

undertake to teach these things along with the practise of farming to a lad just out of the eighth grade? Manifestly not, and for the reason that to him that hath shall be given. Few of the well-prepared boys who enter college make good scientists. Almost none of those entering Dr. Pritchett's ideal school would be able to comprehend scientific problems at all. They would go back to the farms because unprepared for any of the more advanced lines of agricultural work.

Dr. Pritchett believes that the Iowa State College has turned out more lawyers than farmers. It is too bad to break down a system of beliefs by ruthlessly intruding the facts, but the information at hand shows that about two fifths of the recent graduates of the agricultural courses are engaged in actual farming, while only 5 to 7 per cent. are in non-agricultural work. But few of the graduates have become lawyers. Until the demand for teachers and experimentalists is met it is hard to comprehend where they are to be trained if not at agricultural colleges. It is also difficult to see how these men could be more useful to the state by working a farm than by teaching the sciences pertaining to farming, editing farm papers, or testing hypotheses concerning the application of science to agriculture. This answer must be either that all scientific research is now complete, or else that scientific research is not worth while, since, forsooth, the agricultural college should make its main work the teaching of the art of farming.

The second thing needful in realizing Dr. Pritchett's ideal in agricultural school effort is isolation. This needs no discussion, since the grade of education he has in mind certainly could not flourish in a college, alongside of, and on a par with, real college work. However, the world is big and there is a place for the grade of instruction which the doctor has in mind. In fact it is being offered in the numerous short courses at the college and over the state. There will be more such short courses in the future, but the college will hardly go out of business in order to make room for them. It is not improbable that county agricultural high schools, or even town-

ship schools may, in a way which the college could not, meet the needs which Dr. Pritchett has in mind. Something of the sort has been begun. In Europe this kind of instruction is common, but the agricultural colleges are not sacrificed in order that it may be done. On the contrary, they furnish the teachers and a large part of the subject matter for the courses given in the lower grade schools. A paragraph from Dean Bailey, of Cornell, often called a prophet in agriculture, will not be amiss:

An internal danger is the giving of instruction in colleges of agriculture that is not founded on good preparation of the student or is not organized on a sound educational basis. Winter-course and special students may be admitted, and extension work must be done; but the first responsibility of a college of agriculture is to give a good educational course; it deals with education rather than with agriculture, and its success in the end will depend on the reputation it makes with school men.

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A CALL FOR AMPLE AND TRUSTWORTHY VITAL STATISTICS

THE appeal of Dr. J. Madison Taylor, published in *SCIENCE*, October 11, 1912, for a more general and critical body of human statistics is one which should elicit a ready response upon the part of scientific men generally. No one who has had occasion to investigate a problem involving data of human history but can confirm the deficiencies to which Dr. Taylor refers. Something over a year ago the present writer began an inquiry relating to educational betterment which led to a search of various documents such as yearbooks, census reports, reports of the Bureau of Education, etc., and it soon became apparent that these sources were noteworthy for what they did not contain. In other words, they were woefully lacking in just that class of data which were vital to the inquiry in hand. An inquiry as to the existence of personal and family records soon revealed the fact that here, even more than in the other sources, except in rare instances, it was almost impossible to discover data of any adequate or reliable character.

The importance of such data in their rela-

tion to various problems of human interest is too well known to call for argument. However, it may not be amiss to cite a few incidental phases of such interest, and among them the following are especially important. Maudsley long ago ("Pathology of Mind"), emphasized its importance in relation to questions of insanity.

When we are told that a man has become deranged from anxiety or grief, we have learned very little if we rest content with that. How does it happen that another man, subject to exactly similar causes of grief, does not go mad? It is certain that the entire causes can not be the same where the effects are so different; and what we want to have laid bare is the conspiracy of conditions, internal and external, by which a mental shock, inoperative in one case, has had such serious consequences in another. A complete biographical account of the individual, not neglecting the consideration of his hereditary antecedents, would alone suffice to set forth distinctly the causation of his insanity.

It is hardly necessary to say that what is stated in this case has become greatly more certain in the light of manifold facts of current knowledge.

