

SCIENCE

FRIDAY, AUGUST 26, 1910

CONTENTS

<i>Our Universities and Research: DR. ALFRED GOLDSBOROUGH MAYER</i>	257
<i>The Sheffield Meeting of the British Association for the Advancement of Science</i>	260
<i>The Association of Official Agricultural Chemists: DR. H. W. WILEY</i>	270
<i>Scientific Notes and News</i>	270
<i>University and Educational News</i>	273
<i>Discussion and Correspondence:—</i>	
<i>Schmiedeknecht on the Parasitic Hymenoptera of the Family Chalcidæ: DR. A. ARSÈNE GIRAULT. The Population of the United States: FRANK GILMAN</i>	273
<i>Quotations:—</i>	
<i>The Salaries of Professors</i>	277
<i>Scientific Books:—</i>	
<i>Coles-Finch on Water, its Origin and Use: DR. F. P. GULLIVER. Jongmans's Annual Bibliography to Paleontology: EDWARD W. BERRY</i>	278
<i>Botanical Notes:—</i>	
<i>An Experience and a Suggestion; The Action of the Brussels Congress: PROFESSOR CHARLES E. BESSEY</i>	280
<i>A Note on Traube's Theory of Osmosis and "Attraction-pressure": DR. F. H. GARRI-SON</i>	281
<i>Special Articles:—</i>	
<i>The Luminosity of Comets: PROFESSOR WM. L. DUDLEY</i>	286

MSS. intended for publication and books, etc., intended for review should be sent to the Editor of SCIENCE, Garrison-on-Hudson, N. Y.

OUR UNIVERSITIES AND RESEARCH

IN early colonial days there was but one course of study for all who entered an American college, and at its completion the candidate for a degree was required to translate the bible interchangeably into Hebrew, Latin, Greek or English. The culture of a long-past age was the sole concern of the college, and it heeded not the problems of the commonplace world beyond its walls. Its atmosphere was quite uncongenial to research, and the men of science of colonial times and of the several decades thereafter were commonly unconnected with the colleges.

Without aid or substantial recognition from our colleges, Harriot, Byrd, Clayton, Rittenhouse, Franklin, Wilson, Audubon, Rumsey, Fulton and Stevens strove or wrote. Indeed, of all the scientific worthies of those days John Winthrop, of Harvard, and Samuel Mitchell, of Columbia, were almost the only ones of note who labored within the shelter of the college.

With the birth of the republic, however, the most progressive of our colleges began to give courses in the sciences, and it was then that the spirit of research, which had already been fostered into being by men of culture of the outer world, made its first timid entrance within the college walls.

The efforts of its votaries attracted little or no official action on the part of the colleges for the expense involved in the prosecution of research in those early days was so slight that the professors themselves, small as their salaries were, could readily afford to meet them. Simple apparatus mainly the design of their own skilled hands, served Franklin and Henry for

their great discoveries, and I well knew a college professor of thirty years ago whose noteworthy researches in physics were performed always with inexpensive apparatus, almost wholly of his own construction. Nor was his case exceptional; it was almost the rule in our fathers' days.

To-day, the refinement of methods is rendering it impossible for the private investigator to purchase or even to construct the elaborate apparatus he requires.

The independent self-reliant investigator is vanishing, and his successor is becoming dependent in ever-increasing measure upon larger means than those of his own possession for the prosecution of research. Men of science are becoming trustees, not proprietors of the funds required for the expenses of investigation, and thus it is that our productive students are yearly becoming more and more dependent upon the university or the endowed institution, and the attitude of these bodies toward research is becoming of greater and greater importance to mankind, for the hope of civilization lies in him who sees the light beyond the confines of our knowledge of to-day.

Too many of us still believe the fostering of research to be a mere detail of secondary importance, but it is in fact of vital primary importance to each and every one of us, and its utmost advancement is a necessary and absolute duty for those who control the destinies of our colleges.

I fear it will be all too apparent to those who have the highest welfare of science at heart that our colleges have not yet awakened to a sufficient realization of the importance of research or of their heavy responsibility in the matter of its advancement. President Eliot in his recently published book upon "University Administration" presents in his masterly manner the wisdom gained through a lifetime of experience, yet not in one paragraph does he

deal with the special relation of the university toward research. The American university remains to-day the overgrown college, and conservation of the old rather than the revelation of new truth is its ideal.

But to return to the brighter side of the picture; the growing dependence of the individual investigator upon the university is in itself a good thing, for his conscience must be awakened to a sense of increased personal responsibility. His position is becoming that of a highly trusted servant of mankind, no longer the free follower of a mere impulse to explore. Through this dependence upon the college, the investigator becomes most happily surrounded by young minds whose leading spirit he should be. Intellectually nothing is more democratic than the atmosphere of the research laboratory wherein the finely trained but relatively inelastic mind of the master is complemented by the fresher view and greater daring of his pupils' thoughts. Of all collegiate aims, I would place next in importance to the strengthening of character the fostering of that freedom of thought and that masterly self-dependence which come only through earnest devotion to research.

Thus the new conditions are increasing the personal responsibilities and deepening the sphere of influence of the investigator, and in like ratio do they add to the burden of the responsibility of the university toward him to grant the opportunity he may use so well for the benefit of the world at large.

Our leading institutions have already begun to awaken to a realization of their duty toward research, but in many respects the position of the investigator within the college is still handicapped through the lingering traditions and aims of an age wherein his presence was but coldly welcomed.

