

(Continued from first page.)

advance for the school to take is to provide a better general training for all the undergraduates, in a wider field of subjects, before they enter upon the special technical studies of science.

(b) This is in line with the settled policy of the school. The Scientific School has always stood for a scientific and not a technical training.

The contrast here expressed refers to the kind of instruction and the results expected in order to fit an undergraduate for his degree. The instructor is designed to teach the principles and theory of science, not the practice of art or the technical application of science. This latter part of education is left for graduate work and for the special schools. Herein this school differs from those schools which profess to send men out ready to practice at once the scientific branches they have been studying.

A graduate of the Scientific School, if he has been faithful, is supposed to be ready to take up his professional studies, and the training given is that which it is believed will best fit him to take up professional studies and pursue them to best advantage.

LESS LIKE A TECHNICAL SCHOOL.

Thus in policy, spirit and purpose, the School corresponds more closely to the undergraduate department of a literary college, than to a technical school or a strict university—with this difference, that the course is adapted to the needs of those whose life-work calls for scientific knowledge and ability for research rather than a high degree of literary training and fluency.

(c) The present trend of education calls for this broadening of the scientific curriculum.

The progress of civilization with its easy means of communication and larger fields, is demanding a fuller preparation for every one who hopes to hold his head the least above the common crowd, or is in any degree to lead and guide the affairs of the world. Without such training he must be content to be swept along on the surging current of humanity. It is in appreciation of this need that we have training schools in every branch of work. Manual training, technical arts, business, science, pure and applied; medicine in all lines, theology, law, and even the practice of dealing with the poor and outcast are calling for special training and special schools. Women as well as men, the low as well as the high, all who have the ambition and opportunity are calling for a broader and more thorough equipment for their life work. While the schools of higher education have become greatly specialized in response to this need, the amount and scope of foundation studies demanded to fit each man, whatever is to be his special calling, to cope with circumstances, has continually increased. Thus we find the trend of education is also, on all hands, increasing the amount and kind of general studies required to fit men to master the more exact specialties of their advanced work.

This trend of education points directly to an increasing, sooner or later, of the number of years in the Scientific School if we would keep in the front.

THE LEADERS OF TO-DAY.

(d) The signs of the times point in the same direction.

Who are the leaders of men to-day? No longer can it be said that the men of purely literary training are now leading the world. To-day the leaders of the thought and the progress of the world are those who, with a broad education to start with, have devoted themselves to science. Let us name over a few of the men of science known throughout the civilized world, who have swayed the deepest thought of the people. Faraday, Tyndall, Kelvin, Carnot, Siemens, and Helmholtz, Darwin, Huxley, and our own Agassiz and Silliman, Zittel and Pasteur, Dubois and Raymond. How great has been their influence!

What has made them so great? Not alone their mastery of science, but the breadth of their training as men. Eliot of Harvard was a chemist first, but he never would have been President of Harvard University had he not been a thoroughly educated man first. Jordan of Leland Stanford was an expert ichthyologist, but he is not alone a specialist. Specialization in science, if begun too early, makes but pedants, not men. The signs of the times in education warn us that a diet of pure science starves and dwarfs men more certainly than a diet of pure classics, for classics, though dead, are human.

And everyone who closely observes these signs of the times can foresee that our schools of science will deteriorate the education of the country, unless they provide thorough training in the humanistic branches of learning. And the very popularity of science makes our responsibility greater.

(e) The necessities of modern civilization call for a further equipment.

THE POSITION OF SCIENCE.

Science is no longer merely a branch of curious learning, studied simply for its own sake or for the love of truths. It has become the greatest and most important factor in modern civilization. Science makes possible the life of modern nations. Science is knitting the nations of the world into a great commercial family. The artificial production of ice in the ocean steamer is revolutionizing the tariff laws of the world. By its means the cattle, grazing on the plains of Patagonia, where labor is cheap, furnish the best of butter to the London market at a price cheaper than it can be manufactured in the United States. Science is doing more than anything else to make war impossible. But not only is this true, its effect upon the demands made upon men of business and affairs is revolutionary. With such wide competition and ready access, the whole world is open to one who attempts to do any great business. Our customers talk in all languages. The markets for domestic products are determined by thousands of local conditions, of geography, geology, climate, ideas and habits of peoples, laws and customs of nations. A man to be in the midst of the life of the times must be thoroughly educated in the rudiments of each of these branches of learning.