But important as is such knowledge in its bearing upon insanity as a malady to be cared for or treated, it is even more important in its possible relations to social and economic problems. It is no part of the purpose of this brief paper to deal with these phases of the subject. The problem which has concerned the writer is that of eugenics in relation to educational betterment. With many who have been concerned in the present status and tendencies in educational progress he has had a growing conviction that conditions are deplorably bad in many respects, and in some matters the situation is grave to a degree not generally realized. It is not the ranting criticism of hasty reformers and radicals of quixotic type which is the occasion of concern. But those who know best the situation, those who are upon the inside, the friends of the best in educational tradition and inheritance, have been among the critics, and have not hesitated to cry aloud and spare not. Then, too, we have had opportunity to "see

ourselves as others see us." Our system of education has been designated as a "*Proliferating Mediocrity*." It is thrown into our teeth that the present generation has added little or naught to literary, or philosophic, or scientific greatness; that we take none of the Nobel prizes for scholarly achievement; that American schools are glorified chiefly as a *theoretical system*. To such arraignment we may, or may not plead guilty, according to our points of view. This is not the place to discuss the pros or cons. Conditions have provoked the challenge and criticism. It is serious enough to give us pause, and to awaken inquiry and analysis. Assuming there are possible grounds for criticism, that our so-called system is not perfect, that a tendency to mediocre results exists, what can be done in the matter? And further, what has all this to do with vital statistics?

Considering first the last feature, let it be noted that had there been gathered during the century past a body of school statistics of a critical and informing character we should be in possession of just the data which would enable us to answer some of these questions in a more thorough and convincing manner than is possible without them. It is very well to glorify the values of education by pointing to distinguished jurists, statesmen, educators and others, as products of Harvard or Yale or Oxford, etc., but it may still be open to query whether *all this is so!* The cynic will retort "They were great in spite of this, that or the other college!" And who has convincing evidence for or against?

But this is not the only, or chief, call for statistics. There has long been current, as a sort of creedal tenet, applicable to all sorts of social or civil or religious or educational conditions, the adage *all men are created free and equal!* But deductions of science and sociology have later been declaring the very opposite, that men are created under bondage and to inequality through laws of heredity and variable environment. So far as education is concerned it may be assumed as beyond reasonable debate that the armies of idiocy, imbecility, feeble-mindedness, to mention no

others, prove the latter conclusion all too convincingly.

But among the educable none who has had practical experience with the problem is likely to espouse the older tenet. Limitations and inequalities are obvious conditions, not for the schools alone, but for every vocation or avocation of human life. Now, in theory, all this has been quietly ignored. We have framed our curricula, whether of kindergarten, school or college, on the older assumption. There have been *radicals* at work on the curricula of schools for delinquents and imbeciles, and the latter view of human nature has been unhesitatingly accepted as settled. But not so in the schools for normal and subnormal children. Here we still adhere to the older assumption; and while the dunce-cap or the rod may have passed as an index of our inherent faith in our creed, still there are other evidences of the integrity of our creedal loyalty! And how has it worked out in practice? The answer, at least in part, is simple and obvious. Scholarly standards have been made to suit *averages*. While a large proportion are capable of successfully achieving the general average, a considerable proportion could just as easily attain the highest rank of efficiency. But first consideration has been given to the mediocre or average class. The pupil of fine ability, of potential genius, has been allowed to drift, to loaf after the easy task of the average has been met in an indifferent way! And what of the backward or low grade pupil? Here too has there been the same ill-directed mechanical ideals; he has been abused, hectored, discouraged and allowed to become a part of the flotsam of ne'er-dos.

Vital statistics comprising such data as Dr. Taylor suggests, among which are baby records of growth, development, physical and physiological peculiarities, etc., including also data of early childhood and its distinctive traits and idiosyncrasies, would furnish a first discriminative basis for educational outlook. Following this up with similar data of kindergarten and grade schools, in connection with such devices for testing mental quality as the

Binet Scale, the intelligent teacher has at command a ready means for differentiating the school work so as to insure from it a degree of efficiency which in the past has been quite out of the question. Such school statistics, made a part of the permanent records of the school, are at once available, not only as they relate to school pedigrees, but might readily become part of the vital statistics of the city, the state or the nation.

