work of the correlation of the old empirical knowledge with which alone engineering formerly worked. With the completion of this latter task science might come to be the sole guide of engineering, but for two considerations.

First, as engineering adopts the knowledge which science has correlated it simultaneously unearths new uncorrelated knowledge. Science indeed correlates this in turn, but not instantaneously, so that engineering has always at its hand both that which science has correlated and its own empirical discoveries which science has not yet had time to arrange. As optimists we may well expect that this uncorrelated knowledge will form a gradually decreasing fraction of the whole, but can we expect it ever to vanish completely? Must not science's approach to exclusive leadership be asymptotic?

We begin to get a glimmering of the vastness of the scheme of creation when we remember that every lengthening of man's artificial vision by means of telescope and camera, every new strengthening of telescope, sensitizing of plate, and lengthening of exposure brings a proportional increase in the number of visible suns, telling us that even at that inconceivable distance we have not begun to approach the limit of the discoverable universe. When we turn from telescope to microscope and thence to the inferred constitution of matter, we find with every new refinement of observation and inference a proportional addition of new wonders, a proportional increment in the complexity of natural phenomena. Hence while we may speculate that, as there must be a place where the stars end, so there must be a degree beyond which the subdivision of matter can not go, and a limit to the number of nature's laws, we may well ask whether either that limit or the limit of stellar space will be reached in that little throb in the pulse of the universe which we call the habitable period of this earth. Will man survive long enough to complete the discovery of all laws, so that no uncorrelated phenomena will remain for the engineer to unearth?

The second of the two considerations which tend to postpone the completion of science's leadership is that the beautiful as distinguished from the useful and the good will increase without limit its demands upon the work of the engineer. Though the beautiful itself should in time be capable of complete mathematical analysis, who shall say that that time, now seemingly so inconceivably remote, can arrive during man's earthly stay?

HENRY M. HOWE

OUR PSYCHOLOGICAL ASSOCIATION AND RESEARCH[1]

THE American Psychological Association, like the infants who are among the objects of our study, celebrated its first birthday some months after it was born. We are thus able to hold at the same time our twenty-fifth meeting and mark the completion of nearly twenty-five years of activity. This period covers the working life of most of us and about half the adult life of the science in which we work. Wundt's "Physiologische Psychologie," published in 1874, may be taken to mark the coming of age of the experimental work of Weber, Helmholtz and Fechner. But if psychology as a science was made in Germany, the raw materials were contributed from many nations, many centuries, many sciences; and the leading strings attaching us to Germany were severed at about the time when this association was organized.

[1] Address given on the occasion of the celebration of the twenty-fifth anniversary of the American Psychological Association, New York, December 28, 1916.

Our three great leaders in psychology had made straight the way, James at Harvard, Hall at the Johns Hopkins, Ladd at Yale. The publication of "The Principles of Psychology" in 1890 was a declaration of independence, defining the boundary lines of a new science with unapproachable genius. Simultaneously with the printing of the articles composing James's book, Hall was developing the genetic and educational work in psychology which now occupies such a large place. At that time professorships and laboratories of psychology were established at Clark, Pennsylvania, Harvard, Yale, Wisconsin, Toronto, Cornell, Princeton, Columbia and other universities, and these gave birth to the newer generation now active among us.

Both as significant symbol of the position attained by psychology and as true cause of its further progress, the establishment of the American Psychological Association in 1892 is notable. The American Chemical Society, founded in 1876, was the first of our special scientific societies; it was followed in 1888 by societies of mathematicians and geologists. But our association is among the oldest of the fifty different national organizations now meeting here. The association of those with common interests throughout the nation and the world, so that our neighbors are no longer only or chiefly those living in the same place, is among the most remarkable changes and advances of modern civilization. The social group reacts in much the same way as the local group, there are jealousies, misunderstandings and quarrels, but also respect, friendship and cooperation, and when the group can perform a useful service or is threatened from without it develops a consciousness of kind. Groups of this character, whose individuals are bound together by common interests and objects, may become institutions more dominant over our lives, having greater claims to our loyalty and service, than the conventional family, the helpless church or the blood-stained nation.

