announcement at this time. In Volume I there are five "parts" of interest to the general reader prior to the main tables themselves. Part One concerns the classification and history of tables. Part Two deals with mathematical series used in computation. Part Three treats of interpolation. Part Four gives auxiliary interpolation tables. Part Five devotes 28 pages to general bibliography concerning tables. The separate tables constituting the main substance of this work are prefaced in each case by a discussion of the mathematical setting, with history, bibliography, etc., and a graph of the real values assumed. The number of decimal places given are usually from 10 to 20 with differences recorded, the number of places depending upon the part of the range considered. In Volume I are the log gamma function and Psi function. Volume II opens with further polygamma functions (derivatives of the Psi function). This volume continues with the Bernoulli polynomials and numbers, Euler polynomials and numbers, Gram polynomials and functions of polynomial approximation. Fundamental tables computed in this extensive fashion should serve as definitive for many generations. With the growth of statistical laboratories these tables should fill a special need. They represent the first substantial evidence in this country of a creative interest along lines in which recent British enterprise has been so conspicuously fruitful.

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REPORTS

A CENTURY OF GEOLOGIC SURVEYS IN PENNSYLVANIA

ON June 12 and 13, there was celebrated at Harrisburg the centennial of the founding of the First Pennsylvania Geological Survey. A total number of 285 persons registered for the meetings, and many others besides attended the commemorative exercises.

The first survey was created by act of the legislature dated March 29, 1836. Henry D. Rogers, the first state geologist, served until the expiration of this survey in 1858. The second survey came into being under Joseph P. Lesley, second state geologist, in 1874 and continued for about twenty years. In 1899 the third ("Commission") survey was created. Richard R. Hice served as state geologist during part of its existence, which terminated in 1919. The present or fourth survey traces its start to a new legislative act passed in 1919. This was marked by the appointment of George H. Ashley, state geologist. During the intermittent existence of the four surveys a total publication of nearly 200 reports, amounting to over 40,000 pages of text and some 50 maps and atlases, have appeared, including a number of works published jointly with the United States Geological Survey under a cooperative agreement.

The program of the celebration running through two days offered a variety of interesting events not merely to the technical guests and visitors but to the layman as well. During Friday morning the visitors registered at the offices of the Pennsylvania Topographic and Geologic Survey. Here exhibits had been arranged. Important among these were a file of publications of all four surveys, a comparison of various state maps, illustrative material of progress in topographic and geologic mapping, maps of the development of petroleum and natural gas fields, rocks and minerals, recently discovered fossils new to science or to Pennsylvania, stratigraphic charts and miscellaneous material mostly of historical interest in that it touched upon early geologic work in the commonwealth. Among the last were manuscript maps and sketches by the first survey, which were exhibited by the archives and history branch of the State Library in the Education Building. Walking tours of the capitol buildings were conducted at intervals during the morning. At noon a complimentary luncheon to the visiting delegates and invited guests was served at the survey offices.

The afternoon of Friday was devoted to a formal program in the forum of the Education Building. Addresses of welcome by Governor George H. Earle (a letter of welcome was read in the governor's absence), Secretary of the Department of Internal Affairs Thomas A. Logue and State Geologist George H. Ashley opened the program. Responses were given by M. M. Leighton, chief of the Illinois Geological Survey; W. C. Mendenhall, director of the United States Geological Survey, and Frederick Watson, His Britannic Majesty's consul general. After the responses, papers were read as follows: F. Lynwood Garrison, "Philadelphia, the Cradle of American Science"; R. W. Stone, "The Survey, 1836–1936"; George H. Ashley, "The Romance of Geology and the Part Played by Pennsylvania." On Friday evening a symposium, "The Mineral Industry and the Geologic Survey," was conducted with Samuel Taylor as chairman. The leaders were: George B. Hadesty, representing the Anthracite Industry; Carl E. Lesher, the Bituminous Coal Industry; Norman E. Maxwell, Petroleum and Natural Gas, and Paul B. Reinhold, non-metallic products.

Saturday, June 13, was devoted largely to field trips

conducted for the benefit of the visiting geologists. Three all-day trips, run simultaneously, offered a choice among a wide range of geologic phenomena because of the fact that Harrisburg is exceptionally well located for such observations. Trip A covered the area north and west of Harrisburg and included the Paleozoic stratigraphy from the Ordovician to the Pennsylvanian, Appalachian structures and physiography. It was conducted by Bradford Willard and Frank M. Swartz. Trip B visited the area southwest of Harrisburg to observe the stratigraphy of the Cambrian and Ordovician, the Triassic sediments and volcanics and the pre-Cambrian crystalline complex. This party was in charge of W. O. Hickok, IV, and R. W. Stone. Trip C was in charge of F. T. Moyer, C. W. Cumings and G. L. Adair. This trip toured the region east of Harrisburg covering the Ordovician and Triassic sediments and igneous rocks, the Cornwall iron mines and associated phenomena.

