The urethane resembles the corresponding urethane of synthetic tetrahydro-cannabinol in solubilities, but was a higher melting point (about 216° C with reddening and gas evolution compared with that of tetrahydro-cannabinol at about 208° C with reddening and gas evolution). The analysis suggests a derivative of methyl cannabinol: C 65.12; H 6.00. The preparation could be repeated. A derivative of an active product which is possibly a tetrahydro-cannabinol has been obtained directly from the red oil.

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DESIGNATION OF LOCATIONS ON MAPS AND PHOTOGRAPHS

IN recent issues of SCIENCE, two methods of location designation have been described. One of these is a "gridiron" system,[1] the other employs "latitudes and departures."[2] Both are entirely workable within reasonable limits; neither is suitable, without some or much modification, for use with maps or photographs which are to be reproduced on a scale differing from that of the original.

A third method, which may be called a method of intersection, in which the designation remains unchanged regardless of the enlargement or reduction of the original, is here presented. Through the point to be designated and the lower left corner of the map, draw a line. Record the angle between this line and the lower margin of the map. Repeat the process with a line through the point and the lower right corner. A typical actual designation, using this system, is: *Lake Nokoni,* Rocky Mountain National Park Quadrangle, L 51½°, R 56½°. The letters R and L before the angles refer to the right and left corner angles, respectively.

It will be noted that these designations are unaltered by any change in scale of the map, through reproduction or otherwise, and that they may be used with equal facility on photographs or sketches.

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KARL FRIEDRICH GAUSS AND HIS FAMILY RELATIVES

IN this crisis of civilization the reflections of one too old for active service turn toward the history of the human progress that is now at stake. The appearance of a familiar name in the American news is a reminder of the great achievements coming from the classic ground of the Georgia Augusta at Göttingen, the famous foundation of King George the Second. In the early years of the last century a young assistant at the observatory, already a great mathematician, directed his attention to the philosophy of geodesy. He recognized that an observer at station A could make his survey of his neighborhood by use of the fixed stars as a frame of reference; while an observer at a distant terrestrial station B could likewise make a local survey, by aid of the same framework of stars now however in quite different relative position. The two observers or any set of such pairs could know nothing more about their mutual relations if they were outside each other's range of vision owing to the protuberance of the earth's curvature; unless they had the property of locomotion, and could carry measuring chains about with them. The philosophical question of the relation of the results of survey by astronomical angular observations to the results of a chain triangulation of the non-spherical surface, and the foundations required to express their mutual consistency in a single scheme impressed the attention of Gauss so far as even to entice him to undertake a practical survey in the kingdom of Hanover with that end in view. This was the beginning from which the famous mathematical theory of a surface, like that of the earth, arose, considered as a self-contained region standing by itself without any support from a frame of space such as the stars had provided in the practical geodesic problem. Building on his foundation Riemann, also at Göttingen, extended it far beyond this self-contained surface of two dimensions to cognate loci of many dimensions, in results which were made available to the public only many years later, after his premature death. And more recently the Italian geometers Ricci and Levi-Civika condensed its complications into a very remarkable system of general classification of a system of related abstract concepts. This in turn has been annexed during the last great war as a foundation for a universe of mathematical relativity, which by abolishing time and space and evading all dependence of expression of results on frames of reference, has presented a mathematical model of a concise new physical world free from observational imperfections that insisted on arising from the fact of the delay in time of transmission of influences, which is in fact necessary if there is to be any analyzable medium of transmission at all.

This digression leads to my query. Long ago the great mathematician Felix Klein, well known in America, mentioned to me that he understood that

[1] C. F. Reed, SCIENCE, 93: 68, 1941.
[2] L. Hubrecht and R. O. Erickson, SCIENCE, 93: 288, 1941.

descendants of Gauss were still alive in America; and the recent occurrence of this unusual name in diplomacy has suggested that exploration in this direction would be of interest as relating to a conspicuous illustration of the dispersal of Central European centers of learning.

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SCIENTIFIC BOOKS

THE COMPARATIVE PHYSIOLOGY OF RESPIRATORY MECHANISMS

The Comparative Physiology of Respiratory Mechanisms. By AUGUST KROGH. vii + 172 pp. 84 figures. University of Pennsylvania Press. $3.00.

IN the spring of 1939, Professor Krogh delivered a series of lectures on "The Comparative Physiology of Respiratory Mechanisms" at Swarthmore College, and these lectures have now been prepared by him in a publication of about one hundred and fifty pages. The principal theme is shown by the title. It is approached through a discussion of the quantity of oxygen needed by various organisms at rest and in activity. The maximum steady metabolism indicates the maximum capacity of the animal's respiratory apparatus. Oxygen is available in the air and water at tensions differing according to the particular environment, and it is the difference between the tension in the environment and at the metabolizing tissues which determines the force available for diffusion in the respiratory exchange.

The external exchange is effected in special devices like gills and lungs, which secure the exchange in many different structures suited to the various animals, their habitat and activity. Special requirements, like heavy work or the restricted supply of oxygen during diving, show the adjustments of respiration under stress.

The blood of animals shows that there are several different chemical mechanisms utilized to facilitate transfer to the respiring tissues. The final transfer of oxygen and carbon dioxide between blood and tissues is related to the distribution and regulation of the capillary circulation, but the details for this last step in the respiratory exchange are still obscure.

The tracheal respiration of insects has particularly interested Professor Krogh. He develops this subject in detail, presenting many descriptions of analyses of the mechanisms involved which originate from his own laboratory, or as a result of his suggestions. There are so many intricate variations in the organs and methods of tracheal respiration, and Professor Krogh's knowledge and appreciation of them is so precise that this is one of the most interesting chapters of the book.

The book is written in a very succinct style, and the examples and illustrations are clear and appropriate. Printing, illustration and arrangement have been very nicely done. Each detail of the exposition is presented separately and distinctly, but the order of material and the brief conclusions always lead toward the complete picture of respiration suited to maintain the animal at its own level of activity and in its own environment.

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ULTRAVIOLET RAYS

The Chemical Action of Ultraviolet Rays. By CARLETON ELLIS and ALFRED A. WELLS. ix + 961 pp. Illus. New York: Reinhold Publishing Corporation. 1941. $12.00

PHOTOCHEMISTRY, more than most branches of physical chemistry, has suffered from the fact that guiding principles and accurate experimental methods have been slow in their development. This is due partly to the fact that many chemists have been inadequately trained in the use of the physical methods necessary for prosecution of sound research work in this field and partly because of the very complexity of the subject itself. During recent years, however, much progress has been made, and to-day there is a growing appreciation of the importance of the study of the effects of electromagnetic radiation both from the standpoint of the pure chemist and of the biologist.

"The Chemical Action of Ultraviolet Rays" is an attempt to provide a comprehensive survey of the effects of visible and ultraviolet light on chemical systems. A glance at the chapter headings will indicate the breadth of the subject covered. Experimental methods, quantum theory, spectroscopy, photochemical reactions, applications to industrial products and applications in biology are all treated. The number of literature references runs into the thousands.

Any book which attempts to cover as much ground as this one will necessarily be open to several criticisms. The uninitiated would have some difficulty in learning much about theories of spectroscopy and of reaction kinetics from a treatment as brief as the one given, but the list of references on experimental methods is very valuable.

The authors have done a real service to photochemists in covering the literature very thoroughly. One will find cited all the important references on nearly all reactions which have been shown to be light sensitive. The reader will thus be able to ascertain many of the facts in this field. It would be much more difficult for him to obtain a clear idea of the mechanisms