Our place of birth was Clark University; the day, July 8, 1892; G. Stanley Hall was our Socrates and mid-wife. The original members numbered twenty-six. It may be worth while to call the roll. Frank Angell, then as now of Stanford University, a lost angel to us, for he is no longer among the fellowship of the saints. J. Mark Baldwin, then of the University of Toronto, whose contributions to psychology have been so notable, also one of the few whose name is absent from our rolls. William Lowe Bryan and Edmund C. Sanford, pioneers in experimental research, now fallen to "that bad eminence," where they bear the load Atlantean of our humbler fates. W. H. Burnham and Bejamin Ives Gilman, the one in a fundamental branch of education, the other in the fine arts, carrying on work somewhat apart from ours, but related to it. William Noyes, recently lost to us, and Edward Cowles, distinguished alienists. Cattell—*adsum*. John Dewey, John the Baptist of democracy, teacher of teachers, modern master of those who know. E. B. Delabarre, then as now at Brown University. W. O. Krohn, then at Clark; Herbert Nichols, then at Harvard; E. W. Scripture, then at Yale, no longer climbing the steep stairs and eating the bitter bread of academic life. James Hyslop, now following the mystic grail. J. G. Hume, of Toronto University, who saved us from a narrow nationalism and with E. H. Griffin, dean and scholar of the Johns Hopkins University, saved us from a narrow empiricism. Joseph Jastrow, our first secretary, who this afternoon is here to tell us of the work in which he himself has been such a great part. George H. Fullerton, my first professional colleague and comrade, acute thinker, one

of our early presidents, now far away. Lightner Witmer, my first student and my successor at Pennsylvania, where he leads in an important field of research. G. T. W. Patrick, of Iowa, and H. K. Wolfe, of Nebraska, influential as teachers and in their work in psychology and philosophy. Last and most honored of the living, G. Stanley Hall and George T. Ladd, our first two presidents, then seeming to be veteran leaders, but now having become my contemporaries, men to whom we owe so much in so many ways, founders not only of our association, but also of psychology.

To the twenty-six original members, five were added by election at the preliminary meeting. Death has taken from us T. Wesley Mills, of McGill, early worker in animal psychology, and H. T. Ormond, of Princeton, distinguished philosopher. Edward Pace seems to be sheltered from us by the wings of the church in the educational work in which he is engaged. Then there were two men elected not only into the association, but selected from the whole world, because they were those whom we wanted and needed, E. B. Titchener and Hugo Münsterberg.

I once wrote: "Harvard with James Münsterberg, Royce . . . surpasses every other university in the world in its opportunity for psychological study and research." Now they all await us "where beyond these voices there is peace"—Hugo Münsterberg, always my friend since our student days in Leipzig, who with the hand of genius threw prodigally broadcast the diverse endowments of his great nation and his great race; William James, "the sweetest, wisest soul of all my days and lands"; there is none like him, none, nor will be; and Josiah Royce, his friend and ours, the well-beloved disciple, who leaves the world darker, now since his light is quenched.

Should the roll be called of the present membership of the association, there would be three hundred and seven to respond, and there are besides ten former members and others who stand among the hundred leading psychologists according to the list which I have compiled by objective methods.[2] The number of those professionally engaged in psychological work has increased nearly tenfold in twenty-five years. The original members represented 14 colleges and universities. There are now 122 institutions in which our members teach. Then the *American Journal of Psychology*, recently established, stood almost alone; now the published directory of American psychological periodicals contains eighteen titles. This is a growth of our work that has scarcely been paralleled in the history of science.