While the field trips were in progress, special entertainment was arranged for the visiting ladies. In the morning those interested met at the Rose Gardens of Dr. J. Horace McFarland. The visit to the gardens was followed by luncheon at the residence of Dr. and Mrs. Bradford Willard. In the afternoon entertainment was provided at the residence of Mr. and Mrs. R. W. Stone. At five o'clock, after the conclusion of the field trips, delegates, invited guests, the ladies and others assembled for a tea at the residence of Dr. and Mrs. George H. Ashley, which event brought the celebration to a close.

BRADFORD WILLARD

SPECIAL ARTICLES

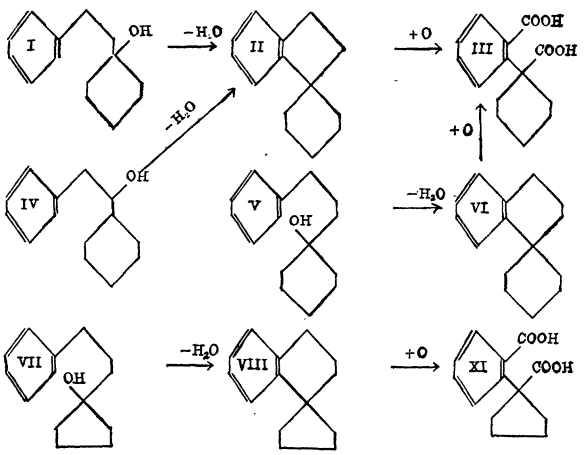
A SPIRANE BY-PRODUCT IN THE PHENANTHRENE SYNTHESIS

SINCE our preliminary communication[1] announcing the preparation of phenanthrene by the dehydration of l-phenylethylcyclohexanol-l(I), with subsequent dehydrogenation of the as-octahydrophenanthrene so produced, we have been studying this synthesis, especially from the standpoint of its mechanism and the constitution of the products. The results were submitted last month (May) to the faculty of pure science of Columbia University, in Dr. Perlman's dissertation for the Ph.D. degree. Articles based upon these experiments are now in course of preparation and will be submitted soon for publication in one of our chemical journals.

In the June, 1936, number of the *Journal of the American Chemical Society*, p. 1062, there appears a communciation by van de Kamp and Mosettig showing that they too are investigating this same problem, and it seems desirable therefore that we should announce immediately those of our results which concern the work reported by them.

By repeated distillation, they succeeded in separating the crude as-octahydrophenanthrene into two main fractions; A(20 per cent.), boiling at 135.5–135.7° at 10.5–10.8 mm; and B(70 per cent.), boiling at 142.6–142.8° at 9.2 mm; which they believe to be the two stereoisomeric forms of the octahydrophenanthrene, A having probably the *trans*- and B the *cis*-configuration. Using the Friedel-Crafts reaction, they found that A and B gave different monacetyl derivatives.

Our own experimental results have led us to a quite different conclusion, namely, that the (lower-boiling) by-product is not a phenanthrene derivative at all,



but is really the spirane (II), the higher-boiling constituent being the octahydrophenanthrene.

In support of this deduction concerning the constitution of the by-product, we offer the following experimental observations:

(1) On permanganate oxidation, it yielded the *alpha, alpha*-pentamethylenehomophthalic acid (III), whereas under similar conditions the octahydrophenanthrene gave only phthalic acid.

(2) The same spirane (II) was obtained as the by-product when benzyl cyclohexylcarbinol (IV) was used instead of the l-phenylethylcyclohexanol-l.

(3) The spirane VI, from l-phenylpropylcyclohexanol-l(V), on oxidation also gave the *alpha, alpha*-pentamethylenehomophthalic acid, one carbon being eliminated in the reaction.

(4) Similarly, the spirane VIII, prepared from l-phenylpropylcyclopentanol-l(VII), yielded on oxidation the corresponding *alpha, alpha*-tetramethylenehomophthalic acid(IX).

(5) Certain of these spiranes were fused with sele-

[1] Bogert, SCIENCE, n. s., 77: 1994, 289, March 17, 1933.