But the difficulties involved! To be sure there will be some difficulty in securing such statistics, and considerable labor as well. But they are not insuperable; they are not so difficult as may be supposed. Such data are already available in many schools. I have direct information as to the existence of such data in the schools of Pittsburgh, Rochester, New York City and others, where for several years these facts have been critically compiled and filed as a part of the records of the schools, just as are data of grades, etc. One condition which greatly lessens the supposed difficulty of such vital records is that of medical school inspection. This has now become a recognized part of all progressive school direction. And while as yet it may be chiefly concerned with such physical problems as teeth, tonsils, nose, eyes, ears, etc., yet there is no good reason why it may not include some note of mental traits, idiosyncrasies, etc. But further, it is now well known that in some of the better schools there are already provided child-study laboratories equipped with all necessary facilities for critically measuring mental qualities, among which are inquiries into heredity and antecedents.

Now to revert to the question of educational betterment. Let it be recognized at once that education is not *creator*, but *guide*. Educability is largely a question of innate mental constitution, which fundamentally is determined by brain structure and its correlations. Hitherto our only means of forming an estimate of educability has been that of experiment. Try out the subject by a dozen years of school life; then pass him on to the college; possibly what the schools failed to do some academic legerdemain of a college pro-

fessor may achieve! But the experiment usually serves only to continue through four years further a task which a brief glance through the school pedigree would have shown to be hopeless against hope. Education must in some way have its basis of selection and differentiation no less efficient than has been that of organic nature. One of the most hopeful of these means, so far as the writer can perceive, is through what may be designated as educational eugenics, the application of the principles of eugenics to problems of mind to the function of the schools, and pre-eminently to the college and university, in the same general way through which we are presuming to secure better social and racial germ plasms.

Assuming what is now generally conceded, that all human characteristics are inherited in probably equal degree, and this must include mental traits and aptitudes, then it is not utopian to anticipate the existence of potentialities of intellect which it may be possible to distinguish early in development, if indeed they may not be predicted on some basis such as Mendelism, and which may serve as an index of fitness for or against prospective scholastic eminence of such nature as to warrant encouragement or inhibition, as the case may be. This does not imply that all educational effort need be intercepted; to the contrary, it means rather differentiation of aims and methods. One may give no promise whatever of fitness for distinctively literary or scientific or pedagogical education, yet may be safely directed toward technical, vocational or industrial education. In other words, our program, like that of eugenics in general, should be selective in both a positive and a negative sense; fitness should be sought and fostered in every reasonable way, while the unfit should be deflected or diverted into avenues in which some outlook may prompt specialized training adapted to such betterment as may be within realization.

Let me close as I began, with a call for ampler and more critical vital statistics. They are needed in almost every phase of our complex modern social and civil life. They

can be made contributory to health, to moral and social conservation, and, as it seems to me, to educational progress toward a degree of efficiency and excellence for which it will no longer be necessary to apologize or explain.

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TO TRACE THE LINES OF FORCE IN AN ELECTRO-STATIC FIELD

MR. R. F. D'ARCY describes an arrangement for tracing the lines of force of an electrostatic field in *Nature*, of March 20. Mr. D'Arcy's method is to support a metal ball at the top of a tall glass tube standing upon a float in a tray of mercury. Then, according to Mr. D'Arcy, the insulated ball follows the horizontal lines of force of the electric field between the properly placed terminals of a large electric machine.

Another method for tracing the lines of force in an electric field is described by Mr. B. M. Neville in *Nature* of April 3. Mr. Neville simply allows a scrap of cotton-wool to fall between the knobs of an electric machine. As soon as the bit of cotton-wool touches one of the terminals it becomes charged and moves off rapidly along a line of force.

The most satisfactory method known to the writer for tracing the lines of force in an electrostatic field is to suspend a toothpick by fine thread from the end of a long handle. When placed in the electric field the suspended toothpick behaves exactly like a compass in a magnetic field, and points in the direction of the field.

The method suggested by Mr. D'Arcy is open to the objection that an insulated metal ball does not, in general, tend to move along the lines of force in an electric field. The objection to Mr. Neville's arrangement is that the piece of cotton-wool moves too rapidly.

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THE fact that an idea is a decade old is not necessarily a recommendation for it; but if it