While it is not feasible to name all the individuals now composing the association, it may be well to give some data in regard to their distribution. The numbers in our chief institutions—including my own—are larger than I had supposed before counting them up. They are: Columbia 23,[3] Chicago 11, Cornell and Harvard 10, Clark, Johns Hopkins and Ohio State 8, Illinois and Michigan 7, Iowa, Pennsylvania, Princeton, Wisconsin and Yale 6, Minnesota and Pittsburgh 5, Bryn Mawr, California, New York University, Texas and Western Reserve 4, Brown, Northwestern, Vassar and Wellesley 3. There are 96 institutions with one or two psychologists—32 universities, 42 colleges and 22 normal

[2] They are: Frank Angell, J. Mark Baldwin, J. E. Creighton, Edwin B. Holt, J. H. Hyslop, Herbert Nichols, E. A. Pace, George Santayana, E. W. Scripture and C. A. Strong. Several of them are primarily interested in philosophy; three reside in France. More than 90 per cent. of our psychologists are thus members of the association.

[3] On Christmas day died Naomi Norsworthy, associate professor of educational psychology in the Teachers College, skilled in research, a truly great teacher, a noble woman.

schools in which psychology is being taught by our members.

272 of our 307 members are now or were recently engaged in teaching (including educational administration). This is a larger percentage than in any other science except mathematics. Most of the remaining 35 have also taught. Of these there are eleven who are engaged in work unrelated to psychology, supposing this to be the case for married women, for there are nine women among the eleven. We have one museum curator, two clergymen, and two practising physicians. Then there are sixteen connected with boards of education, hospitals, laboratories of reformatory and charitable institutions and the like. It is not impossible that this group, now so small, may at our fiftieth anniversary surpass in numbers those engaged in teaching.

258, or 84 per cent., of our members are recorded as holding the degree of doctor of philosophy. Psychology is the most academic of all subjects, a larger percentage of psychologists having taken the advanced university degree than is the case in any other science. Thus in a study made several years ago I found that about 60 per cent. of zoologists and of mathematicians, who in this respect come next to psychologists, have taken the degree and the percentage falls to about 10 for anatomists and pathologists. The American universities which have conferred more than two of these degrees are: Columbia 46, Harvard and Chicago 31, Clark 25, Cornell 24, Johns Hopkins and Yale 15, Pennsylvania 11, Iowa 6 and Michigan 4. The foreign universities are: Leipzig 15, Würzburg, Berlin and Freiburg 3. These fourteen institutions have conferred all but 27 of the 258 degrees. But while psychologists have taken their advanced degrees from a small number of institutions their college origin is very wide. They come largely and increasingly from the institutions of the central and western states, but the data at hand do not permit of a numerical statement. In my previous study I found that psychologists were as likely to come from small colleges as from large institutions having strong departments, and that those from the smaller institutions were equally likely to be distinguished.

At our second meeting, held in New York in 1893, Professor Mary W. Calkins and Mrs. C. Ladd Franklin were elected to membership. We were thus tolerably prompt to recognize equality of opportunity for the sexes, and this record we have maintained, for we now have 39 women among our members. Thirteen per cent. of women may be an unlucky number—it does not represent the ratio of the sexes—but it is larger than in any other science. I have recently counted up the number of women in my Biographical Directory, and find that among the 224 psychologists, 9.8 per cent. are women. Zoology stands next with 7.5, and the percentage falls to 2.1 for chemistry and 1.3 for physics and geology. Of our 39 women members 36 have the degree of doctor of philosophy, 11 from Chicago, 5 from Cornell and 3 from Columbia. If we should use the illegitimate method of projecting the curves of attendance in our courses in psychology at Columbia, we could set the date when it will be no longer a coeducational institution.

I think it is safe to state that we are now doing more work in psychology than any other nation. I once counted up the entries in the Index covering the first 25 volumes of the *Zeitschrift für Psychologie*—from 1890 to 1902—containing references to the articles published in the journal or reviewed by it, the more important contributions to psychology from the German point of view. It was disclosed that during this period America led all nations in experi-

mental work, exceeding Great Britain in a ratio of 10 to 1, that in theoretical contributions we were about equal to Great Britain, but were doubled by France and tripled by Germany. In contributions of a physiological and pathological character we fell far below these nations and below Italy, Germany surpassing us in a ratio of nearly 10 to 1. I have found no convenient way of making a similar comparison for the more recent period, and all contemporary international comparisons are now impossible. "Who's Who in Science," published in England in 1913, attributed 84 of the world's leading psychologists to the United States, as compared with 31 to Germany, 27 to England and 13 to France. This is a predominance which according to the book the United States holds in no other science.

