an unusually hardy organism, and in other respects it is especially favorable material for the study of vital phenomena. And equally important is the fact that henceforth the modifications produced by experimental methods may be analyzed in the light of normal development.

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REPORTS

TEN-YEAR RESEARCH PROGRAM OF THE VIRGINIA GEOLOGICAL SURVEY

WITH the appointment in 1929 of a new state geologist and of an assistant state geologist, a long-range program of field research by the Virginia Geological Survey was planned. The objectives of this program were chiefly three-fold: to obtain fundamental geologic data, mainly stratigraphic and structural, in a large part of the state which lacked detailed field mapping and studies; to study thoroughly the geologic relations of certain mineral resources; and to obtain as much data as possible upon the characteristics and uses of these resources.

The 40,262 square miles of land area in Virginia includes parts of five geologic or physical provinces—from the Atlantic coast westward into the Appalachian Plateaus. The fact that the 440-mile southern boundary is approximately transverse to the "grain" of the Appalachian Highlands and the Coastal Plain indicates the nature of the geologic problems to be studied. It should be noted also that the annual production value of the mineral resource industries in the state has, in general, ranked increasingly higher during the last two decades.

In planning the program, the wide range of uses of the field data was one controlling factor. The primary uses of technical data obviously would be by geologists and mining and industrial engineers. Much of the geologic data has had basic use in the planning of normal community and industrial development, and recently some have been very useful in national defense projects. Part of the program was planned for the distinct purpose of interpreting geology and mineral resources in a manner to be of use in the schools in the state and of interest and value to laymen.

The field research program was definitely started in 1930–1931, as certain appropriations became available. Its development over a decade can now be summarized. The emphasis in this brief summary is upon types of research projects that have been completed, or are nearing completion. More progress in research was made during the earlier part of the decade, despite the depression, because more funds were then available for field investigations. During this decade, 24 bulletins based on field research projects, having a total of about 3,000 octavo pages of text and about 775 half-tone illustrations and nine geologic maps in colors, were published. In the same period, almost 40 other field research projects have progressed to the stage where the manuscripts are on hand, or are being prepared, for publication as Survey reports. These projects cover many phases of the broad field of Virginia geology and its manifold economic applications.

It may be noted that at first in this decade two geologists constituted the regular technical staff of the Geological Survey and that another geologist was added a few years ago. Thus many of the research projects have necessarily been carried forward by other geologists—25 of them—who were from year to year employed seasonally. Some of these men were graduate students engaged in field research as a part of their work for Ph.D. degrees at various universities. In addition, eight geologists of the U. S. Geological Survey staff worked during this decade on cooperative projects in Virginia.

All this research by the State Geological Survey has been done as a division of the Virginia Conservation Commission, which was created in the reorganization of the state government by Governor Byrd in 1926.

Twenty projects were completed during the decade by the publication of reports in the regular bulletin series of the Survey. Projects in which basic geology predominates included Roanoke County with map[1] (34),[2] James River marble belt with map (39), Appalachian Valley geologic map with explantory text (42), Goochland County with map (48), Appalachian Valley geology (52, in press), Warrenton quadrangle in the northern Piedmont Upland and Triassic Lowland (54), and Draper Mountain area in Pulaski and Wythe counties (55). Industrial mineral (nonmetallic) projects were Coastal Plain sand and gravel (32), pegmatite deposits (33), kyanite deposits with map (38), Giles County marble prospects (40), and barite deposits (53). Metals included zinc and lead deposits with map (43) and gold (44). Ground-water projects comprised thermal springs with map (36), ground water of northern Virginia (41, preliminary summary, and 50, final report), and ground water in Shenandoah Valley (45). Educational, or more or less nontechnical publications for use in schools and by laymen, were: Virginia caverns (35), The Peninsula (37), mineral resources (47), and Russell County (49). In addition, two volumes of "Contributions to Virginia Geology" were published (46, with 13 papers, and 51,

[1] Map means geologic map in colors.
[2] Numbers in parentheses are serial numbers of published bulletins.

with 8 papers). Obviously most of these publications contain many data on, and interpretations of, basic geology which are of great importance in scientific and economic investigations, whether for peace-time welfare or industrial activities under the urge of national defense programs.

