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THE HUMANIZING OF SCIENCE[1]

By HARVEY CUSHING, M.D.

NEW HAVEN, CONN.

IN the prefatory chapter of Dr. George Sarton's monumental undertaking,[2] there occurs the following statement: "The History of Science, being a new discipline, is not yet well organized or well circumscribed and attracts the attention not only of experienced scholars but of amateurs, dilettanti and cranks."

From which of these categories I have been elevated to this position of prominence I hesitate to enquire. It certainly was not from the ranks of experienced scholarship, nor have I any pretence even as an amateur historian. Though long active in what is said to be a scholarly profession, yet I would be put to it to tell just where the technique of medical practice—the art of medicine—leaves off and the science of medicine begins.

Both are essentially "humanistic" in its wider sense, in so far as the one is directed toward the alleviation of the diseases to which mankind is heir and the other toward their ultimate banishment. The chief difference between modern science and the natural philosophy of the ancients is said to lie in our greater inclination to put things to the test of experiment; and while medicine is constantly broadening its scientific background, in a certain sense every drug a doctor administers and every operation a surgeon performs is experimental in that the result can never be mathematically calculated, the doctor's judgment and the patient's response to his prescriptions being variables indeterminable by any law of averages. But this is far from making medicine a scientific calling.

That admission being made regarding the only subject with which I can claim familiarity, I must at once confess that I do not clearly perceive just where the humanities leave off and science in general begins, nor why in the schools any conflict should have arisen between them, for they spring from the same hellenic roots and seem so essentially supplementary.

Naturally on the part of teachers there is constant elbowing for the curricular recognition of their subjects and with energetic leadership emphasis from time to time may shift in one direction or the other.

[1] Presidential address before the History of Science Society, Washington, December 28, 1934.

[2] "Introduction to the History of Science." Carnegie Institution, Washington, 1927, Vol. I.

Thus at Oxford, the humanities have so long received the greater attention that one easily forgets the presence there in the thirteenth century of Michael Scotus, of Sacrobosco, of Robert Grosseteste, of John Peckham, and above all of Roger Bacon with his dictum: *Sine experientia nihil sufficienter scisi potest.* Then again in the seventeenth century under Wilkins, Boyle and Wren, Lower, Willis and Hooke, natural science was so ardently cultivated at Oxford that the Royal Society had its inception there. In Cambridge, on the other hand, the physical sciences since the time of Newton have been increasingly emphasized; and this same tendency now so far pervades most universities in our own country that the number of undergraduates who major in the classics appears to be constantly dwindling.

Yet those who ultimately take up whatsoever branch of science without some preliminary schooling in Latin and Greek unquestionably suffer a handicap. This is true, among many other reasons, in that our scientific terminology is almost wholly based upon these two languages; and consequently the special lingo that must be acquired, if not meaningless to the tyro without them, at least loses much of its real significance, flavor and interest. What is more, since the early scientific treatises were written in the same languages that constitute the *Litterae Humaniores,* there would appear to be no essential reason, apart from the subjects with which they happen to deal, why from a classical standpoint they are not as humanistic as what used to be called "polite letters."

All this goes to show that I do not know precisely what, if anything, the humanities have to do with humanism, or just what humanism is unless it concerns itself with the philosophy of man whereas the physical sciences deal with the philosophy of his environmental matter—what Professor Dewey would call Naturalism.[3] But the old-time natural philosophy went out—proudly, be it said—with the comprehensive "Kosmos" of the aged Humboldt, whose death, curiously enough, coincided with the appearance of "The Origin of Species" which may be looked upon as the beginning of the modern era of science with its wholly altered conception of man's place in the universal scheme of things.

The term "scientific" in these modern days has come to be much abused. Many things that are popularly looked upon as being scientific, and many persons who are said to look upon life from a scientific point of view, are no more scientific than an infant in its cradle, however much the child is in process of being brought up on so-called scientific principles with a pediatrist on one side scientifically to measure its vitamins and calories day by day and a psychologist on the other scientifically to protect it from complexes—perhaps even to provide an infant chimpanzee as a comparative playmate. Thus does the quasi-science of medicine sometimes lead to absurdities from which medical practice, largely controlled by common sense, usually escapes.

