blem and the desire to make a trial of it. Such a student will be very sorry when his clerkship in the clinic comes to an end.

Were the time of undergraduate medical study longer, the student could profit by attending special courses on clinical medicine in which a single group of diseases is intensively treated, say those of the digestive system, etc. Such courses should be offered in every medical center. They should be optional for medical students, not obligatory, and should be opened to physicians that apply to the medical clinic for "continuation courses." It may be that, sometime, as Professor Ewing has advised, we may add a fifth year to the medical curriculum, in order that more of this training may be given.

During his first year of clinical work, the student should study carefully a text-book of clinical methods of investigation; during his second year of clinical work he should study a good text-book of medical practise, in which both the diagnosis and treatment of internal diseases are dealt with. Such texts replace, to a large extent, the formal systematic lectures that formerly were given on medicine in the medical schools.

Above I have dealt only with the development of the teaching of the science and art of diagnosis. The teaching of clinical medicine includes, of course, that of therapy, and it, in my opinion, should be taught in a similar way, that is to say, first by a thorough education in the principles and technical methods of therapy, general and special; and, second, by first-hand experience in the application of these methods to the actual treatment of patients during the clinical clerkship. Unfortunately, the medical wards of our hospitals are all too often mere diagnostic institutes, unprepared for the teaching and application of therapeutics. It seems to me very desirable that each university medical clinic should have associated with it, not only an institution for clinical diagnosis, but also an institute for therapy, in which the methods of modern therapy may be systematically taught and applied.

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OUR UNIVERSITIES[1]

Such an organization as the American Philosophical Society represents a body of men who are keenly interested in the important problems that confront our universities. In my judgment, among the most significant problems we are facing to-day are the following: (1) the relation between instruction and research; (2) the relation in research of pure and applied science; and (3) the relation between university work and the modern commercial doctrine of efficiency. I wish to formulate a statement which will involve these three questions.

The research function of a university is its greatest function. In biological terminology it may be said to represent the central nervous system of the university organism. It stimulates and dominates every other function. It makes the atmosphere of a university, even in its undergraduate division, differ from that of a college. It affects the whole attitude toward subjects and toward life. This devotion, not merely to the acquisition of knowledge, but chiefly to the advancement of knowledge for its own sake, is the peculiar possession of universities.

This does not mean that teaching is not also an important university function; but it means rather that teaching is to be made most effective in an atmosphere of research. The university investigator not only lives on what may be called the "firing line" of his subject, but he is training group after group of recruits to continue the conquest of the unknown. To extend the boundaries of human knowledge, and to multiply oneself in genera-

[1] Response to the toast "Our Universities" given at the annual banquet of the American Philosophical Society, April 15, 1916.

tions of students, is the high privilege of the university investigator.

It is a point of view that seems to separate him from the ordinary interests of men, but to separate oneself from the vast majority of one's fellows in denying the ordinary ambition for place or for wealth; to devote oneself to the research for truth, with no expectation of recognition, except from a select coterie of colleagues; to spend one's energy upon investigations that will neither interest nor benefit mankind, except as they gradually enlarge the boundaries of knowledge, is a spirit distinctly fostered by the university.

In these days the demand that investigators shall be of practical service is swelling into a universal chorus. This demand fails to recognize the fact that to meet immediate need is relatively a superficial problem; and that the more fundamental the problem, the wider are its possible applications. For thousands of years the superficial problems of plant-breeding were attacked, and agriculture became a reasonably successful practise; but when such fundamental problems as evolution and heredity came to be attacked, an incidental result was a revolution of practical plant-breeding.

The study of anything that holds no relation to the needs or convenience of mankind is peculiarly difficult of comprehension by the American public, and the general sentiment is either opposed or at most indifferent to it. This feeling is emphasized by the development and rapid growth of technological schools, in connection with which there has developed one of our most serious problems. It can hardly be denied that the rigidity of the old American college in denying this form of special training its proper place, and thus controlling its prerequisites, forced the establishment of schools of applied science with no educational basis. And now the universities are confronted with the problem of incorporating this form of training into their organization without weakening it.

There must be the pursuit of science for its own sake, for it is the life-blood of a university; and there must be the application of science, for this is the genius of the age. Can these two exist together in the same university organization, and with mutual profit? The grave danger is that the essential function of a university may be given less opportunity to develop than certain subsidiary functions. The time has come, however, when the barrier between pure and applied science is more artificial than real, when each is essential to the best development of the other. Applied science is becoming so grounded in pure science that the former is only one of the natural expressions of the latter; and applied science has passed through its empirical stage and can advance now only as it cultivates pure science. The problem, therefore, is not so much one of grafting, as of cross-fertilization, that the strength of both may be combined in a single organization.

