inventions. In all these things, in great organizations of industry and in nations, the fault is not with the scientist or the inventor. The fault is with the human will which utilizes these and many other discoveries to hurt or destroy men. Pasteur's discovery of the germs of disease was one of the most beneficial ever made, and yet some devils in human form have proposed the wholesale use of disease germs in war to destroy the enemy population.

No, science is not by nature destructive or even injurious. Science is neutral. It provides forces, which, like everything else, can be used or can be abused. We must advance ethical ideas to a higher plane so that scientific discoveries will be used only to benefit the race and not to destroy it.

Every other use of science is futile. Scientific warfare with big guns, electricity, poison gas, bombs dropped from aeroplanes, and all its other hellish instruments, does not conquer men. It destroys them. Science did not win the war. The honor of the Belgians who would rather die than break a treaty, the courage of the British "Contemptibles" who held at Mons till they were all killed, the heroism of the young American marines who drove the enemy back at Chateau Thierry, the spirit of the French poilu who declared at Verdun, "They shall not pass!"—these won the war and not science. These are not physical forces, they are spiritual.

More significant than these attacks is the idealistic reaction against a rationalistic interpretation of science, which we are glad has come at last. The grossly exaggerated rationalism which threatened to establish materialism as the only conceivable view of the universe and to regard man merely as the most wonderful of nature's machines, has aroused philosophers as well as theologians. Disagreements in the ranks of science have added to the revolt. Psychology arose to claim independence of physics and physiology. Biology declared that mechanical laws were utterly inadequate to explain the phenomena of life. Radio activity came to upset the theories of the physicist, chemist, geologist, and astronomer, and the theory of relativity makes it necessary to build our scientific philosophy all over again. So long as the science-philosophers are at sea, the rest of us had best stay near land. At any rate the mechanistic materialism is dead.

What then has science to do for religion? Naturalism claims to hold the future of mankind in its own hands. It also claims that man needs no other religion. Are these things true? Science may provide for all our physical needs

and command all the physical forces to work for us. But science will never give us a religion or a philosophy that will satisfy our hearts. For science knows nothing of the æsthetic and religious demands of our nature. There are three eternal values—Truth, Beauty and Goodness—each independent of the others and all necessary for our spiritual satisfaction. Science supplies a vast body of Truth, but it cannot supply us with either Beauty or Goodwill. Even if we never solve the difficulties caused by the revelation of the Eternal, as Truth, Beauty and Goodwill, we must have a philosophy that will provide us with art and religion, as well as with science. The world known to science is not really put together of electrons revolving around each other in the ether. The world was put together and is kept together by Infinite Mind.

What about science and government? It is in politics and in the legislative departments of our government that the methods and teachings of science are least used. The man of science has less use for what is called practical politics than any other thing in the world and the practical politician returns the compliment. And yet the scientist and the politician must get together some day if government is ever to be perfected. Mr. Lloyd George, in his address as Rector of Glasgow University, said that "Government nowadays is a government by talking." As the greatest talker of his age and the Premier of Great Britain during the most critical period in its history, he ought to know. From what we have seen and heard in Washington, we fear that this is true of our Government also. "Government by talk!"—yes, that is too frequently the way in which our democracies decide things.

The evils that afflict the world, for which we have made ourselves largely responsible, are numerous and great. The

cries of men for the more abundant life are loud. The call is for action, not talk. If we can do nothing until we have talked ourselves and our colleagues out, we will never catch up with the suffering and the misery of the world. It is tragic to talk and keep on talking while millions are perishing as they have been in Europe these last five years. As a recent writer has said, "What the world wants to-day is not a League of Nations, but a league of people who know each other, and can work together for the peace and happiness of all."