It is ridiculous that a doctor should be regarded as "scientific" merely because, having recourse to a few instruments of some considerable precision, he supplements his sensory impressions thereby, possibly puts a few of his observations or conjectures to the test of experiment and finally writes a paper or two on his deductions. He may even awake some day to find his name starred in "American Men of Science" when in his heart he knows that his supposedly scientific observations have been either disproved or reinterpreted almost before their appearance in print, whereas his true learnings are humanistic. At least he likes to think his instincts are humanistic—shall I say scholarly?—and yet, while so flattering himself, he is conscious of some uncertainty as to what, after all, the term really signifies. He is quite familiar with humanity—knows it, in fact, stripped to the skin—and his code of ethics emphasizes the Christian principles of philanthropy; but "humanism" appears to be something entirely different. It has become a word people conjure with.

Even after reading Irving Babbitt,[4] so bewildered have I found myself regarding the implications of the term I have felt obliged to seek aid from a scholarly friend and colleague. His interpretation, it appears, is restricted to the last of the four definitions given in 1901 by Gilbert Murray and his collaborators, *viz.:* a devotion to those culture-promoting studies, especially the Roman and Greek classics which came in vogue at the Renaissance. Insisting that this is in accordance with the usages of Varro and Cicero, my friend cites Aulus Gellius to the effect that *humanitas* in Latin is *not* φιλανθρωπια which is defined as *benevolentia erga omnes homines,* but that people who knew Latin and used it well "humanitatem appellaverunt propemodum id quod Graeci παιδειαν vocant, nos *eruditionem institutionemque in bonas artes dicimus. Quos qui sincereter percupiunt ad petuntque, hi sunt vel maxime humanissimi.*"

Thus it would appear that even during the lifetime of Galen there may have been a tendency, against which Gellius protested, for the word *humanitas* to imply something more than literary culture just as in our own time, on the authority of the New English Dictionary, humanism more properly signifies a "de-

[3] John Dewey, "Humanism and Naturalism." Monroe's Encyclopoedia of Education.

[4] "Humanism: an Essay at Definition." Essays on the Outlook of Modern Civilization. Edited by Norman Foerster, 1930.

votion to human interests" or "the character and quality of being human" which comes very close to a concern for man's well-being on the one hand, and to φιλανθρωπια on the other.

I have gone into all this because of my somewhat enigmatic title "The Humanizing of Science" which may mean one of two things—(1) a revival of interest in the early classics that deal with natural philosophy, and (2) such an enlargement of the scientific outlook as to include in its scope matters which have to do with human welfare as something apart from culture and in the long run perhaps more important.

While a revival of appreciation for the literary and historical classics chiefly characterized the Italian-born humanistic movement of the Renaissance, it should not be forgotten that contemporary mathematicians and astronomers were for their special purposes finding the early classics of science no less remarkable and important as sources of learning. But the scientifically minded among the scholars of the day represented, as always, a minority and it was natural enough that the larger group, through the wider appreciation and understanding of the subjects with which they dealt, should have come to be regarded as the more cultured.

As typical representatives, the names of Erasmus and his English friends, More, Colet, Latimer and Grocyn, quickly come to mind and, among doctors, perhaps more particularly the name of Linacre, *philosophorum medicorumque facile princeps*—with the futile wish that one might have possessed some of his scholarly gifts.

While Linacre is said to have made his Latin translations of Galen from Greek codices in the Vatican, they were already well known through Muslim transmitters whose texts, though used in all the schools, were coming into disrepute as supposedly barbaric. Nevertheless, Albertus Magnus, according to Renan, owed everything to Avicenna as did St. Thomas Aquinas almost everything to Averroes; so possibly even Linacre in collating his Galenic texts may have had reason to lament his want of familiarity with a language which was of little use to the Renaissance students of history and literature. The Islamic scholars thought more of Hippocrates than Homer and were far more interested in the mathematics and natural philosophy of the Greeks than in their literary writings.

Of the seven liberal arts required for a doctorate those composing the *trivium* were probably more useful for a prospective doctor of medicine than were arithmetic, geometry, astronomy and music—the four mathematical disciplines of the *quadruvium*. Medicine consequently, though slow in being regarded as one of the learned professions, attracted during the Renaissance many humanistic scholars scarcely less notable than Linacre. Physic was taught as a branch of philosophy; and the ancient learning, though presented in the tongue universal to scholars of the day, was largely what the industrious Hunayn and others, copying from Greek codices, had passed along, in course of time to be laboriously set over from Arabic into none too good Latin.

The hand of Aristotle with the commentaries of Averroes lay heavy on philosophical thought for a period of four centuries; but the fact that the peripatetic teachers of the Lyceum were keen observers and had dipped so deeply into mathematical, physical and biological subjects that their era may well be looked upon as "the heroic age of science,"[5] has been all too much neglected by humanistic scholars of recent times.