Perhaps it is fitting in this connection to sound a note of warning. In these days of efficiency, when university faculties are being checked up on the basis of the number of students and the number of hours spent with them, there is grave danger that efficiency of this type may be secured at the expense of investigation; in other words, that the teaching function of the university may be exalted above its research function. This would be disastrous, but it is certainly true that the atmosphere of business efficiency is not the atmosphere in which investigation can flourish, for research knows no limits of time and strength and numbers of students.

The normal atmosphere of a university is investigation; and the method of instruction is through companionship in investigation. The appropriation of previous knowledge is no longer the chief purpose, but is entirely subsidiary to the discovery of additions to knowledge; and the ability to stimulate students to investigate becomes the chief problem of teaching. This truth is so fundamental that without it there can be no universities distinct from colleges, no matter how prolonged the instruction may be. The distinction is one of controlling purpose; in the one case it is chiefly acquisition; in the other case it is chiefly the development of initiative. In other words, we are equipped to teach through in-

vestigation, at least in an atmosphere of investigation, and anything that vitiates this atmosphere impairs our teaching function as well.

The universities must see to it, therefore, that there is developed a renewed appreciation of the place of research in the university, and an increasing determination to permit no other function to diminish its opportunity, and to allow no method of administration to depress its spirit.

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THE SAN DIEGO MEETING OF THE PACIFIC DIVISION OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SEVERAL societies have determined to participate in the San Diego meeting of the Pacific Division of the American Association occurring between the dates, August 9 and 12, 1916. These societies will welcome the presentation of worthy papers from any of their members or from any members of the Pacific Division. Titles of papers to be presented, together with brief abstracts of their contents, should be forwarded to the secretary of the society before which the paper is to be offered as soon as possible and well in advance of the date of the meeting. The societies which will meet at San Diego are:

The Astronomical Society of the Pacific, Secretary, D. S. Richardson, 2541 Hilgard Avenue, Berkeley, California; the Cordilleran Section, Geological Society of America, Secretary, J. A. Taff, 781 Flood Bldg., San Francisco, California; the Western Society of Naturalists, Secretary, E. L. Michael, La Jolla, California, meeting in conjunction with the San Diego Natural History Society and the Pacific Slope Branch of the American Phytopathological Society; the Pacific Slope Branch, American Association of Economic Entomologists, Secretary E. O. Essig, University of California, Berkeley, and the Ecological Society of America, Secretary, Forrest Shreve, Desert Botanical Laboratory, Tucson, Arizona.

The opening of the San Diego meeting will be preceded on Wednesday, August 9, by exercises for the dedication of the recently completed museum building and concrete pier at the Scripps Institution for Biological Research at La Jolla near San Diego. At the opening session of the meeting of the Pacific Division will be given the annual address of the President of the Division, Dr. W. W. Campbell, director of the Lick Observatory, Mount Hamilton, California, upon the subject, "What we know about Comets." This address will be followed by a reception to visiting scientists. On Thursday and Friday evenings, August 10 and 11, two other general public addresses will be given by Dr. Barton W. Evermann, director of the museum, California Academy of Sciences, San Francisco, upon the subject, "Modern Natural History Museums and their Relation to Public Education," and Dr. F. F. Wesbrook, president of the University of British Columbia, upon a subject to be announced later.

The San Diego committee in charge of the local preparations for this meeting is as follows:

Dr. Fred Baker, Point Loma, chairman; W. C. Crandall, business manager of the Scripps Institution for Biological Research, La Jolla; Stanley Hale, San Diego County Chamber of Commerce, San Diego; E. L. Hardy, president of the California State Normal School, San Diego; Dr. E. L. Hewitt, director of the School of American Archeology, Santa Fe, New Mexico; Duncan MacKinnon, superintendent of schools, San Diego, and Dr. Wm. E. Ritter, director of the Scripps Institution for Biological Research, La Jolla.

In addition to the three general meetings of the Division and the meetings of participating societies on Thursday and Friday, a number of excursions to points of special scientific interest in the vicinity of San Diego are being planned. The committee in charge of these excursions consists of the following members of the staff of the Scripps Institution for Biological Research, La Jolla: Dr. F. B. Sumner, chairman, Dr. George F. McEwen and E. L. Michael.

The usual excursion rates of a fare and a third have been granted by the railroads from points in the states of Arizona, California, Oregon, Washington, Idaho, Nevada and Utah, and from British Columbia. In taking advantage of these rates, members are cautioned