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

the great work that needs to be done. Such an institution should open its doors freely to the few who are sufficiently advanced to profit by its help, but it should not be hampered by any question of degrees or credits, remaining free to do for the advanced student what it feels will be of service in establishing the highest standards of research and scholarship.

An institute devoted to this work, by whatever name designated, would need to be sufficiently endowed to be independent of fees or of large financial returns from its publications. It might be established independently, with a building of its own in any city with abundant library and museum facilities, or it might be endowed to work as part of some institution already organized, such as a large university or a museum of science.

Such an institute should have among its activities the following:

1. To offer to qualified students the best equipment for work and the advice, assistance and encouragement of a small corps of experts in the history of science.

2. To afford to universities, libraries and scholars the opportunity to acquire at cost photographs of important manuscripts, documents and objects, thus making it possible to study leisurely at home many original sources that at present can only be examined abroad and at a considerable expenditure of time and money. To this end there should be secured the best available technicians, with the best types of apparatus, working both in foreign libraries and in the laboratory of the institute.

3. To offer to scientists interested in history, to historians interested in science, and to cultivated philosophers a meeting place worthy of their respect; a clearing-house where all matters of common interest to them would be centralized, examined and eventually made known to the world.

4. To begin collections of prints, instruments and all other early material bearing on the history of pure and applied science. This activity could in course of time expand into a department of enormous importance, as is clear to any one who has visited the Conservatoire des Arts et Métiers in Paris, the Science Museum in Kensington, or the Deutsches Museum in Munich, foundations with which we have nothing to compare in this country.

5. To publish two journals, one of a popular nature and the other of the highest scientific character. The former should set forth in an interesting manner the latest discoveries in the history of familiar science, appealing to the eye through the best style of illustration and to the intellect through popular but accurate and scholarly statements. It should also give much attention to the history of civilization in all its highest features, and should thus do for history, though in a more scholarly way, what has already been so successfully done for geography. The scientific journal might be a series of editions of important scientific manuscripts or a journal of the type of *Isis* which should record the world's work on the subject. In such a journal great attention should be given to bibliography, not merely external but also internal and critical. For this purpose the institute should carry on, in its own field, the coordination of the most thorough bibliographical work, mobilizing the best critical talent available.

Such an institute would not rival any department in our universities. It can and should set a higher standard of scholarship by reason of its independence, and it should be looked upon as a valuable aid by every university in this country and abroad, and as a source of supply of material which no university or library can furnish.

The institute would need to begin its work with a small staff of experts; with a small number of well-trained technicians, including photographers and process workers; with bibliographical and clerical assistants; with a well-chosen library; and with the best facilities for scientific bibliographical work. It would, of course, be necessary to do part of the work abroad, since it would be too expensive to assemble in any one place all the scholars whose cooperation would be essential to the best success. This is especially the case with respect to the Oriental civilizations, in connection with which a great amount of pioneer work remains to be done.

The international character of the institute should also be fully recognized. Although located in America, its field of influence would extend equally to all other countries and it would develop a power for internationalism the value of which could hardly be exaggerated. It is a serious misfortune that, whereas there are thousands of organizations devoted to local history, or to such auxiliary branches as heraldry, genealogy and numismatics, there is nowhere a single one that is dedicated to the historical study of that which is *the greatest common good to all mankind,* the excellent institute in Leipzig being devoted exclusively to the history of medicine. It would place the New World in another light if there could be founded here, especially at this time, an institute which might in the near future become the cradle of new intellectual movement, of a new humanism.

There is already a gratifying interest in the project. Two or three of the finest libraries on the history of science and of its special branches are likely to be given to the institute if it is founded on the lines above set forth.

The following scholars have written to express their interest and sympathy and most of them have promised some kind of collaboration:

Joseph Sweetman Ames, Wilder Dwight Bancroft, Fr. Barry, Alexander Graham Bell, George David Birkhoff, Franz Boas, Marston Taylor Bogert, James Henry Breasted, George Lincoln Burr, Florian Cajori, William Wallace Campbell, Paul Carus, William Ernest Castle, James McKeen Cattell, William Bullock Clark, Frank Wigglesworth Clarke, Thomas Chrowder Chamberlin, Russell Henry Chittenden, William Thomas Councilman, Henry Crew, Harvey Cushing, Charles Benedict Davenport, William Morris Davis, Arthur Louis Day, John Dewey, Leonard Eugene Dickson, Henry Herbert Donaldson, Jesse Walter Fewkes, Edwin Brant Frost, Fielding Hudson Garrison, George Ellery Hale, Granville Stanley Hall, Charles Homer Haskins, Lawrence T. Henderson, T. William Francis Hillebrand, William Ernest Hocking, R. F. Alfred Hoernlé, William Henry Howell, Edward Vermilye Huntington, Ellsworth Huntington, Morris Jastrow, Jr., David Starr Jordan, Louis Charles Karpinski, Arnold Carl Klebs, George Frederick Kunz, Berthold Laufer, William Libby, Frank Rattray Lillie, Ralph S. Lillie, William Albert Locy, Jacques Loeb, Graham Lusk, Percival Lowell [deceased], Franklin Paine Mall, George Herbert Mead, Samuel James Meltzer, Albert Abraham Michelson, Robert Andrews Millikan, Edward Caldwell Moore, Eliakim Hastings Moore, Ernest Carroll Moore, Arthur Amos Noyes, William Albert Noyes, William Fogg Osgood, George Howard Parker, Ralph Barton Perry, Edward Charles Pickering, Frederick Leslie Ransome, Theodore William Richards, David Riesman, James Harvey Robinson, Julius Sachs, William Thompson Sedgwick, Thomas Jefferson Jackson See, H. M. Sheffer, Paul Shorey, James Thomson Shotwell, David Eugene Smith, Edgar Fahs Smith, Edward Clark Streeter, Henry Osborn Taylor, Harry Walter Tyler, Victor Clarence Vaughan, Addison Emery Verrill, James Joseph Walsh, Arthur Gordon Webster, William Henry Welch, Edmund Beecher Wilson, James Haughton Woods.

In the matter of corespondence the undersigned will act for those interested in the movement until it is seen whether a more definite organization can be effected.

George Sarton

Harvard University,
Cambridge, Mass.

SCIENTIFIC EVENTS

TECHNICAL AND MEDICAL EDUCATION IN RUSSIA

The London *Times* states that one of the most striking features of recent educational reform in Russia has been the unusual activity of Count Ignatiev, the ex-minister of education. There has been great need of people of higher education in Russia in two departments especially, the technical and the medical. In November last Count Ignatiev brought before the Duma a scheme for a new university statute introducing far-reaching reforms. Meantime many new technical and medical schools are already being provided for. Ten new technical institutes of various types are in process of organization, and in this connection Count Ignatiev approached the municipalities and Zemstva concerned, with a view to sharing the expense. These technical institutes are to be opened especially in the eastern part of the empire, in Saratov, Vyatka,