The value of Greek and Latin as a cultural discipline began to be undermined so soon as the exercises —as many of us to our sorrow remember—began to be largely philological and pedantic in character. But over-emphasis on classical learning even during the Renaissance sometimes led to absurdities, as when in Toulouse and elsewhere there developed a Ciceronian cult against whose pompous style in writing and diction Erasmus winged one of his barbed shafts. It however was dangerous to be too knowing and to express ideas that might be taken as adverse to the accepted dogmas of the church even when couched in the Ciceronian style which Dolet cultivated.

And if this was true of the literary humanists, persecutions for heresy were far more likely to strike at those who dabbled with science and formed opinions about cosmogeny and natural phenomena that ran counter to the book of Genesis. Copernicus died before the Inquisition could call him to account for publishing the "De Revolutionibus," while for upholding the views it expressed Giordano Bruno went gallantly to the stake and Galileo's abjuration alone saved him from a like fate.

The restriction of humanistic culture to those classics possessing literary and historical worth can be envied since their message from generation to generation is not subject to change. The classics of science, on the other hand, while just as ancient, deal with concepts that continue to be in a constant state of flux. This is particularly true of the physical sciences for despite their supposedly precise laws, expressible in complicated symbols, it takes a mathematical genius to keep up with the shifting approaches of astronomers and physicists toward a solution of the great riddles of space, time and the atom. Meanwhile space gets ever larger and particles ever smaller.

Those of us who have clung to the belief that

[5] William A. Heidel, Carnegie Institution Publication No. 442, Washington, 1933.

nature abhors a vacuum and that Archimedes knew what he was about in regard to π being 3.1416 are told that all such old-fashioned ideas which failed to take time and the quantum theory into consideration are completely outmoded. But who were Pythagoras and Euclid and Aristarchos and Archimedes and Apollonius and Hipparchos, to mention only a few of those who left their names stamped on mathematical science long before the heyday of Rome? In my youth Euclid was the name of a street in Cleveland, Ohio; and then I had of course heard it rumored that Archimedes once got a new idea in his bath—which explained why plumbing was so often hopefully labelled Eureka.

Partly as a sop to my humanistic yearnings and partly in the vain hope of stimulating my unmathematical mind, I once purchased a copy of Radolt's famous edition of Euclid's "Elementa" in a monastic binding. Possessing that, I could not resist another scientific landmark, the "Principia" of Newton, when a copy happened to come within reach. Here then on my shelves, if not in my head, were scientific treatises as an evidence of my respect for a branch of knowledge whose theorems and mathematically expressed formulae would supposedly endure for all time.

This anticipation, however, was soon shattered by Einstein whose original paper on relativity I was impelled to secure; and though none of it could be understood, a mathematical colleague assured me that it unquestionably represented the last word. But no such thing! The chief justice of the High Court of Allahabad has just succeeded, it is said, in reducing the equations of both Einstein and Newton to such simple forms it can be demonstrated that time slows down with distance. In other words, it can now be mathematically shown that if A and B are twin brothers and B makes a journey, B must be younger on his return than A. Doctors of course have long been aware of the practical truth of this and it explains their custom, when put to it to tell what is wrong with a patient, to suggest travel and change of scene as favorable to longevity.

Thus while modern physical science makes headlines for itself so fast there is difficulty even for experts to keep up with it, Sir James Jeans publicly acknowledges that photons, electrons and protons, though their properties can be expressed mathematically, are really as meaningless as x, y and z to a child on its first lesson in algebra; and it has been admitted by someone else that the advance of physical knowledge is at present reduced to the extraction of one incomprehensible from another incomprehensible. Yet we are assured that the mathematical starting point for all this was Hero's synthesis of the two laws of Euclid which have merely been expanded by Newton, Einstein and Sulaiman to embrace all the activities of the universe.

Though beyond the comprehension of most Renaissance humanists, the impact of the ancient treatises dealing with mathematical subjects certainly had a no less marked effect on the progress of human thought than had the classics of history, philosophy and literature; and it would seem therefore that some familiarity with their purport at least should be as much a part of the fiber of a classical education as the writings of Homer, Virgil, Horace and Cicero.

