

impure, deteriorated or inferior drugs. This commissioner should be a retail pharmacist actively engaged in the business, and having had at least ten years' experience as proprietor of a pharmacy, being such at the time of his appointment; he should be required to give at least eight hours per diem to his official duties, be required to visit either, personally, or through one of his agents, every pharmacy in the state at least four times annually, at least one visit being made by himself; he should be provided with an office and necessary office force; also a properly equipped laboratory, and laboratory force, competent to make necessary examinations of drugs, not only as to their purity but in the case of so-called patent or proprietary medicines, as to their contents, so as to be able to state whether they are safe for general medication or not; one month prior to the time of examination of candidates for registration, in conjunction with the dean of the school of pharmacy of the state (if recognized as such by the Conference of Faculties) or where there are two or more such schools, the one nearest his headquarters; or in states where there is no such school, with the President and Secretary of the State Pharmaceutical Association, he should select five retail pharmacists in actual practice, who, in conjunction with himself, should select the questions for the ensuing examination and conduct the same, together with such assistants as might be necessary, giving at least two days of eight hours each to the examination, one day, or more if necessary, being given to a thorough test of the candidates' ability to recognize and identify drugs and chemicals, according to the tests set forth in the U. S. P., the preparing of official preparations and compounding of prescriptions; five days or less after the last day of the examinations, the names of the successful candidates should be published, in one or more of the leading newspapers of the state; and each candidate receive a notice as to whether he was successful or not, from the office of the commissioner, whose name should appear on all certificates issued.

The commissioner should be appointed for a period of five years, and besides all expenses of his office and official duties, such as traveling expenses, etc., receive a salary commensurate with his work; those chosen to conduct the examinations should be paid at the rate of \$5 per day, the time not to exceed ten days at any one time of examination.

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## SCIENCE AND THE SCIENCES.\*

CHARLES ZUEBLIN, BOSTON.

We are beginning to see that democracy is not, as was thought at the beginning of the last century, the condition of society or organization of government which would secure the greatest good of the greatest number; the greatest good of all is now our ideal. We are no longer content with the splendid definition of political democracy enunciated by President Lincoln, "a government of the people, by the people, and for the people." We want something more than po-

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litical democracy, and perhaps a discussion of education as a preparation for this fuller democracy may of itself help to explain democracy—democracy which is not government of, for, and by the people merely, but the life of all, by the cooperation of all, for the welfare of all.

Education necessarily is modified to meet the demands of a progressive civilization. New institutions require new methods, and both the method and content of education, therefore, change with civilization's onward march. In the last century we observe two great social phenomena which were fundamental in their influence on our educational system, speaking now not merely of schools, but of all which goes on through life. These two phenomena are the Industrial Revolution and the Transformation of Domestic Life.

With the eighteenth century in Great Britain, and extending to the rest of the western world in the nineteenth, there occurred an industrial revolution. The most significant of the transformations of the educational system are the introduction into the curriculum of science, in its various applications, evolutionary philosophy, pure science of various kinds, applied science, and the mere inferences of science, which come to us out of the air almost, so that we think in scientific terms, even if we have not minds trained in science.

We are in the presence today of a decay of the influence of the dead languages and mathematics. Whether this is legitimate, whether it will be continued, remains for the scientists and pedagogues to investigate, but we are in the midst of their decadence and rejoicing in it. Not that we believe that it is not good to study these languages, but that in the multiplication of indispensable subjects today these are becoming increasingly non-essential for the mass of the people. If you only stop to think you will appreciate the fact that many do not stay in school long enough to distinguish one writer from another. It cannot matter much that a few have read the *Anabasis*, with some scraps of Homer, all of which they have successfully forgotten. As for mathematics, we recognize that we spend too much time over arithmetic, solving problems which the higher mathematics will enable us to solve much more easily. Intellectual discipline is the only purpose of these things, it would appear, and there are other ways of getting intellectual discipline. It can be done in any useful occupation, and the best discipline of all we get from science.

The reconstruction of philosophy is going to grow out of average working men, getting discipline from their machines, which the older people did not get from the study of the classics and mathematics. This discipline may be very imperfect, because the workman is not led to see its application. He gets laws, but the application of them is difficult.

The school must be an organic part of the daily life, which means that the school must be a cooperative institution; competition must be subordinated. The old method was to make each child independent, by measuring his intellectual acquisitions apart from those of his companions, and making the assisting of one's companions a crime. In the school of the future, to assist will be a mutual benefit. In all the departments of wood-working it is possible for the children to assist each other with benefit to everybody. But if we employ examinations as a measure of mere quantitative acquisition, there can be no mutual assistance. It may be that cooperation will never eliminate competition,

but we cannot go on with a highly organized society where there is no mutual interdependence as a feature of it.

What are some of the possible applications of education to the social science of today, which must be the corollaries of the use of science in the schools. The true place to begin is with births. We do not know how children come into the world, what they are like, what they give promise of being from the standpoint of heredity and environment. We cannot answer these purely quantitative questions—how many children there are and of what ages. There is the decennial census, which tells us a few years after, a few of the things we want to know when they have ceased to be true, for which we pay an immense sum of money to political appointees. If we are to have a democratic government let us have a permanent census bureau keeping us informed all the time about everybody. In that way we should lay the foundation for a scientific treatment of life.

The day is coming when we shall want to use the scientific knowledge we are acquiring so that every child that is going to come into the world will have at its entrance the presence of a government physician to see that it is done properly, and that the child is guaranteed life. The mother may have as many private physicians and other people as are within the command of her pocket-book, and whom she may regard as indispensable, but government subsidies will guarantee a decent entrance into the world. That is a perfectly legitimate requisite on the basis of the scientific knowledge we have. Does that seem Utopian? We already impose penalties for failure to report the death of people. If it is concealed, we look into it and suspect a crime. Surely it is more of a crime not to get children properly into the world.

