

SCIENCE

VOL. LXII

JULY 24, 1925

No. 1595

SOME MATHEMATICAL ASPECTS OF COSMOLOGY¹

CONTENTS

<i>Some Mathematical Aspects of Cosmology:</i> PROFESSOR W. D. MACMILLAN	63
<i>The Third Pan-Pacific Science Congress</i>	73
<i>Scientific Events:</i>	
<i>The German Museum of Applied Science; Standardization of Colors for Traffic Signals; Gifts to Harvard University; The Hopkins Marine Station</i>	74
<i>Scientific Notes and News</i>	76
<i>University and Educational Notes</i>	81
<i>Discussion and Correspondence:</i>	
<i>The Art of Pluviculture:</i> DR. DAVID STARR JORDAN. <i>A Root Rot of Alfalfa:</i> L. W. DURRELL and W. G. SACKETT. <i>The Definition of Loess:</i> PROFESSOR JOHN L. TILTON	81
<i>Quotations:</i>	
<i>What is Reason for?</i>	83
<i>Scientific Books:</i>	
<i>Bayliss on Interfacial Forces and Phenomena in Physiology:</i> PROFESSOR RALPH S. LILLIE	84
<i>Scientific Apparatus and Laboratory Methods:</i>	
<i>A Simplified Rainproof Valve for Porous Porcelain Atmometers:</i> L. J. PESSIN	85
<i>Special Articles:</i>	
<i>The Photochemistry of Cod Liver Oil:</i> EDWARD S. WEST and G. H. BISHOP. "Russell Effect" as Cause for Changes in Photographic Plate by Antirachitic Substances: DR. I. N. KUGELMASS and DR. I. MCQUARRIE	86
<i>The American Chemical Society:</i>	
<i>Division of Chemical Education</i>	89
<i>Science News</i>	viii

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. McKeen Cattell and published every Friday by

THE SCIENCE PRESS

Lancaster, Pa.

Garrison, N. Y.

New York City: Grand Central Terminal.

Annual Subscription, \$6.00. Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

Entered as second-class matter July 18, 1923, at the Post Office at Lancaster, Pa., under the Act of March 8, 1879.

I. COSMOGONY

THE intimate relationship between mathematics and astronomy, even in ancient times, is well known; and since the time of Kepler, Galileo and Newton astronomy has been the ideal exact science. From a mathematical point of view, it must be admitted that we have been very fortunate in the fact that the earth is merely one of a family of relatively small planets, and that the earth possesses an extraordinary satellite, so extraordinary that an inhabitant of Mars would doubtless say that the earth and moon is a double planet rather than a planet and satellite. We are fortunate also in the fact that the earth is only 50 per cent. cloud-covered instead of 100 per cent. as may be the case on the planet Venus. Finally, the regular succession of day and night, the waxing and waning of the moon and the annual circuit of the sun among the stars are uniformities in nature that can escape the attention of no one, save perhaps one who lives in a large modern city.

The somewhat less regular motions of the planets with respect to the background of stars excited attention among the ancients and stimulated the search for simple schemes to account for them. Even some slight irregularities in the motions of the sun and moon were discovered more than two thousand years ago, and a scheme of epicycles was invented to account for them, a compounding of uniform circular motions which is the geometrical equivalent of our modern Fourier Series. A dynamical explanation was not sought because it was the age of geometry, and dynamics had not yet been dreamed of. Even Kepler, who devoted a lifetime to the discovery of uniformities in the motion of the planet Mars, and who discovered the three laws of planetary motion which bear his name, did not seek a dynamical explanation of these uniformities. He was content to ascribe them to the intelligence of an angel who guided the planets in their courses. His was the age of spirits, and Kepler's interpretation of uniformities was animistic.

The foundations of dynamics came only with the genius of a Galileo who had little liking for the conceptions of animism. His induction that the natural state of a body was uniform motion in a straight

¹A symposium lecture read before the American Mathematical Society at its meeting in Chicago, April 10, 1925.

Science

62 (1595)

Science **62** (1595), x-90.

ARTICLE TOOLS

<http://science.sciencemag.org/content/62/1595.citation>

PERMISSIONS

<http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. The title *Science* is a registered trademark of AAAS.

Copyright © 1925 The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works.