tude of the pole star, and altogether nearly 200 altitudes by aneroid were determined, the meteorological station at Beirut supplying a record of the daily march of the barometer for purposes of comparison, while the leveled line of railway gave a reference to sea-level. The map, like Dr. Musil's previous one of Arabia Petræa, has been plotted on the scale of 1:300,000, but it will be published on a smaller scale. The results of the journey will be issued by the Vienna Academy of Sciences.

UNIVERSITY AND EDUCATIONAL NEWS

COLUMBIA UNIVERSITY has received $100,000 to be ultimately used for promoting cultural relations between Germany and the United States, and $30,000 from Mr. E. D. Adams, to buy and equip a Deutsches Haus for the university. In addition to several other gifts, a farm of 320 acres, valued at $15,000 has been given for an experiment station in connection with projected instruction in agricultural engineering.

ANNOUNCEMENT is made of a gift of $100,000 to the Johns Hopkins University endowment fund by Mr. R. Brent Keyser, chairman of the board of trustees. The university must raise $750,000 in order to secure $250,000 from the general educational board.

THE University of Pittsburgh has received from Mr. Joseph C. Trees, '93, a gift of $100,000, to be applied toward the construction of a new gymnasium and athletic field.

MR. FREDERICK WEYERHAUSER, of St. Paul, has promised to erect a $150,000 auditorium and conservatory building for Augustana College at Rock Island, Ill.

THE dedication of the new Science Hall at Howard University, Washington, took place on December 13. The principal addresses were given by Dr. Henry S. Pritchett, president of the Carnegie Foundation, Dr. William H. Welch, of Johns Hopkins University, and Dr. Booker T. Washington, principal of Tuskegee Institute.

PROFESSOR FREDERIC S. LEE has been appointed to the directorship of the department of physiology of Columbia University. It is expected that the staff of the department will be increased beyond its present membership by the appointment of several additional trained physiologists.

DR. EDWARD MARTIN, professor of clinical surgery at the University of Pennsylvania, has been elected to the John Rhea Barton professorship of surgery to succeed Dr. J. William White.

DR. F. LYMAN WELLS, formerly assistant in pathological psychology in the McLean Hospital, has entered upon the duties of assistant in experimental pathology in the Psychiatric Institute of the New York State Hospitals, and lecturer in psychology in Columbia University.

AMONG recent appointments in botany at the Michigan Agricultural College are the following: Dr. Wm. H. Brown, Ph.D. (Hopkins), to be research assistant in plant physiology under the Adams fund, at the Agricultural Experiment Station, for three fourths of his time, the remainder to be devoted to teaching advanced plant physiology in the botany department of the college. Dr. Brown comes from the Desert Laboratory, Tucson, Arizona, where he has been spending some months in research. Professor G. H. Coons to be research assistant in plant pathology at the Experiment Station, devoting one fourth of his time to teaching plant pathology at the college. Professor Coons is now assistant professor of agricultural botany at the University of Nebraska. He will assume his duties at the Michigan Agricultural College on January first.

M. MAURICE LERICHE, of Lille, has been appointed professor of geology at the University of Brussels.

DISCUSSION AND CORRESPONDENCE

IS THIS A DYNAMICAL PROOF OF THE PYTHAGOREAN THEOREM?

As indicated in the figure, $O-p$ is assumed to be a rod without mass which can revolve in the plane of the paper about O as center. $1-2$ is also assumed to be another rod without mass which lies in the plane of

the paper with its center located at p. Concentrated at each end of the rod $1-2$ are equal masses m, m, each distant r from p. Let R equal the distance $O-p$, x the distance $O-1$, and y the distance $O-2$.

When the system revolves about O as center, the point p will have a linear velocity;

$$v = ds/dt = R\,da/dt = RW,$$

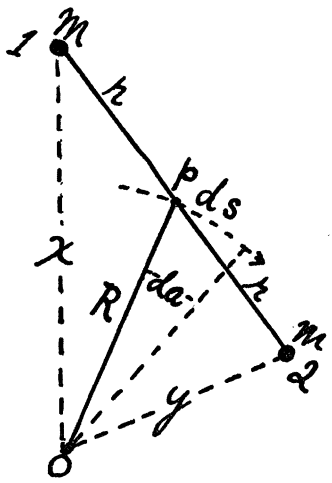

Fig. 1

where ds is the element of arc described in time, dt, da is the differential angle through which $O-p$ turns and W is the angular velocity of $O-p$.

1. Assume that the rod $1-2$ is free to turn on p as center. Since m at 1 and m at 2 are equal and equally distant from p, p is the center of mass. No motion, force or acceleration which exists at the point p can produce rotation of $1-2$ about p as center. This must be so, as it is axiomatic in dynamics that, when there is a force or acceleration at the center of mass only of a body, there remains no couple to produce rotation of the mass, and by Newton's first law, a force must act before a mass can change its state of rest or motion.

In the condition, where $1-2$ is free to turn about p, the kinetic energy then of the system must be,

$$E' = \tfrac{1}{2}(2m)v^2 = mR^2W^2. \qquad (1)$$

2. Conceive the rod, $1-2$, to become rigidly attached at p. Then, as $O-p$ revolves about O with angular velocity W, $1-2$ also revolves about p with like angular velocity. By making the attachment at p rigid the system is forced to take on an additional kinetic energy which can be only that, which is a result of the additional motion now possessed by m at 1, and by m at 2, in virtue of their rotation about p as center. This added kinetic energy is:

$$E'' = \tfrac{1}{2}(2m)r^2W^2 = mr^2W^2. \qquad (2)$$

Hence, the total kinetic energy of the system when $1-2$ is rigidly attached at p, is:

$$E = E' + E'' = mW^2(R^2 + r^2). \qquad (3)$$

3. With the attachment still rigid at p, the kinetic energy of m at 1 is, plainly, that which is due to its rotation, at distance x, about O as center, and this is

$$E_0' = \tfrac{1}{2}mx^2W^2. \qquad (4)$$

Likewise, the kinetic energy of m at 2 about O as center is

$$E_0'' = \tfrac{1}{2}my^2W^2. \qquad (5)$$

The total kinetic energy must be the sum of these two, or

$$E = E_0' + E_0'' = \tfrac{1}{2}mW^2(x^2 + y^2). \qquad (6)$$

Expressions (3) and (6) are both true expressions for the same kinetic energy and hence they may be equated, giving as result,

$$\tfrac{1}{2}(x^2 + y^2) = R^2 + r^2. \qquad (7)$$

In (7) we have a geometrical relation of some interest, but in the particular case when $y = x$, that is, when line $1-2$ is perpendicular to line $O-p$, we have the result,

$$x^2 = R^2 + r^2. \qquad (8)$$

Thus it is proved by dynamical considerations only that in a right-angled triangle the square on the hypothenuse is equal to the sum of the squares on the other two sides.

Edwin F. Northrup
Palmer Physical Laboratory,
Princeton, N. J.,
October 7, 1910

Women and Scientific Research

There are now nearly as many women as men who receive a college degree; they have on the