The Cosmical Abundance of the Elements: Dr. Henry Norris Russell

Obituary: Hugh McCormick Smith: Dr. Leonard P. Schultz. Recent Deaths

Scientific Events: Results of the Eclipse Expedition of 1940; The Engineers' Defense Board; The "B-Complex" Award of Mead Johnson and Company; The 1941 Eumford Award of the American Academy of Arts and Sciences; Dr. Jessup Succeeds Dr. Keppel as President of the Carnegie Corporation

Scientific Notes and News

Discussion:

Colleges and the Changing High Schools: Dr. M. H. Truett. P-Aminobenzoic Acid, an Essential Metabolite for Autotrophic Organisms: Dr. Sten Wiedling. Culex Quinquefasciatus, a New Vector of Plasmodium Gallinaceum: Dr. Luis Vargas and Professor Enrique Beltrán. Polished Areas on Granitic Porphyries of the Hueco and Cornudas Mountains of Texas and New Mexico: Walter B. Lang

Quotations: Mr. Keppel's Achievement


Special Articles:

The Size of Streptococcus Bacteriophages as Determined by X-Ray Inactivation: Dr. Frank M. Exner and Dr. S. E. Luella. The Detection of Poliomyelitis Virus in Flies: Dr. J. R. Paul and Others. The Localization of the Nicotine Synthetic Mechanism in the Tobacco Plant: Dr. Ray F. Dawson

Scientific Apparatus and Laboratory Methods:

A New Type of Micro-Respirometer: Professor Albert Tyler and William E. Berg. A Qualitative Test for Bile in the Urine: Dr. Frank T. Maher

Science News

THE COSMICAL ABUNDANCE OF THE ELEMENTS

By Dr. HENRY NORRIS RUSSELL

PRINCETON UNIVERSITY OBSERVATORY

Eighty-eight chemical elements are known—(not counting two whose isolation is still a matter of controversy, nor unstable isotopes of short life, produced artificially). For all these, methods of isolation and of qualitative and quantitative analysis have been developed in chemical and physical laboratories, so that it is only a matter of hard work for the analyst, presented with a sample of matter of any sort, to determine its composition with accuracy. The simplest definition of composition alone concerns us here—the relative abundance of the elements in our specimen. We may measure this by weight or by the numbers of atoms of different kinds. The chemist is
doubtedly the first, the astrophysicist the second. As one of the latter, it is not my place to-day to do more than mention the many methods by which the chemist separates the various elements, and avoids loss of them in the process. Suffice it to say that the separation is sometimes easy, sometimes very difficult (as for the rare earths). The best available tests are much more sensitive for some elements than for others, and it is peculiarly hard to detect the latter when they are present in but small proportion, say less than one ten-thousandth of the whole mass.

The physicist can at times come in to ease the situation. Radio-active tests are available for but a small number of the elements, but can detect these in excessively small amounts.
Editor's Summary

This copy is for your personal, non-commercial use only.

**Article Tools**
Visit the online version of this article to access the personalization and article tools:
http://science.sciencemag.org/content/94/2443.citation

**Permissions**
Obtain information about reproducing this article:
http://www.sciencemag.org/about/permissions.dtl