Projects initiated during the past decade and still in various stages of progress toward completion for published bulletins may be briefly summarized as follows:

Basic geologic research primarily pertains to 14 projects, namely, Great Gossan Lead district in the southwestern Blue Ridge province,[3] geology of Frederick and Clarke counties (transverse of the northern Shenandoah Valley),[3] Natural Bridge district,[4] geology of Giles County,[3] Hot Springs district, Burkes Garden quadrangle (Tazewell County),[3] northwest front of Blue Ridge province in southwest Virginia, Eocene formations,[4] Lower Devonian, geology of Abingdon 30-minute quadrangle, Amherst quadrangle (15′), Buena Vista quadrangle (15′), Lexington quadrangle (15′), and Stony Man quadrangle (15′).[4]

Research involving chiefly industrial minerals includes 7 projects: Commercial granites,[4] diatomite, Valley limestones, southwestern Piedmont limestones, mineral industries, slates,[3] and talc and soapstone.[3] One project is concerned with fuels, namely, natural gas possibilities in southwest Virginia,[3] which is in cooperation with the U. S. Geological Survey.

Projects in progress that are in large measure educational, that is, for reports in non-technical language for use in schools and by laymen, and which in addition will afford considerable basic data are as follows: Common rocks and minerals, geology of Virginia, geologic history of Shenandoah National Park, natural wonders, physical features, rocks and land forms in state parks, guide-book of the Lee Highway (U. S. 11), and separate "Outlines" of the geology and mineral resources of Augusta, Bath, Frederick,[3] Scott,[4] Smyth,[3] Tazewell, and Wythe[3] counties.

Ground-water investigations in cooperation with the U. S. Geological Survey consist of two projects, namely, the southern Coastal Plain[6] and the middle Coastal Plain.

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SPECIAL ARTICLES

ABSORPTION OF PELLETS OF CRYSTALLINE HORMONES

THE introduction of the pellet method by Deanesley and Parkes[1] has made possible a much more efficient administration of many of the crystalline hormones. Due to the present scarcity of available data on the relative absorption rates of hormones in pellet form, it seemed advisable to attempt to obtain such information.

Using a modification of the Hartman[2] apparatus, cylindrical pellets of various crystalline hormones were prepared; all these pellets had the same diameter and had been subjected to the same amount of compression. (The modified apparatus and the detailed results will be described in a later article.) The length of a pellet varied according to its weight (in these experiments, 1.6 mgm = 1 mm of length). The pellets used weighed 6 to 10 mgm each. They were implanted subcutaneously, under ether anesthesia, in the lower right abdominal quadrants of 97 normal, healthy, sexually mature male and female rats. One freshly made, full-sized pellet, after careful weighing, was implanted in each rat. Each rat and each pellet were used only once. After varying intervals had elapsed the pellets were removed, cleaned, dried to constant weight in a desiccator and reweighed. Each rat was also weighed when the pellet was implanted and when it was removed.[3]

The data reported below were obtained from the implantation and removal of 20 testosterone, 16 testosterone monopropionate, 12 methyl testosterone, 14 stilbestrol, 17 desoxycorticosterone and 18 progesterone pellets. The loss of weight of each of these pellets, expressed in terms of per cent., was plotted graphically against the number of days the pellet had been *in situ*. Such a graph showed surprisingly little scattering from a nearly linear curve. Pellets could be and were successfully removed and weighed until they were about 90 per cent. absorbed. Under the conditions of the experiment, it was found that 90 per cent. absorption of the pellets required the following amounts of time: desoxycorticosterone, 27 days; testosterone, 31 days; methyl testosterone, 36 days; stilbestrol, 51 days; testosterone monopropionate, 61 days; progesterone, 88 days. It is believed that the uniform technique employed makes these results directly comparable. The sex of a rat appeared to have no constant differential effect on the absorption rate.

The absorption curves were either linear or else showed with time only a slight gradual decrease in the absorption rates, a fact which agrees with theoretical

[3] Field work completed.

[4] Manuscript report and geologic map completed for publication.

[1] R. Deanesley and A. S. Parkes, *Proc. Roy. Soc.*, Ser. *B*, 124: 279–298, 1937.

[2] C. G. Hartman, *Endocrin.*, 26: 449–471, 1940.

[3] The author wishes to express his indebtedness and gratitude to Mr. Bruce Valentine for construction of the pellet press, to the staff of the Edward Martin Biological Laboratory of Swarthmore College for providing facilities and animals to begin the experiment and to Dr. Erwin Schwenk, of the Schering Corporation, for donating the hormones used.