

which now has a medical department, is one of the institutions supporting the project.

WE learn from the *Journal of the American Medical Association* that two chairs in the University of Cincinnati College of Medicine, honoring John D. Rockefeller and Andrew Carnegie, donors of munificent sums to the medical school, were founded at a meeting of the board of directors on July 19. The professorship in obstetrics will be known as the John D. Rockefeller Chair of Obstetrics and the professorship in biochemistry as the Andrew Carnegie Chair of Biochemistry. Dr. William Gillespie holds the chair of obstetrics, and Albert Prescott Mathews, Ph.D., is professor of biochemistry.

DR. STEPHEN RUSHMORE, associate professor of gynecology, has been appointed dean of the Tufts Medical School. The deanship has been vacant since the resignation of Dr. Charles F. Painter, one year ago. Dr. Rushmore is a graduate and former instructor of the Johns Hopkins Medical School.

DR. WILLIAM MOULTON MARSTON has been appointed professor of experimental psychology in the American University at Washington, D. C.

DR. R. W. SHUFELDT, of Washington, has accepted the position of lecturer on art anatomy and zoology on the faculty of the Research University of that city. He will also give a course of lectures at the Catholic University of America on "The Essentials of Natural Science."

DR. H. F. PIERCE, who has been for three and a half years in the department of pathology at the University of Oxford, engaged in research for the British Medical Research Council, has been appointed associate in physiology at the College of Physicians and Surgeons, Columbia University.

M. PRUVOST has been appointed to the chair of geology and mineralogy newly established at the University of Lille.

M. Hesse has been appointed professor of zoology at the University of Dijon.

IN the University of London, Dr. J. C. Drummond has been appointed to the univer-

sity chair of biochemistry tenable at University College, and Professor Adrian Stokes to the Sir William Dunn chair of pathology tenable at Guy's Hospital Medical School.

## DISCUSSION AND CORRESPONDENCE

### PASTEUR ON SCIENCE AND THE APPLICATIONS OF SCIENCE

IN his address as president of the American Association for the Advancement of Science, *SCIENCE*, 54: 650, 1921, Dr. L. O. Howard makes the following quotation from the address of Edwin Linton at the Baird Memorial meeting in Washington in 1916:

As I look over the titles of theses for doctorate degrees in biology, however, knowing that they must, in some fashion, reflect the activities of our biological leaders, I am led to wonder if the failure of science to influence legislation in the interests of the people is not to be charged to the propensity on the part of these leaders to shun the practical. Is there a hierarchy in science that frowns upon independence of thought and action in her sanctuary? That can hardly be. Let the heads of departments of biological research in our universities then take heart, and not be afraid to follow the lead of Pasteur, who surely committed no violence upon science by undertaking the solution of practical problems.

This reminds me that, about fifty-one years ago, Pasteur had some pretty definite things to say about this matter. In the preface to the fourth edition of "Fragments of Science," December, 1871, Tyndall says:

My friend M. Pasteur, of the Institute of France, sent me some time ago, among other important books and papers, a short essay entitled "Quelques Réflexions sur la Science en France." It consists of three articles, the first published in January, 1868; the second unpublished, though laid before the Emperor Napoleon at the Tuileries in March, 1868; and the third communicated to a public journal last March. All three articles are conceived in the same spirit, and directed to the same end. The last of them, entitled "Pourquoi le France n'a pas trouvé d'hommes supérieurs au moment du péril," contains many remarks which may wisely be laid to heart in England. In our eager pursuit of "practical" results, the high

preparatory studies contended for by M. Pasteur as essential are only too likely to be underrated or overlooked.

The bearing of his views on the question of technical education, now so much spoken of in England, will be apparent to every reader of the following translation of a portion of the article referred to. Its introduction in this place would be incongruous were it not that the main object of the various essays published in this book was to create a public interest in science as a source of knowledge, and as a means of culture, without present regard to its material results. But the issues of studies animated by this spirit are incalculable; for, though undertaken with no practical intent, they are really the prime movers of all practice. If the purely scientific discoverer die out, practical applications cannot long survive him.

The following three quotations are selected from Pasteur's article:

Few persons comprehend the real origin of the marvels of industry and the wealth of nations. I need no other proof of this than the employment more and more frequent in lectures and speeches, in official language, and in writings of all sorts, of the erroneous expression *applied science*. The abandonment of scientific careers by men capable of pursuing them with distinction was recently complained of in presence of a minister of the greatest talent. This statesman endeavored to show that we ought not to be surprised at this result, *because in our day the reign of theoretic science yielded place to that of applied science*. Nothing could be more erroneous than this opinion; nothing, I venture to say, more dangerous even to practical life, than the consequences which might flow from these words. They have rested in my memory as a proof of the imperious necessity of reform in our superior education. No, a thousand times no! There exists no category of sciences to which the name of applied science could be given. *We have science and the applications of science*, which are united to each other as the fruit and the tree on which it grew.

At one time the majority of the foremost disciples of the École Polytechnique followed the career of mathematical and physical sci-

ence, and of the higher studies generally. In our day this fact is only a rare exception. It is not that the pupils of this great school are less numerous than formerly, or less capable than their predecessors, the Maluses, the Poissons, the Fresnels, to render their country illustrious by fruitful discoveries, but the course of events invites them to carry the fruit of their studies into the operations of industry, such as the working of mines, the construction of railways, etc.

The German nation has understood that there exists no applied science, but only the applications of science, and that these latter are only rendered valuable by the discoveries which nourish them; while the constant preoccupation of our statesmen regarding public instruction during fifty years has had principally for object primary and secondary education. They have forsaken the higher studies, particularly that of science, to the impulse they had received from the renovation of science in the eighteenth century.

Finally Tyndall says:

The opinions of so eminent a man regarding the relation of science to its applications, and to the general culture of the nation, merits our gravest attention.

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## CULTIVATION AND EVAPORATION

TO THE EDITOR OF SCIENCE: Dr. L. S. Frierson (in SCIENCE, March 24, 1922, p. 317) shows by his remarks the danger of confounding facts with their explanation. What "all practical farmers from the days of King Hamurabi to date" agree upon is the *fact* that cultivation helps plants in dry weather. But Dr. Frierson and I have differed as to the *explanation* of this fact—he believes that cultivation "stops evaporation, and thus conserves the store of soil water," whereas my view was that "a greater total surface is exposed to evaporation, and evaporation is therefore facilitated."

The remarks of Dr. H. A. Noyes (in SCIENCE, June 9, 1922, p. 610) throw further light on the subject. He believes that "cultivation lets air down in the soil, thereby increasing bac-