Plato said that the world would never be well governed until philosophers became kings. This is too much to expect in Texas or these United States, but it is true that the weakest thing about our democracy is its failure to employ its best men for its important work. The end for which we endure governments is the highest development of every citizen. The democracy should be a school for citizens. If it fails to make good citizens, it fails entirely. It is a serious matter that our most intelligent and best men and women take no part in government. What else can we expect when the schools and colleges set pecuniary success before their pupils as the goal of their efforts? The end of education is not the power to make money, but character and fitness to serve. We start the youth on the vocational or professional course before he is really educated. Science studies alone do not supply the material for the complete education. From the study of humanities come, as from no other studies, concentration, discrimination, strengthened memory, exact expression, a feeling for making things right, the power to conquer difficulty and a knowledge of the sources of civilization and of those primal men whose spirit has permeated the ages. On the one side comes power to think, on the other knowledge of the basic material with

which our thinking is concerned. To that is added the purification and elevation of spirit that follows the contemplation of beauty, the ideal of how to live, that is beyond the knowledge of how to make a living.

Incompleteness of culture and character is the trouble. Incomplete faith that has no great end in view, and, therefore, has no courage; the refusal to see more than one side of a question and the habit of visualizing everything we do see in raw primary colors, without shading or discrimination; the inability to concentrate or to think correctly, and consequent acceptance of the crass and superficial; a sensationalism in speech and writing, that is only a more or less camouflaged appeal to low passion and a soul debasing cynicism, ever the companion of sensuality, that casts a deadly blight over beauty and virtue—these are some of the results of a one-sided, materialistic education.

At the present time, this unmoral trend of our education gives rise to a dangerous contempt for law that threatens the very foundation of government. The law that crosses the personal pleasure or habit of some people is a law not to be regarded. The pursuit of selfish ends, even to the hurt of others, is maintained under the guise of the right of property and of personal liberty. To such men, having no thought for the welfare of the young or weak, liberty means license. Those, who legislate for the protection of their property from taxation, they declare statesmen; those, who endeavor by law to protect the bodies and souls of the people from corruption, they deride as "uplifters". They forget that the only true liberty is liberty regulated by law.

This state of the public mind and conscience is directly attributable to the incomplete development of the minds and hearts of the people. There must be a renaissance of cultural education. This does not imply a reactionary

movement against science and invention. It will not be a movement against scientific investigation. Science will pursue its shining path. It will be used more and more for the good of men, and not their hurt. Our efforts should be directed, not to the curbing of science but to its furthest advancement, and to its fullest utilization for good.

Now finally, what is the solution? What is the disease? What is the remedy? The trouble is that we have more knowledge than we can use. We have had a boom in knowledge and a slump in wisdom. Man has now sharper tools than he is prepared to handle. His scientific knowledge has too far surpassed his cultural and moral training. He has not sufficient self-control and good will to use these gigantic forces for the well-being of mankind. Our knowledge has outstripped our morals. As a result the foundations of faith are shaken, the minds of the youth confused, moral restraints and codes of conduct are being discarded.

Civic virtue to endure must be based on spiritual enlightenment. Only religion can provide this. In natural evolution many believe; in spiritual evolution we must all believe. To doubt this is to make life a race after a mere shadow. There must be a spiritual evolution of man corresponding to this evolution of science and industry. This vast accretion of scientific knowledge and this tremendous power in invention create a great new responsibility, which calls for a greater service to men than we have the strength to render, which demands a higher character and stronger will than we possess.

This marvellous development of science and industry constitutes a challenge to the school, and a challenge to the church. It constitutes a challenge to the school, the college and the university to give men cultural as well as scientific education, moral as well as physical training, a love of the

beautiful as well as of the merely big things in nature and art, and above all the strength of character to use and not abuse the tremendous new power and vast new wealth bestowed upon man by science and invention. It is a challenge to the church so to enlighten the consciences, and develop the hearts and wills of men that they shall have the power to see the right, the will to do it and the love to serve their fellowmen even at the sacrifice of their own pleasure, comfort, and life if need be.