We may wonder whether the importance of the work accomplished in this country for psychology has increased in the same ratio as the number of those engaged in it. It would not be fair to expect to see ten Jameses in this room, just as it would be unreasonable to look for five Darwins in England, because its biologists may have increased five-fold in a generation; or twenty Newtons, because the physicists may have increased twenty-fold since his time. But do we have a hundred members doing work as valuable as that of the more productive ten of those whose names I have recalled among our first members? Probably we have; in so far as it may seem otherwise, this may be because there are in the earlier days of a science more opportunities for original departures, but more especially to the fact that the relation of eminence to numbers follows a psychophysic law of its own. The number in a group who become eminent tends to be a constant, dependent on the limitations of the attention and the interest of the members. Thus a savage tribe may have as many distinguished chiefs and warriors as a nation of a hundred million. We may be unable to see the trees for the forest.

It would be impossible in the time allotted to me to give a history of the development of psychology during the past twenty-five years or an account of American contributions. It seems to me that the lines of development, especially in this country, have been in the directions which from the beginning I have followed, though my advocacy and example have doubtless been epiphenomenal. These are to ally psychology and its methods with the natural and exact sciences rather than with philosophy; to replace introspection and verbal descriptions by experiments and measurements; to investigate behavior and conduct rather than mind and consciousness; to study individual and group differences; to make practical applications and develop a profession of applied psychology.

Mr. Dean R. Brimhall has counted up for me—so my own prejudices are eliminated—the papers presented at the twenty-five meetings of the association. The reports have been printed in *The Psychological Review* and *Bulletin,* except those of the first two annual meetings, which were printed in a brochure which was edited by me as secretary. On the chart is shown for five-year periods the percentages of papers in accordance with their character. Applied psychology and individual psychology are cross classes, the same papers being listed for a second time and also largely in both classes. Only a rough subdivision is feasible, but it serves to show the distribution of our interests and the changes that have taken place in the course of twenty-five years.

In order to obtain information concerning present work, I have used the method of the questionnaire—a psychological tool which we owe in large measure to Stanley

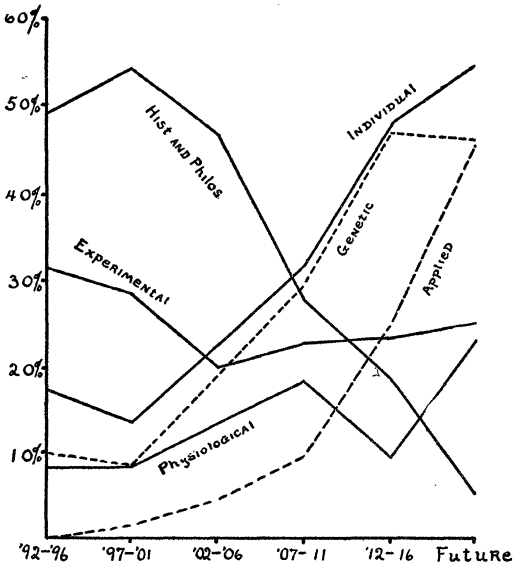

Chart showing the Distribution of Work of American Psychologists

Hall, though some of us may at times regard it as an invention of the devil. Members of the association were asked to fill in a blank stating the psychological researches in which they are engaged or plan to take up soon and the amount of time they are able to spend on research. Of the 220 who replied, 68 either reported that they are not at present doing research work in psychology or signed the blank without making a report. Of the 87 members who have not replied there are only a few who are doing work of consequence. More than 90 per cent. of those working in psychology are members of the association, and the replies consequently represent fairly well the work now in progress.