The time for laying a foundation, broad and deep, is while one is separated a little from the intense activity of life, or during the college life. As soon as a man enters the struggle, he must become specialized and devote his keenest energies to the immediate task before him. The better he is prepared for it, and the broader his education has been, the greater will be his mastering of the situation. Hence it is that the increasing demands of modern civilization call for a more thorough equipment and especially so for men of Science, in those broad and liberalizing studies, which will enable them to appreciate and make useful the perplexing relations they are sure to meet with if they attain any degree of success in after years.

THE DIGNITY OF SCIENCE.

(f) The dignity of science demands such a change. It is un-American and contrary to the spirit of equality of rights and of manhood to suppose that a teacher of Greek Grammar deserves any more honor than the builder of a steam engine, or that there is any higher dignity in studying the work of Virgil than in studying the work of Faraday. But with the present organization of the two great undergraduate departments of the University, there is a very distinct implication that those men who require a four years' curriculum for their degree are fitting for higher functions in life than those for whom three years of training is sufficient.

In other institutions this distinction is not made, four years in science-courses is as much expected as four years in literary studies.

But the answer will be made, that here we expect specialists to go on and take a couple or more years to finish their professional studies, and if our curriculum were enlarged to four years, the time required in preparing for the active work in the world would be too long.

The way this difficulty is met in other universities is by allowing those who wish to prepare for professions to take studies in their senior year which will lead directly to the end they are seeking, and which are allowed in shortening the time spent in the professional training. This plan would be perfectly practical in case our curriculum were lengthened to four years.

But the implication of inferiority is not removed by saying that it is intended that the more earnest men shall take two years in university studies after graduation, since the more earnest men who graduate in the four years Academic course are also expected to take similar graduate study.

Nor is it removed by saying that the three years course provides for men who were obliged to abbreviate their time of preparation for a life career, since this would be to acknowledge that it is an inferior course provided for those unable to take the best.

But, however much such claims might be made, in theory, the fact still remains that the large majority of the men entering the Scientific School do not intend to take graduate work; and when they do the inferiority, due to the shorter length of the curriculum, is distinctly recognized in the statement in the catalogue that more than two years of graduate labor may be required for a Ph.D. degree, "especially so whenever the course of undergraduate study has been, as in the Scientific School, less than four years." (p.139 of the catalogue.)

THE SELECT COURSE MEN.

(g) Another argument in the same direction is found in the fact that the Scientific Department, as in other universities, is chosen by a large number of men in every class who have no intention of becoming specialists in Science, and are in the select course for the same purpose that men are in the academic course—viz: for the purpose of getting a liberal education.

It is regarding the Select Course men that the implication works the greater wrong. In other, and particularly, the newer universities, the equality of the scientific and classical courses is made a special feature, perhaps for the very purpose of attracting students away from the older New England universities where the traditions are in favor of the Academic curriculum.

Of the larger universities, Yale is almost alone in retaining a three years' course for Scientific men, while requiring four years for the regular-course men.

We cannot criticize the present system as if there were any intention to draw these lines; we inherit the system with its faults, as with its virtues, from our fathers. These lines appeared because they were wrought in the very principles of the English universities of the time when our science department was started, and we were the first to provide the scientific college curriculum. The school was provided for those who then neither were able nor wanted to profit by a thorough education. Within the last fifty years, however, a great change has taken place, and the United States has become a nation of workers. So that Science has earned its place alongside of medicine, religion, and law, as one of the learned professions, and one, too, capable of moving the affairs of the world.

Because Science has thus become one of the most important factors in modern civilization, it is fitting that a curriculum in which Science is the central element should have a place of first, not second, rank in our University, fully equal in dignity and in advantages to the Academic Department. It is because science does occupy this position of prominence that we find so many young men, from all over the country, seeking a full liberal education in Scientific branches. And while other Universities are taking advantage of this appreciation of science to the degradation of literary scholar-

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