Historians, generally speaking, either from want of understanding or lack of interest have rarely laid stress on the manifold ways in which science and its applications have modified world events and affected human society. But since these effects are becoming rapidly accumulative, their consideration by historians will be more and more inevitable as time passes. The last great war was precipitated apparently by political rivalries but in its conduct it was clearly a war between the mobilized scientists of the contending parties, for they alone were in a position rapidly to increase the effectiveness of its destructive agencies and in an emergency to devise means of defence against such novel forms of destruction as might be introduced by their opponents. It was a sorry business to throw in the lap of Science, though stimulated by the responsibility Science doubtless has profited by it in many ways.

But as political historians know better than most others, the almost invariable aftermath of war is a temporary wave of apparent prosperity followed by a more or less prolonged period of economic depression with its social disorders, prevalence of crime, licentiousness and unemployment. On these now urgent and world-wide problems Science does not as yet appear to have put its mind—or if it has, it has not offered any solution to the problem. Society in the interval restlessly endures the situation as best it can, and it is left to time and politicians to find a way out.

Meanwhile, a very curious and unexpected thing has happened. Science to the average man has become suspect and he has begun to feel that scientific research and the labor-saving inventions which grow out of it are chiefly responsible for the hard times and unemployment and uneven distribution of property. Legislative bodies have been inclined to ask what after all science is up to, and to question whether the motives that activate it are as altruistic as the scientists in their arrogance would have us believe; they set about to curtail the funds that hitherto have been allotted to governmental research and grow inquisitive regarding the scientific attitude toward such things as the secrets underlying the manufacture of munitions.

This is surely a phenomenon of extraordinary interest. Not since the days when they were under close surveillance of the Church have scientists been put in a defensive position of this kind. But in this instance it is not the theologian but the man in the street and on the farm who is asking his neighbor "what price science?" And since the physical scientists in particular take themselves seriously and are prone to regard the results of their activities as benefactions to mankind, they have been struck all of a heap and a number of them have felt obliged to make a public apologia that has been none too convincing.

This surprising situation has been the more remarkable in view of the fact that scientific discoveries have never before been so widely heralded by an organized press agency, nor their applications so extensively advertised by exhibitions of scientific progress, like that recently held at Chicago, and by celebrations such as was staged three years ago on the centenary of the discovery of electro-magnetic induction.

Yet could modest Michael Faraday have stepped out of the Royal Institution where in the Christmas holidays of 1860 he had given to a juvenile audience six lectures on the chemical history of a candle, and have seen his familiar London in the dead of night ablaze with indirect lighting, he would, I imagine, have been somewhat taken aback by the responsibility laid at his door for all that the spectacle implied.

A good many people have been left confused, in the present discussion of the matter, as to the distinction between scientist and inventor—between what is called pure science—the disinterested search for truth —and the practical applications of scientific discovery through engineering. This is the more so because the apologists for science, in bolstering up their defence, have chiefly instanced some of the more outstanding scientific inventions and their relation to human comforts and conveniences. Even so, there may be reason to doubt whether the harvester, the internal combustion engine, the electric dynamo, the victrola, the cinema, the radio, the sawed-off machine gun and so on have in the long run been more beneficial or harmful. They enable us to do more in shorter time, to go faster between points, to banish darkness and so on, but how much human society has been benefited by more wheat with less labor, by getting somewhere a little quicker, by the products of Hollywood, the electric light and night life, the radio and its misleading advertisements, the machine gun and banditry, is open to question.

And whether any one thinks more clearly and deeply than before about the social problems that face humankind and whether people as a whole are as contented and happy as they were in simpler times may well be doubted. Invention of course is an inevitable part of science, in so far as the scientist continually has to improvise things to help with his researches, but the trouble comes when business takes both science and engineering into partnership and then through mass production abetted by the psychology of modern supersalesmanship makes the distribution of the economic benefits disturbingly lopsided.

Faraday's discovery was unquestionably the starting point of the electrical industry that has spread over the world and employs a vast number of people. At the same time, with the great expansion of electrical devices, the machine becomes man's chief competitor—the tractor-drawn harvester and gang-plow displace hordes of farm-hands; road-making and tracklaying and concrete-mixing and electric-welding machines displace hordes of city laborers; the electric furnace and out goes the chore man, the frigidaire and away with the iceman, the dialling telephone dismisses an army of operators from the switchboard. Countless other illustrations might be given to show how the applications of a scientific discovery may well throw people out of jobs faster than the manufacture of its patented gadgets gives others employment.

A short time ago a distinguished British engineer in extolling what Einstein has called "the limitless perspective and beauty of modern science" referred to the newly completed Battersea Power Station as representing the highest stage of development of the science of engineering; for there three steam turbines with a total output of 300,000 horse-power—a power exceeding that of four and a half million laborers!—could be seen in the engine room all under the control of one man wearing a spotless white coat. While this may appear beautiful to the engineer, there is at the same time something inhuman and terrifying about it.

