bergen in the British Museum. Mr. Lundström is taking some plants to see if they will grow there.

UNIVERSITY AND EDUCATIONAL NEWS

RECOMMENDATIONS that a fund of more than $3,000,000 for the treatment of cancerous, nervous and disabling ailments be given to the University of Pennsylvania Hospital has been made by Dr. Winford H. Smith, superintendent of the Johns Hopkins Hospital, Baltimore, who was selected by the trustees of the fund, jointly the incorporated trustees of the Philadelphia Yearly Meeting of Friends and a body organized as the board of managers of the Jeanes Hospital, to come to Philadelphia and make a survey of its hospitals and medical work and give them his opinion as to where the fortune would work the greatest benefit. The fund is the estate and its increment willed for the purpose by Anna J. Jeanes, a noted Friend philanthropist, who died in 1908.

MR. BLANCHARD RANDALL and Dr. Howard Kelly have presented to the Johns Hopkins Hospital a collection of portraits of medical men said to be of great value. The collection given by Mr. Randall, who is one of the trustees of the institution, consists of forty-eight portraits. Dr. Kelly, who is one of the consulting physicians, added eleven portraits.

MISS S. E. S. MAIR and Mrs. A. M. Chalmers Watson, on behalf of women medical graduates, students and their friends, have offered to pay to the Edinburgh University $20,000 for the medical education of women.

THE report of President R. S. Hyer to the board of trustees shows that the enrollment of the initial year of the Southern Methodist University reached 706 students, 453 of whom were in the academic department. Over 300 students in the academic department carried science courses during the year. In the choice of a science, chemistry, physics, biology and geology registered practically the same number. The total enrollment is said to establish a new record for the initial year in American universities. The University of Chicago registered 698 in its first year.

DR. W. W. CORT, Ph.D. (Illinois, '14), professor of biology at Macalester College, St. Paul, Minn., has accepted a position as assistant professor of zoology at the University of California. Dr. H. D. Gould, Ph.D. (Princeton, '16) has been appointed instructor in zoology in place of Assistant Professor J. A. Long on Sabbatical leave.

APPOINTMENTS at the Massachusetts Institute of Technology have been made as follows: Dr. Frederick G. Keyes, associate professor of physico-chemical research; Eugene Olaf Christiansen, instructor in business management; Clarence K. Reiman, instructor in inorganic chemistry; Ernest W. Wescott, research associate in applied chemistry; Robert E. Wilson, research associate in applied chemistry; Charles L. Burdick, research associate in physical chemistry; John G. Barry, instructor in geology and mineralogy, and Alexander Klemin, instructor in aeronautical engineering.

DISCUSSION AND CORRESPONDENCE

THE FUNDAMENTAL EQUATION OF MECHANICS (IV)

IN his paper on "The Accepted Facts of Dynamics,"[1] Professor Hoskins proposes as a sort of challenge a simple problem which he believes can not be solved by means of my fundamental equation $F/F' = a/a'$ without the aid of a further principle which he calls the *additive property of mass*. This challenge seems to me a fair one, and without reopening the general discussion, I should like to show how easy it is to offer a solution of this problem based entirely on the principles I have set forth as sufficient.[2] The problem is as follows:

A first body, A', is observed to have an acceleration a' when acted on by a force F; a second body, A'', is observed to have an acceleration a'' when acted on by an equal force F; if the two are combined into a single body, what acceleration will this body have if acted on by a force F?

[1] SCIENCE, June 30, 1916.

[2] SCIENCE, February 5, 1915; July 30, 1915; and especially March 3, 1916. Further discussion of this topic may be expected to appear in the *American Mathematical Monthly*.

It will be noticed that we are here concerned not with a single particle, but with a collection of two particles, so that we may expect the *principle of action and reaction* to be called into service. (This principle was included in my paper, in a footnote.) The solution I would propose is as follows:

Since the force F applied to the composite body must be applied at some point, let us suppose that it is applied at the A' end of the body; and since the two parts A' and A'' must be connected together by some means, let Q be the force which each part exerts on the other. If now we confine our attention to the first body, A', we see that the net force acting on this body in the forward direction is $F - Q$, while the acceleration produced is the required acceleration of the combined body, say a; hence, by the fundamental proportion as applied to the first body,

$$(F - Q)/F = a/a'.$$

Similarly, if we confine our attention to the second body, A'', we see that the net force acting is Q, while the acceleration produced is the same as before, namely a; hence, by the fundamental proportion as applied to the second body,

$$Q/F = a/a''.$$

Solving these two equations for a, we have at once the required answer:

$$1/a = 1/a' + 1/a''.$$

It is obvious that the proof just given—involving the elimination of the internal forces Q—is nothing more than a special case of the proof regularly employed for the familiar theorem on the motion of the center of mass of any collection of particles. In fact, as far as I can make out his meaning, *all that Professor Hoskins values so highly in his (rather vague) principle of the additivity of mass is really contained in this well-known theorem on the motion of the center of mass.* If this is true, the chief difference between the methods advocated by Professor Hoskins and myself comes down to this: *he would regard as a fundamental assumption, to be stated as such at the very outset of the course, a rather complicated proposition called the additivity of mass, while I would prefer to treat this proposition as a theorem to be deduced by easy steps from much simpler fundamental assumptions.*

In conclusion, there are two minor points in Professor Hoskins's paper on which I may be permitted to comment.

First, I can not assent to Professor Hoskins's characterization of my method as one that "purports to be independent of mass." It is true that my method purports to require, at the start, only three fundamental concepts, namely: force, length and time; but the concept of mass is no more "ignored" or "evaded" in the development than are the concepts of energy, momentum, etc., all of which take their proper places in the theory as derived concepts. *The kinetic idea of mass or inertia (namely, force over acceleration) is as difficult as it is important, and should be led up to gradually, by easy and very definite steps.*[3]

Secondly, I can not admit that my method requires me to define "the unit force" as "the force which would give the unit mass 32.1740 units of acceleration." On the contrary, my idea of a force is a spring balance, and my idea of a unit force is any spring which may happen to be selected as a standard. It is a matter of entire indifference in my method whether the unit force is a pound or a dyne or a pennyweight.

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SIR CLEMENTS MARKHAM

TO THE EDITOR OF SCIENCE: It was a great pleasure to me to read the appreciation of Sir Clements Markham which came out in SCIENCE for April 21. Too often have the admirers of Sir Clements in this country had reason to believe that his anthropological labors are not properly appreciated here. Such a full, generous and complete résumé of his great accomplishment as that given by A. C. B. contributes toward a contrary belief.

Through Sir Clements Markham's extraordinary diligence and scholarship, students of South American anthropology are given ready access to Garcilasso de la Vega's "Royal Com-

[3] Compare the excellent remarks of Professor Willard J. Fisher in SCIENCE for July 7, 1916.