had no hesitation in assuming that the general British public was so thoroughly familiar with the ideas of Professor Chamberlin, many of which they reproduced in the chapters which they wrote, that to refer to him, even indirectly, would be an unwarranted waste of space. While the foregoing may be accepted as the true explanation of interesting, if unusual, methods, a critical friend of mine points out still another theoretically possible explanation of these "astounding tactics" of certain English writers, an explanation which Dr. Jeffreys mentioned only indirectly. The suggested explanation is that these "astounding tactics" have been followed because other English writers have shared with Dr. Jeffreys the assumption that I have been "asleep for twenty years," an assumption probably due in part to the fact that it has not been my habit to publish the same ideas over and over again on every possible occasion.

F. R. MOULTON

EULER'S TENSOR AND HAMILTON'S CUBIC

WE may begin with the usual Eulerian tensor constructed for arbitrary axes in i, j, k, but write it in dyadic form $\phi i = i\phi = iA - jF - kE$; etc. To refer it to the principal axes of the momental ellipsoid, the scalar function $\lambda(A, B, C, D, E, F)$ is introduced. The outcome is the determinant

$$\begin{bmatrix} A-\lambda & -F & -E \\ -F & B-\lambda & -D \\ -E & -D & C-\lambda \end{bmatrix} = 0,$$

which implies three vector equations $(\phi i - \lambda_1 i) \cdot w_1 = 0$, etc., for the three principal axes w_1, w_2, w_3.

The determinant when expanded in powers of λ, with the coefficients expressed as volumes, is $\phi i \cdot \phi j \times \phi k - \lambda \Sigma i \cdot \phi j \times \phi k + \lambda^2 \Sigma i \cdot j \times \phi k - \lambda^3 = 0$ where Σ refers to the three dimensions i, j, k. If, therefore, the initial volume is $i \cdot j \times k$, the coefficients of λ^0, λ, λ^2, λ^3 are identical, respectively, with m, m_1, m_2, 1, in Hamilton's cubic of the scalar dyadic ϕr. Of course this is not to be wondered at; but it ought, I think, to be more frequently accentuated; for a problem in rigid dynamics thus takes the form appropriate to a homogeneous strain applied to an initial volume, and this is somewhat unexpected.

CARL BARUS

BROWN UNIVERSITY

NOTICE TO ZOOLOGISTS ON THE POSSIBLE SUSPENSION OF THE RULES IN THE CASE OF NYCTERIBIA LATREILLE

IN accordance with the provisions governing possible suspension of the rules, the undersigned has the honor to invite the attention of the zoological profession to the fact that application for suspension of the rules has been made in the case of *Nycteribia* Latreille, 1796, monotype *Pediculus vespertilionis* Linn., 1758. The commission is requested to set aside the monotype designated in 1796 and to validate *Nycteribia pedicularia* 1805 as type of *Nycteribia*. *Pediculus vespertilionis* Linn. was based on an acarine (described and figured by Frisch, 1728) which is now classified in *Spinturnix*. Latreille was dealing with an insect which he erroneously determined as *Pediculus vespertilionis*. Unless the rules are suspended *Nycteribia* should be transferred from the Diptera to the Acarina and should supplant *Spinturnix*; this would cause extreme confusion and upset generic and supergeneric nomenclature which has been accepted without challenge for about a century.

A vote on the foregoing proposition will be delayed until about January 1, 1930, in order to give zoologists interested in the case ample opportunity to express their opinions, *pro* or *con*, to the International Commission on Zoological Nomenclature.

C. W. STILES
Secretary of Commission

U. S. PUBLIC HEALTH SERVICE,
WASHINGTON, D. C.

SPECIAL CORRESPONDENCE

EINSTEIN'S APPRECIATION OF SIMON NEWCOMB

THE following letter, which has recently been deposited in the manuscript division of the Library of Congress, will be of value to American scholars, especially to those interested in the physical sciences. The letter was written by Dr. Albert Einstein in response to an inquiry from Mrs. Josepha Whitney, of New Haven, Connecticut, daughter of the late Simon Newcomb, and was forwarded by her to her sister, Dr. Anita Newcomb McGee, of Washington, D. C., for deposit with the Newcomb papers in the Library of Congress.

In view of the present interest in the new work of Dr. Einstein, Dr. McGee has asked to have the letter translated and published. As the letter has an important bearing upon the history of astronomy in America and the particular part Newcomb had in this development, it is herewith published with Dr. Einstein's permission, and I therefore take pleasure in sending it to SCIENCE for publication.