It is quite true that many patented inventions are purchased and closeted to protect industries that are temporarily stabilized. It is true also that one can not easily foresee what will be the ultimate effect on society of a given invention—like the invention of printing, for example, which in making a new trade threw a vast number of scribes and rubricators out of work. There was no possibility of heading off the reduplication of books even had it been desirable, any more than could the electric light, the telephone, the automobile, the cinema, the radio, the aeroplane and countless other inventions based on scientific experiment and discovery have been pushed aside.

None of them could we now do without. They indubitably have added vastly to the interest and zest of life and at the same time have played a large part in what we have mistakenly idolized as prosperity. It has been estimated, for example, in pointing out the beneficent rôle of applied science that the commercial value of the inventions of one man alone—the late Thomas Edison—have amounted to fifteen thousand million dollars. And just here it seems to

me that in some concealed way lies the crux of the matter. For compared with this vast sum, had Jenner's or Lister's or Pasteur's or Laveran's discoveries been patented and commercialized instead of being outright gifts to humankind, the economic value of any one of them would have been simply incalculable.

Theology, long the controlling factor in our educational system, finally was supplanted and the chief emphasis came to be laid on linguistic and literary culture. This state of things endured until the past century when the great advancement in the natural sciences and engineering enabled their representatives successfully to challenge the supremacy of the classics, thereby securing ultimate parity in the curriculum. At the present time we may be approaching another such change since in some institutions business has come to be accorded the dignity of a university subject. This would not be particularly disturbing were it not for the close association of business with engineering and other applied sciences through the commercialization of their inventions, this contact with its implication of advertising and salesmanship being as remote from the old humanism and its standards of culture as anything well could be.

The view has been expressed by Dr. Sarton that "Science must become more humanistic and that humanism must include science." But this is far from humanism ever coming to include business or from expecting business ever to become humanistic with its ancient maxim that "what's good for business must therefore be good for everybody," which is a little like saying that charity begins at home—and usually ends there. Dr. Sarton, I take it, was using the words in their more truly Ciceronian sense, as David Eugene Smith presumably does in saying[6] that by studying the mathematics of the Greeks in the original texts Regiomontanus was "the first who made humanism the handmaid of science."

So it may be horrifying to scholars to have what appears to be a modern connotation given to this historic word. Regiomontanus, however, was called from Nürnberg to Rome by Pope Sixtus IV to put his mathematical mind on the reform of the calendar and subsequently at his own expense printed the first almanac, a copy of which Columbus supposedly used on his voyages. This to my conception was no less humanistic on his part than taking up the study of Greek the better to understand the principles laid down by the early writers on mathematical and astronomical subjects.

It would be Utopian to expect of commercialized science that it should forego the financial returns from its discoveries and inventions on the grounds that if its activities are so definitely gifts to mankind, mankind should have a larger share in the profits. Yet this has been part and parcel of the ethical code of the doctor and of medical scientists from time immemorial—only to be broken occasionally of late years, I grieve to admit, under the provocation of economic necessity.

Time was when the doctor would have lost caste if he commercialized a secret remedy, the method of preparing a useful drug, a piece of apparatus or a surgical instrument. Now that the barrier has been broken and a university here and there has come to engage in the marketing of such products, there is danger that the tendency may spread and that the profession's long-accepted standards of humanism may come to be lowered. In the past, vast fortunes have been made for quacks and charlatans by the sale through advertising of worthless patent medicines, and the temptation must be great in these hard times for those who have discovered, let us say, some potent tissue extract that proves to be of a high medicinal value. Should it become a universal custom, however, and Medicine thereby become commercialized, she may well hang her head for her lost altruism, particularly should Science come to take a leaf from her book and decide that the greater part of the royalties on her patent rights justly belongs to the people. This has been done in a few instances but the practice is not likely to become universal for human nature is the last thing to change and this is still a practical, that is selfish, world and not the New Atlantis.

It is of course extremely doubtful whether Science is in any way to blame for the economic troubles in which the world has been wallowing. One might with equal reason lay unemployment and the increasing need of insurance against old age at the door of Medicine for keeping more people alive than can be employed. Nevertheless the fact that the question of responsibility has at this time been raised will certainly some day be looked back upon as a matter of great historical interst.