We should realize that there are, broadly

speaking, two sorts of men in the *personnel* of every faculty, and while every successful professor must be an enthusiastic student and an inspiring teacher, some are mainly erudite, while others are productive of discoveries in science. While the needs of these two classes of men are mainly in accord, in some important respects they are at variance.

From the nature of the case, the merely erudite must greatly outnumber those whose genius is directed with success toward discovery, and thus the needs of the teacher have been well provided for, whereas the investigator finds his task rendered harder through the imposition of duties which, while precious in the opportunity they afford to the teacher are of a character to interfere with that freedom of action which is so essential to productive work in science or in art.

The teacher's happiest opportunity is in meeting students of the primary classes. It is also well for him to teach in the vacation school in order that his store of knowledge may become accessible to the many; but an atmosphere in which these ideals predominate to the exclusion of other aims is not favorable to the welfare of the productive student, for his disposition peculiarly befits him to perfect the training of the gifted few rather than to reiterate old truths for the enlightenment of the many. The American college has been justly solicitous for the welfare of the average student, but the requirements of the most gifted and original are in some measure sacrificed, and it is not due to accident that our colleges have not yet developed a man of science of the highest European type. For example, the extraordinary increase in the number of summer schools maintained by our universities has been adverse to the welfare of the investigator, forcing him as it does to the time-consuming task of pri-

mary teaching during a period when he should be most free to devote his attention to research. Owing to the paucity of their salaries, labor in summer schools is practically forced upon the young instructors, and this factor has become so serious a one that it is now the most pernicious single influence tending to defeat the development of the research spirit in the teaching force of our universities, stultifying as it does many a promising young man at the beginning of his career in science.

It is essential for the welfare of research within our universities that graduate schools shall maintain as an ideal the fostering of productive scholarship, rather than the mere training of college teachers, and the holders of professorships in our graduate schools should above all be successful investigators, for they will then be inspiring teachers.

Our universities have often been deterred from the most effective encouragement of research or have entered only half-heartedly into it, owing to the large expense involved, and thus many of our graduate schools are still mainly training institutions for college and high-school teachers.

In 1880 our colleges were housed in simple brick structures, whereas to-day they are domiciled in palaces. This material change has necessarily been disproportionate to their intellectual development during the same period, and those who have the welfare of the colleges at heart have had it brought forcefully to their attention that grand buildings and beautiful lawns may be necessary and are certainly desirable, but a university is made by a faculty of earnest and eminent men. Fair, intelligent, generous treatment their cause demands, for their very unselfish high-mindedness renders them peculiarly liable to be the prey of narrow exploiters of the mere commercial side of education.

It will be necessary for our colleges to offer a more attractive career to their professors, especially in the enlargement of opportunity for individual freedom of intellectual effort. This is more important than any increase in salaries, for the ablest men strive to serve mankind rather than to seek money. It is true, as President Eliot states, that "in the United States the profession of teaching and scientific research offers absolutely no money prizes." The middle ages looked complacently upon the beggar student and this spirit survives to-day in many a college trustee's easy tolerance of the poor salaries paid to famous teachers whose names will be remembered as leaders of our race long after his own has perished; but insufficient though their material support may be, it is of vastly more importance for us to improve their *opportunities* to be useful in respect to their peculiar individual abilities. This omnipotence of the effective individual is the key-note of the success of the German university system. German students seek individual professors—whereas ours commonly enter college ignorant of the names and even heedless of the scholarly reputations of their teachers.

The most serious effects of a bad system are often the most obscurely seen and difficult to detect, and it may safely be said that the most pernicious result of the treatment now accorded him who devotes his life to pure science is that it deters many an able young man from entering upon a career of research. When he leaves the university he elects to follow law or commercial pursuits, and hopes thereby to gain the competence which will enable him to reenter the ranks of men of science with all the great advantages of personal independence; but the habits of another life overwhelm him—he never returns and is lost to science.

ALFRED GOLDSBOROUGH MAYER

*THE SHEFFIELD MEETING OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE*¹

ON the last day of this month the British Association for the Advancement of Science will begin at Sheffield its eightieth annual meeting. Only once before in its history has the association met there. That was in 1879, when Professor G. J. Allman, M.D., F.R.S., the then president of the Linnæan Society, assumed the presidency of the association in succession to Mr. W. Spottiswoode, and the list of sectional presidents included such well-known names as Mr. G. Shaw Lefevre (economic science), Professor Dewar (chemistry), Mr. Clements Markham (geography) and Professor St. George Mivart (biology).

The extent to which the problems of to-day were even then attracting attention is shown by the subjects of the evening lectures, it being recorded in the annals of the association that Mr. W. Crookes, F.R.S., discoursed on Radiant Matter, Mr. W. E. Ayrtton lectured to the operative classes on "Electricity as Motive Power," and Professor E. Ray Lankester, F.R.S., discussed the question of degeneration. But though the former Sheffield meeting fully sustained the high reputation of the association on its scientific side, only 1,404 members and associates were attracted to the meeting. A smaller attendance has been recorded at only seven meetings during the past half century. The forthcoming meeting ought to bring together a much larger number of members and associates. The presidential addresses, the lectures, discussions and many of the individual papers promise to be of great interest and

¹The London *Times* prints annually a forecast of the meetings of the British Association for the Advancement of Science, compiled with the cooperation of the officers of the association. We reprint this sketch as the best available account of the forthcoming meeting.