The letter states briefly the history of the problem of perturbation in a system of three bodies in space, and the effect of relativity on the results. It throws light on the monumental work of Newcomb toward the solution of this problem, and also contains appreciative comments upon Newcomb's work.

It is of special interest to note that the entire collection of Newcomb's note-books, manuscripts and letters has been deposited in the Library of Congress and is waiting to be interpreted by some historian of physical astronomy. The position of Simon Newcomb in the history of astronomy is well known, and the collection of manuscripts and letters is, therefore, remarkable especially for its completeness and the extent of the wide range of his correspondence.

BERLIN, 15/7/1926

My dear Mrs. Whitney:

Referring to our meeting in the Hall of the League of Nations I shall endeavor to give here the information you desired.

Your father's life-work is of monumental importance to astronomy. It may be characterized as follows. Kepler discovered empirically the laws which would govern the motion of a planet around the sun, if no other planet were present. From these Newton deduced the general laws of motion as well as the law of gravitation which bears his name. Newton's laws assert quite generally how masses must move when acted upon by no other forces than those of mutual gravitation. When there are more than two masses present the calculations of the motion over an extended period of time present great difficulties. However, in our solar system the relations are much less involved, inasmuch as one of the bodies, the sun, is greatly preponderant in mass. In the case of a single planet the calculations lead to results which differ but little from those which would have obtained, were this planet and the sun extant. If it were not for this, Kepler would not have been able to discover his laws and it is hard to conceive what orientation astronomy would have then taken.

There remained, however, the problem to determine the influences which the rest of the planets exert upon each individual planet. This is the astronomical problem of "perturbations"; it engaged the attention of the most outstanding mathematicians and astronomers for the last hundred years. Your father was the last of the great masters who, with this object in view, calculated with painstaking care the motions in the solar system. So gigantic is this problem that there are but few who can confront its solutions with independence and critical judgment.

This work is of great importance for an understanding of the laws of nature, for only thus can we establish the degree of accuracy to which the Newtonian laws are valid. The calculations, when compared with actual facts, showed that theory reflected experience with extraordinary precision. Only in the case of one planet was there found a slight deviation from the calculated orbit, a deviation which exceeded the limits traceable to errors in observation: it was the case of Mercury, the planet nearest the sun. Indeed, observations disclose a slow rotation of the major axis in the plane of the orbit and in the direction of Mercury's motion and this can not be accounted for by perturbations as calculated on the basis of Newton's law. The amount of this rotation is about forty seconds in a century, *i.e.,* it is so slight that it would take not less than thirty thousand years to bring about a complete revolution of the orbital axis. Yet all attempts to explain satisfactorily this deviation in accordance with the Newtonian theory were in the main unsuccessful.

Then, some ten years ago, theoretical investigations in the theory of relativity showed that the Newtonian laws could not be held rigorously true, but are merely true with great approximations. The exact laws, which were obtained through speculative methods, prove that in every planetary motion the major axis of the orbit executes a slow rotation, independent of the perturbations exerted by the other planets. This rotation is for all planets other than Mercury too slight to be observed. And as to Mercury, the calculation furnished exactly the forty seconds per century which heretofore caused so much perplexity.

It was thus that the theory of relativity completed the work of the calculus of perturbations and brought about a full agreement between theory and experience.

With kind regards,
Yours,
A. EINSTEIN

I wish to acknowledge my gratitude to Dr. Tobias Dantzig, professor of mathematics at the University of Maryland, for the exact translation of the above letter.

FREDERICK E. BRASCH,
Secretary of the History of Science Society
LIBRARY OF CONGRESS,
WASHINGTON, D. C.

SCIENTIFIC BOOKS

Moss Flora of North America. By A. J. GROUT. Vol. III, Part 1, 62 pp. + 14 pls. 1928. Published by the author.

FOR more than forty years the Lesquereux and James "Manual" has been the standard work on the mosses of North America: this, supplemented in 1896 by the Barnes and Heald "Keys." During this time several books have been written on the mosses of eastern North America, but nothing which has even pretended to cover the country west of the Mississippi. American bryologists have been compelled to depend, in no small degree, upon Dixon's "Handbook of British Mosses" and other European works for a knowledge of the mosses of their own country. It