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No. 1804

<i>Some Problems of Cosmical Physics</i> : LORD RAYLEIGH	77	<i>Special Correspondence</i> :	
<i>The Decline in the Average Length of Life</i> : PROFESSOR C. H. FORSYTH	85	<i>Stanford University Scientific Expedition</i> : LIONEL WILLIAM WIEDEY and WILLIAM W. VALENTINE	99
<i>Obituary</i> :		<i>Scientific Books</i> :	
<i>Sidney Savory Buckman</i> : DR. C. H. CRICKMAY.		<i>Steinmann's Geologie von Peru</i> : PROFESSOR EDWARD W. BERRY	100
<i>Recent Deaths</i>	87	<i>Special Articles</i> :	
<i>Scientific Events</i> :		<i>On the Incidence of Infection with Intestinal Protozoa</i> : DR. DAVID CAUSEY. <i>Chemical Treatment to Shorten the Rest Period of Sugar Maple Trees</i> : DR. C. G. DEUBER and P. R. BOWEN	102
<i>Progress of the World Farm Census; Report of the House Committee on Flood Control; The New Laboratory Building at Columbia University; Summer Work of Harvard Geologists; Committees of the American Engineering Council</i>	89	<i>Science News</i>	x
<i>Scientific Notes and News</i>	91	SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL and published every Friday by	
<i>University and Educational Notes</i>	95	THE SCIENCE PRESS New York City: Grand Central Terminal Lancaster, Pa. Garrison, N. Y. Annual Subscription, \$6.00 Single Copies, 15 Cts.	
<i>Discussion</i> :		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.	
<i>Priority in Stratigraphic Nomenclature</i> : HERBERT P. WOODWARD. <i>Did John Napier Invent Logarithms?</i> PROFESSOR G. A. MILLER. <i>Dinosaur Tendons</i> : DR. ROY L. MOODIE. <i>Lactation vs. Improved Growth in Stock Albino Rats</i> : PROFESSOR ARTHUR H. SMITH and WILLIAM E. ANDERSON	96		

SOME PROBLEMS OF COSMICAL PHYSICS, SOLVED AND UNSOLVED¹

By LORD RAYLEIGH, F.R.S.

OF the activities of our section, the Cape has perhaps been more identified with astronomy than with any other branch. In the middle of the eighteenth century, when exact astronomy of the southern hemisphere may be considered to have begun, there were few, if any, other places in a considerable southern latitude where an astronomer could work in safety with the necessary help of trained artisans. This tradition worthily begins with Lacaille (1750-51). Other landmarks were the foundation of the Cape Observatory (1821), the expedition of Sir John Herschel (1833-38) and the forceful and energetic career of Sir David Gill, who was the life and soul of our organization on its visit to South Africa in

¹ Address of the president of Section A—Mathematical and Physical Sciences, British Association for the Advancement of Science, Cape Town, South Africa, July 24, 1929.

1905. Shortly afterwards he retired, and I then had the privilege of friendship with him in London. Indeed, I have taken these few facts and dates from the copy of his "History of the Cape Observatory," which he gave me very shortly before his death. Although past his prime at the time I knew him, he was still vigorous and keenly interested in scientific developments, though if one brought anything new to his notice a severe cross-examination as to the validity of the evidence had to be faced.

It is partly on account of this association of South Africa with astronomy that I have chosen to lean as far towards this direction as I feel able, and to pass in review some subjects lying on the border-line between astronomy and physics.

After the first period of success in identifying the origin of the spectral lines of the sun and stars with

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70 (1804)

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