The last ordinate of the curve is for this work. When more than one research was reported the subjects were distributed fractionally so that the 152 replies give an equal number of researches and represent the work of so many individuals. The most impressive exhibition is the small amount of attention given to historical, critical, philosophical and analytical subjects, and that half of all the work is devoted to genetic and educational psychology. The suicide of philosophical papers is in part accounted for by the birth of our child—The American Philosophical Association—and does not necessarily represent a decreased interest in philosophy in America. It does, however, mean the establishment of psychology as a science completely independent of philosophy.

We are each year carrying forward more and more research work and, I trust, are continually improving its quality. We are doing a larger quantity of work than any other nation and work of equal value. But our accomplishment falls far below what it might be and should be. Psychology does not attract a sufficient number of able men and adequate opportunity is not given to them. I suppose the median salary paid psychologists who teach is less than that of employees in the railway unions, nor do we have the eight-hour day. The Ph.D. with all its outfit is a trap baited for mediocrity rather than for intelligence, and the victim gets caught at the advanced average age of 28 years. Then he must teach or starve or both. He has done research work of a kind, but whether it has been the mere routine attempt to solve a set problem or promises original performance, he is stewed in the same juice. He is not given a position unless he has done the modest amount of work required for the doctorate, but the position is usually such that further research work is prohibited. If he shows exceptional ability he may receive a minor university appointment with extension and summer courses, and if he continues to show ability he may become a dean or a president or some such thing. Scientific research and productive scholarship are regarded as desirable accomplishments, and men are sometimes called from one institution to

another because of their advertising value, or promoted in their institutions to ward off such calls; but usually the only considerable and tangible reward open to an investigator is transfer to an executive position which makes further investigation impossible.

The situation is illumined by answers to my questions. Of those who report that they are doing research work, 109 give the percentage of their working time that they are able to devote to it. Sixteen are able to give more than half their time to research, 50 from quarter to half, 43 less than quarter, 106 of our members are doing no psychological research. A man must be regarded as an amateur in work to which he does not devote more than half his time. If we add to the sixteen professionally engaged in psychological research, an equal contribution from those who did not reply to the questionnaire or to this particular question, the number would be about doubled, but they are not in fact nearly so many, and some of those who reported are doing work primarily physiological or psychiatric in nature. We have all told fewer than 25 men who are able to devote more than half their time to psychological research, men who may be regarded as professionally engaged in investigation.

It is further a misfortune or crime of the first magnitude that there is but little correlation between the performance of the men and the time they are now able to devote to research. Of the four men who state that they are able to devote all their time to such work, one is a young man temporarily out of a job, one holds a research fellowship, one a subordinate position in an industrial laboratory, one has an institutional position. If we divide the members into three classes of merit, the first 30, the second 70 and the balance of 207, in accordance with the selection by ten leading psychologists which I have previously described, and which has recently been made for the third time, we get this arrangement for those who answered the question:

Time Devoted to Research	Class I	Class II	Class III	Total
More than 50%.....	4	4	8	16
25% to 50%.....	9	15	26	50
Less than 25%.....	10	25	114	149
Total.....	23	44	148	215

The largest group, one ominously large, is not unnaturally those who do little or no research work and who are undistinguished. But apart from this group it appears that those with greater ability for research are not able to devote considerably more time to it than others.

The conditions adverse to research are not peculiar to psychology nor even to science. They hold in all cases where services are for the benefit of society as a whole rather than for individuals or groups. Men can not undertake research as a profession and be paid in accordance with the value of the work they accomplish. Aristocratic institutions have devised schemes for the reward of research, but these can not be transported overseas to a democracy. We do not want a leisure class in order to secure certain desirable by-products. A title, presentation at court, or an invitation to dine with a lord, can scarcely have an equivalent here. Membership in a national academy of sciences, a gold medal or an honorary university degree is a feeble stimulus, belonging to other days and other ways than ours. The payment of scientific men, as of soldiers, in the fiat money of honor and glory, like the inexpensive offering of happiness in heaven to compensate for meekness and misery on earth, is not a method of modern democracy.