Aristotle said, "The State should be the means to the good life." Such was the avowed aim of the civilization of Greece and of India and China for thousands of years. Such, far more richly, was the civilization of the ancient Hebrews, as taught by their prophets and priests, and this was definitely the teaching of Jesus who came "to give men life and life more abundantly." With the coming of Christ the world took on a new life. He was the Star in the East that brought hope to man wandering for ages in the wilderness of despair, seeking a way into the light of truth and righteousness. Jesus first taught man that it was not by physical science and industry, not by meditation and the cultivation of his own mind and soul, but by love and service to his fellowman that he would complete his life and attain the Kingdom of God, the perfect civilization. Science, industry and commerce have given western civilization the power to conquer the material world. Christianity alone will enable it to conquer the souls of men. The only hope of humanity is that Christianized western civilization, overflowing the world, may carry to all nations this religion of love and peace.

I believe that we are at the dawn of this renaissance of culture. The process of a moral reform is beginning. It is similar to the old Reformation and it will be more funda-

mental. The raw materials for such a renewal lie all about us. Much of this material is the result of modern scientific investigation, and science will provide more as it goes forward. This new renaissance will bring together in a new synthesis the products of these investigations and of the thinking of truth-seeking scientists. The result will be a new and better formulation of the old faith in one God, the Father of all.

Who shall be the leader, the prophet of this new renaissance? He need not be a theologian necessarily, a Luther or a Calvin. The man who shall lead the way to the new world, may be a statesman or he may be a teacher. When the miserable partisanship of our age has died away, some man may arise to lead us past the idols of narrow nationalism and the "bogies" of entangling alliances into a new association of nations that will be the clearing-house, not only for the political, but for the social activities of men. Or the new leader may be a teacher, the head of a great society of scholars like this University, who will study what the human mind has done and should do, as it works its way out of darkness and error towards the understanding of itself and its destiny. Such universities as this, constituted of such scholars as these around us to-day shall train a new race of thinkers, men with hopes as well as with habits; men with standards of eternal values as well as of human science; men with ideals of service as well as of professional success. This will be the new birth of civilization.

Facing to-day a new world of opportunities, as you do, young women, we feel a special interest in you. You are fascinated by the glamour of new experiences in freedom. These offer themselves to you in business, in science, in social effort, in the professions. All is not gold that shines in this bright array of these new careers. That, too, you are

beginning to sense. You see the temptations which are hidden in the "New Freedom," but I believe you also see new uses to which to put it.

Whatever our views, we all admit a definite progress in woman's use of her talents. Her accomplishments in the professions are fully recognized. Some are surprised by her grasp of the sciences. In the arts she has long played the double rôle of patron and creator. Her rise in business in the last two decades has been rapid. She merits a higher position in finance and administration than has so far been accorded her. These careers rightly set the college woman to dreaming of new fields to conquer. Looking to the future she will feel a keen appreciation of the aid science and learning have brought her. More inspiring still is her share in the partnership which will be formed by the best of young college people. Surely the world holds nothing finer than the happiness to be found in such marriages, if based on a single and high standard of responsibility. And let her not forget that as wife and mother she must always carry the torch!

The two great currents in the history of the world express the issue this day presented to you, young men and women. What shall be your chief purpose in life? The acquisition of wealth and power, or the development of your own character and that of your fellow man? What will you do with the knowledge and training you have acquired? How will you use your life? The race is about to start—which goal will you run for?

It is said that when the Olympic games were re-established in the great Stadium in Athens in 1896, the native Greek youths looked on with utter indifference while the modern athletic events were all won by the American and foreign athletes. To the Greek, the British and American

games seemed trivial and purposeless, conveying no sentiment and no ideal. But when the Marathon race was called, every Greek eye shone with light and every Greek pulse throbbed with heat as the minutes went painfully by. At last, when the Greek champion was described in the distance racing far in advance of all competitors, the hundred thousand Greeks gave vent to their feelings in silent floods of tears. And when the King handed their victorious runner the olive wreath from the mountains of Marathon, all felt that historic Greek honor had been vindicated and ancient Greek glory restored.

Young men and women, which race will you run? Shall it be the modern race for selfish power, or shall it be the world-old race for humanity? I beg you to enter the Marathon for the "abundant life" for all men. It is the only life worthy of the scholar, for it is the race of Knowledge with Ignorance, of Wisdom with Error, of Love with Selfishness, of Life with Death! Run it like men! And God speed you!

CHARLES WILLIAM DABNEY.