Children will no longer dread the schools when we begin to use our scientific knowledge in treating these children. We are beginning to have nurses and medical inspection in the schools, and to give the pupils good food once a day, though there are some who would cry out against these things as paternalism. Meanwhile what are we going to do about it? Are we going on in the same old way, breeding no better children, giving all our money to increasing our scientific attainments in the rearing of dogs, horses, cattle, and poultry?

This country suffers from more serious accidents than any other country in the world. It is time we had the data to show to the world why these things happen, and then they will not happen any more. It is almost incredible to think that in a school in Cleveland quite recently two hundred little children had their lives snuffed out, while in a Pennsylvania town a similar holocaust had taken place only a few weeks before, and the disaster at the Iroquois theater in Chicago occurred only a couple of years before. It is incredible that these things should be repeated in the same country, when we know how to protect buildings from fire, and we know what sanitary precautions are, and we do not take them.

We shall go on in this application of science still further. We shall begin to distribute our population. We know where we need people today, and know where we do not need any more people. We do not need any more people for a great many years in Philadelphia, New York, Boston, or any of those seaport towns, and these people who come here should be taken away to the South, the West, and the Northwest, where they are needed.

That will also suggest the problem of unemployment. We shall know where

people are wanted, and see that they are there. We ride in our great, beautiful trains from Chicago to New York, where you get every few minutes the record of the stock market. If you can distribute that kind of information, surely you might distribute some industrial information to the settled towns. It is not necessary to elaborate this further, but we shall culminate by making some provision for the old age that comes to those people who are fortunate enough to live long enough. We shall have pensions for the aged which will enable them to live decently, so that they will not be a burden upon youth, as well as seeing that youth is not dependent upon them.

The relation of education to science means to us a superior discipline in the school for every boy and girl, keeping them there longer in order that they may get the benefits of this science, then putting them into industry better trained, and then extending this democratization of science until it ramifies through the whole of life.

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#### A STRIKING OBJECT-LESSON IN HEREDITY.

The long-looked-for history of the Kallikak family\* has at last come from the press of the publishers. Under the auspices of the Training-School for Feeble-Minded at Vineland, N. J., Dr. Henry H. Goddard has investigated and compiled the results of his work in the heredity of this most remarkable family. During Revolutionary days, the first Martin Kallikak (the name is fictitious), descended from a long line of good English ancestry, took advantage of a feeble-minded girl. The result of their indulgence was a feeble-minded son. This son married a normal woman. They in turn produced five feeble-minded and two normal children. Practically all of the descendants of these defectives have been traced as well as those of the two normals.

From both normal and defective descendants of this union came a long line of defective stock. There were 480 in all. Of these thirty-six were illegitimate, thirty-three sexually immoral, twenty-four confirmed alcoholics and three epileptics. Eighty-two died in infancy, three were criminal, eight kept houses of ill fame and 143 were distinctly feeble-minded. Only forty-six were found who were apparently normal. The rest are unknown or doubtful. But the scion of the good family who started this long line of delinquent and defective progeny is also responsible for a strain of an entirely different character. After the Revolutionary War was over, he married a Quaker girl of good ancestry and settled down to live a respectable life after the traditions of his forefathers. From this legal union with a normal woman there have been 496 descendants. All of these except two have been of normal mentality. The exceptions were cases of insanity, presumably inherited through marriage with an outside strain in which there was a constitutional psychopathic tendency. In all the 496 there was not an instance of feeble-mindedness. The offspring descended from this side of the house have universally occupied positions in the upper walks of life. They have never been criminals or ne'er-do-wells. On the other hand, there has not been a

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\* Goddard, Henry Herbert: *The Kallikak Family, a Study in the Heredity of Feeble-Mindedness*, New York, the Macmillan Company, 1912.

single instance of exceptional ability among the descendants of the first Martin Kallikak and the feeble-minded girl. Most of these descendants have failed to rise above the dead level of mediocrity, indeed, most of them have fallen far below even this minimum standard.

The fact that the descendants of both the normal and the feeble-minded mother have been traced and studied in every conceivable environment, and that the respective strains have always been true to type, tends to confirm the belief that heredity has been the determining factor in the formation of their respective characters. In the cities the descendants of the legal marriage with the normal woman are physicians, lawyers and prominent business men, while the descendants of the feeble-minded mother are almost invariably found in the slums. In the rural districts the descendants of the normal mother and her consort are wealthy and influential farmers, while the others never rise above the rank of farm laborers and shiftless men and women who are unable to subsist without the aid of charity. Many representatives of the defective branch are inmates of almshouses, while there are no paupers at all among the normal descendants.

In many ways this study of Goddard's far outweighs in importance the famous comparison by Dr. Winship of the Jukes and Edwards families. In that case the simple fact was demonstrated that a good family like that of the illustrious Jonathan Edwards had given rise to innumerable examples of the highest intellectual and moral worth, whereas the criminal Jukes for seven generations contributed nothing to the common good, and cost the State of New York large sums of money. But the Jukes family and the Edwards family had no ancestor in common. Their environment was totally different and they lived in entirely separate communities. Although from sociologic and economic points of view the history of the Jukes family and its comparison with that of the family of Jonathan Edwards has great value, it is of but scant scientific importance as compared with that of the Kallikak family, for here a natural object-lesson in eugenics shows unmistakably the manner in which after-coming generations from a given mating receive the characteristics of the dominant strain, which in the elder (illegitimate) Kallikak line was the inferior strain, with only a debased and enfeebled heritage to hand on.—*Journ. A. M. A.*