There are four ways by which research work in psychology and other sciences can

be undertaken as a profession: (1) At our universities and colleges, in so far as these recognize that research work is part of the service for which instructors and professors are paid; (2) under the federal government, the states and the municipalities, when these regard the promotion and payment of research as a function of the state; (3) in endowed research institutions or in charitable and public institutions in which research is considered part of their objects, and (4) in cases where work can be conducted on an economic basis. For psychology we have no endowed research laboratory, the state does but little, our discoveries are not patentable and our expert knowledge is but rarely saleable. Nearly all of us are employed by universities and colleges, and we are in the main dependent on them for the opportunity to do the work that is done. Their attitude is on the whole favorable and is improving.

As secretary of a committee of the American Association for the Advancement of Science, I have addressed inquiries to all our institutions of higher education, asking the extent to which research work and productive scholarship are considered in making appointments and promotions and are regarded as part of the work for which instructors and professors are paid. Nearly all the replies emphasize the weight laid on research.

The president of Harvard University writes:

> In the making of appointments and promotions at Harvard University, greater weight, on the average, is given to scientific research and productive scholarship than to any other single consideration. Research is a part of the work expected from instructors and professors.

The president of Columbia University:

> In making recommendations for appointments and promotions in the faculties of Columbia University, the several departments concerned are expected to give predominant weight, and as matter of fact do give predominant weight, to capacity for scientific research and to evidence of productive scholarship.

The president of the University of Wisconsin:

> Scholarly work or research is a part of the work expected of instructors and professors. When presenting statements to the legislature I have estimated that upon the average from one third to one fourth of the cost should be charged to investigation.

The president of the University of Illinois:

> The work of research is fundamentally a part of the duty of the university, and this is especially true of state universities. Necessary equipment and necessary time should be allowed for every member of the staff to be actively engaged in some piece of research work all the time.

Letters such as these are full of encouragement for the future; but we must remember that it is not on university presidents and trustees but on us ourselves that the future depends.

To individual philanthropy we owe the endowment of research and of institutions expressly devoted to research. We have long had endowed astronomical observatories, and it is due to this circumstance that America has done relatively better in astronomy than in any other science. Museums, botanical gardens and similar institutions have more and more seriously added scientific investigation to their other functions. But it is only within recent years that the Carnegie Institution of Washington and the Rockefeller Institute for Medical Research have been established, and we see in them for the first time in history research in pure science conducted as a profession. There is urgent need of an adequately endowed Institute for Psychological Research; but we can scarcely expect one of our members to supply the needed ten million dollars.

Our federal government makes larger

appropriations for scientific research than any other nation, and the money has on the whole been used to advantage. The fact that the work there is mainly economic is not, in my opinion, altogether a drawback. The difficulty has been that better provision is made for routine work than for exceptional performance. The present emergency has led to further large appropriations by congress for scientific research, and we may hope that the truth expressed in the President's words "Preparation for peace is the best preparation for war" will lead to still greater efforts to promote science for the national welfare. The government has done practically nothing for psychology, and the Bureau of Education is inadequately supported. The Smith-Hughes bill, however, provides a considerable sum for educational research, a large part of which will be psychological in character. Public education is supported with increasing appreciation throughout the country and our educational systems are gradually learning the importance of psychological experts. State supported institutions for the defective and criminal classes are also beginning to make such appointments.

The patent laws were enacted before psychology had been invented; there is at present no way by which ideas can be controlled for the profit of the man who gives them to the world, even to the smallest percentage of the value of his gift. How this may be corrected may itself become an object of psychological research. If some means could be devised by which the state could pay for the services of individuals in accordance with their value to the state, the progress of science and of civilization would be greatly accelerated. In the meanwhile the psychologist may increase an inadequate salary by the writing of textbooks and by outside teaching and lecturing, but he usually does so at the sacrifice of research. There may soon be psychological experts whose advice will be paid for at the same rate as is now paid for the advice of physicians, engineers and lawyers. It is a curious circumstance that while the plan is being introduced of full-time professors of medicine with relatively adequate salaries, the professors in the graduate faculties must increasingly support their families by outside work. The cost per student or per professor of the magnificent buildings and grounds of the university where we are now meeting is perhaps four times what it once was or need now be for purposes of teaching and research, whereas the effective value of the salary of the professor at Columbia is now about one fourth what it was thirty years ago.

