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<i>The Chemistry and Biological Significance of Thiamin</i> : DR. ROBERT R. WILLIAMS .....	559
<i>Dedication of the Crellin Laboratory of Chemistry at the California Institute of Technology</i> : <i>The Future of the Laboratory</i> : DR. LINUS PAULING	563
<i>The Development of Chemistry at the California Institute of Technology</i> : DR. ROBERT A. MILLIKAN .....	565
<b>Obituary</b> : <i>John Jacob Abel</i> : PROFESSOR E. K. MARSHALL, JR.	566
<b>Recent Deaths</b> .....	566
<b>Scientific Events</b> : <i>The Cambridge Meeting of the British Association for the Advancement of Science; Assembly of Laboratory Directors and Serologists; The Department of Neuropsychiatry at Washington University, St. Louis; In Honor of Professor Schuchert</i> .....	569
<b>Scientific Notes and News</b> .....	572
<b>Discussion</b> : <i>Americans and the Royal Astronomical Society</i> : R. HEATHCOTE HEINDEL. <i>The First Known Long Mathematical Decline</i> : PROFESSOR G. A. MILLER. <i>Cross References in Scientific Literature</i> : W. J. HOOKER. <i>Overexertion as Cause of Death of Captured Fish</i> : DR. A. G. HUNTSMAN .....	575
<b>Scientific Books</b> : <i>Men of Mathematics</i> : PROFESSOR EDWIN B. WILSON	578
<b>Societies and Meetings</b> : <i>The Royal Society of Canada</i> : PROFESSOR E. HORNE CRAIGIE. <i>The Virginia Academy of Science</i> : DR. E. C. L. MILLER. <i>The Tennessee Academy of Science</i> : PROFESSOR JOHN T. MCGILL .....	579
<b>Special Articles</b> : <i>Anaphylaxis in the Liverless Dog and Observations on the Anticoagulant of Anaphylactic Shock</i> : DRs. E. T. WATERS, J. MARKOWITZ and L. B. JAQUES. <i>Soluble Solids in Citrus Fruits</i> : DRs. E. T. BARTHOLOMEW, WALTON B. SINCLAIR and BYRON E. JANES. <i>A Relation between the Electronic Radius and the Compton Wave-length of the Proton</i> : PROFESSOR ARTHUR E. HAAS .....	582
<b>Scientific Apparatus and Laboratory Methods</b> : <i>A Growing Yeast Medium for the Cultivation of an Hemophilic Bacilli and of an Organism Causing a Bronchitis in Chickens</i> : DR. J. P. DELAPLANE and H. O. STUART. <i>Preservation of Anatomical Specimens</i> : DR. JOHN R. PATE. <i>Cellophane Used for Projection Drawings</i> : PROFESSOR CHRISTIANNA SMITH .....	585
<b>Science News</b> .....	8

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## THE CHEMISTRY AND BIOLOGICAL SIGNIFICANCE OF THIAMIN

By Dr. ROBERT R. WILLIAMS

BELL TELEPHONE LABORATORIES, NEW YORK, N. Y.

SOMETHING more than fifty years ago the Japanese Navy annually suffered an incapacitation of from 23 to 40 per cent. of its effectives. The disease which the Japanese called kakke was also prevalent among the civilian population, not only of Japan but of Asia generally. In China it was recognizably described more than 300 years ago. Its devastations among the Malay peoples of the peninsula and of the great islands of the East Indies is attested by the fact that the world at large has adopted the Malay term beriberi for the disorder. It is, however, no stranger in India, Siam and Burma.

It was the Japanese, however, who first afforded convincing evidence regarding its general nature. Takaki, in effect surgeon general of the Japanese Navy, observed in 1883 a disastrous outbreak during a six months' voyage of the training ship, *Riujo*, and being convinced of the nutritional nature of the disease ordered an experimental duplication of the cruise with

the sole alteration of a change of ration. The comparative results of the two cruises were so striking that the changes in ration were presently made effective for the entire Navy with the result that the incidence of beriberi has never, since 1885, risen to as high a figure as one half per cent. of the force.

Takaki had little notion of the specific nature of the shortage in the diet. The beginnings of this disclosure were left for Eijkmann, medical officer in the Dutch colony in Java. In the course of experiments aimed at a study of the disease, he encountered its counterpart in chickens which for the sake of economy had been fed on waste rice from the hospital kitchens. He published his results in 1897. There followed many further studies from his laboratories, studies to which neither the world at large nor even the medical profession of the Orient paid prompt attention. A few discerning persons took them seriously. These were mostly Englishmen in overseas service, Braddon,

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