People in general are unquestionably becoming more socially minded—that is, more "humanistic" in its broader sense—and this is everywhere reflected in the governments that undertake, however feebly, to represent them. In a brilliant and courageous address[7] just a year ago before the American Association for the Advancement of Science, that modern Cato, the present Secretary of Agriculture, challenged the assembled scientists and engineers to tell where they were heading; and lest Spengler prove to be right in his pessimistic prophecies, he appealed to them to bend their talents to higher human aims than the mere increase of productive power.

In similar vein the Bishop of Carlisle opened the recent meeting of the British Association at Aberdeen

[6] "History of Mathematics," Vol. I, p. 260, 1923.

[7] Henry A. Wallace, SCIENCE, January 5, 1934.

with a sermon in which he asked whether the time had not come for science to abandon something of its severe spirit of isolation. The entire program of the meeting, indeed, was given over to a consideration of the social consequences of scientific discoveries. It represented a plea for the closer affiliation of science in the task of government "in terms which admit of unfettered inquiry, of undiminished loyalty to the truth, and a vision characteristic of the great age of Greece." This at least is what reports of the meeting said of it, and if that is not an appeal for a more humanistic science one is at a loss what to call it.

Among those who call themselves pure scientists, whatever their particular field, there are many who feel that they would demean themselves and lose caste among their fellows should they engage in researches that obviously point toward some utilitarian purpose. This I have always regarded as an academic pose; for in the disinterested pursuit of knowledge, to stumble, as did Röntgen or the Curies or Banting, on something not only of great scientific importance but which at the same time was immediately applicable to human welfare is certainly nothing to be ashamed of.

There have been plenty of socially minded and benevolent—dare I say humanistic?—scientists in the past. One quickly thinks of Benjamin Franklin, of Count Rumford and Humphry Davy, to give a few examples. Two of them were American-born, and to one of these the citizens of Munich erected a monument in gratitude for the reforms in public service and social economy that he had brought about while a resident in Bavaria. In their day was organized in England a Society for Improving the Condition and Adding to the Comforts of the Poor "by the systematic employment of scientific methods and knowledge."

Whether the present British Science Guild whose professed purpose is "to promote the application of the scientific methods to social problems and public affairs" is an outgrowth or a continuance of the older society I am not prepared to say, but the fact that no such organization exists in America should give our scientists pause. Never was there greater need for such a movement, and people are beginning to ask why our social problems are not being attacked by those presumably best fitted to solve them because of their familiarity with scientific methods.

Something of the sort might well enough grow out of the Science Advisory Board recently appointed to give advice and make recommendations to the government regarding ways in which science might be of service to the public interest. And should the leaders among our scientists grow more sensitive to the mood of the times and be persuaded at this juncture to focus their highly trained and inventive minds intensively on these difficult subjects, a more humanistic attitude of science or humanization of scientific effort might result which might check the present trend toward a machine-made and -operated civilization whose social dislocations more than offset the personal convenience of its many time-saving and labor-saving devices.

So let us hope that when some future student of this confused and disconcerting period in our history comes to tell of it, he will be able to say: That at the very time when such progress in their subjects was being made as never before, with one discovery following on the heels of another, the scientists and engineers of the country temporarily abandoned the investigations dear to their hearts in order to concentrate on problems the most difficult of all to solve—those that have to do with the social well-being of the community at large. Thus, under a quickly spreading Religion of Humanity, there began a new era—one in which scientists took a commanding position in a rapidly changing world and through their well-planned and executed experiments a new and rational science of society came into being and made its first great forward movement.

It has been said[8] that one distinct advantage we hold over our predecessors is that we have more history behind us; and that the value of classical studies is what they teach us, by example or warning, of the experiences of the civilizations from which we have sprung. So in all likelihood my imaginary historian in recording the new humanistic spirit that was born of the great depression will have occasion to add that those who played the most effective part in bringing it about, whether scientists or not, were persons who knew where were to be found the most noble examples of civic duty, who were familiar with the long history of another republic and who remembered Cicero's maxim, *Salus populi suprema lex esto.*

OBITUARY

DEATH OF THREE FORMER PRESIDENTS OF THE PHYSICS CLUB OF PHILADELPHIA

DURING recent months the Physics Club of Philadelphia has lost by death three of its former presidents.

Edward A. Partridge, president during 1912–13, died on March 22, 1934. He was educated at Central High School, Philadelphia, and at the University of Pennsylvania. In 1898 he was awarded the doctor's degree in mathematics. His life work was science

[8] J. W. Mackail's "Classical Studies," 1925, XII.