It is our business as individuals and especially as united in this American Psychological Association to use all possible efforts at all times, in all places and in all ways to improve the conditions under which research work is done. Science has doubled the length of human life and quadrupled the productivity of labor. A single advance in applied science, such as the Bessemer steel process or the electromagnet, discovered by Faraday in the only research laboratory then existing, may add annually some two billion dollars to the wealth of the world. The psychological and social sciences have already done their share in freeing us from superstition and unreason, in leading us to tell the truth as we see it and in some measure to see the truth as it is. They have repaid many fold their cost in economic applications. An improvement of ten per cent. in the educational work of this country saves us a hundred million dollars a year. But it is to the future that we look to obtain a control over human conduct corresponding to that of physical science over the material world, and more vital. We must eliminate the in-

calculable waste of preventable idleness, misfit employment, disease, vice, crime and war; we must divide wealth more fairly and use it more wisely, we must alter fundamentally all our institutions, the family, the church, the school, the courts, government and the rest; each must be enabled to give what he best can and to receive what he most needs. And, as I said twenty-two years ago—before that "infant industry" eugenics had begun its career—in my address as president before this association:

> We not only hold the clay in our hands to mould to honor or dishonor, but we also have the ultimate decision as to what material we shall use. The physicist can turn his pig-iron into steel, and so can we ours; but he can not alter the quantities of gold and iron in his world, whereas we can in ours. Our responsibility is, indeed, very great.

J. McKeen Cattell

AN INSTITUTE FOR THE HISTORY OF SCIENCE AND CIVILIZATION

To those interested in placing before American students advantages not only greater than are now offered in this country, but greater than those offered abroad, the following statement may suggest an opportunity.

The history of science deals with so large a part of the intellectual development of the race, that it should attract the interest of every thinking person. Such an interest is already manifest among an ever-increasing number of scientists and technicians. Furthermore, a very general interest is also becoming apparent, for example, in the history of the numerous means of locomotion from the first beasts of burden to the airplane of to-day; in the history of computation from the ingenious but rude abacus to the refined calculating machine; in the history of such methods of communication as telegraphy and telephony and in the history of medical and surgical practise.

If we consider it from a higher point of view, the importance of the history of science becomes even greater. We then realize that science is the strongest force that makes for the unity of our civilization, that it is also essentially a cumulative process, and hence that no history of civilization can be tolerably true and complete in which the development of science is not given a considerable place. Indeed, *the evolution of science must be the leading thread of all general history.*

The more scientific research becomes specialized, the more do coordinating studies of some kind become necessary to keep scientists interested in one another's work. Specialism, indispensable as it is, should not be allowed to obscure the broader vision, and there is no better way to prepare these coordinating, encyclopedic studies than to unfold as clearly as possible the evolution and interrelations of all sciences. These have not grown independently, but together, the progress of each making further progress possible for all the others. *The history of science is the essential basis of any philosophy of science, indeed of any philosophy which is not mere metaphysics or literature.*

Science is ever growing and is becoming daily a more important factor in the field of education. Science it is which makes it possible for men to tame the forces of nature to their purpose; which is the foundation of all material power; which is the backbone of our civilization. Knowledge is power, but this power may become a danger if its spirit be false and if it be bent solely upon material achievements. It is only when science is explained and tempered by history that it acquires its whole educational value, and that the main objections to scientific education cease to be valid. *The more science enters into our lives, the more it must be "humanized," and there is no better way to humanize it than to study its history.* Such studies, reconciling the purely scientific, the historic, and the philosophic points of view, would be the source of the soundest and highest idealism.

The field of the history of science as we have defined it is, of course, too broad to be adequately covered by separate departments in any of our universities. This can only be accomplished by an institution devoted strictly to this purpose and adequately equipped for