ciation, established in 1906, celebrated its twenty-fifth anniversary in October, having functioned continuously for a quarter of a century. The primary reason for its establishment was that the Council on Pharmacy found it difficult to secure satisfactory outside help in checking the composition and properties of newer drugs under investigation and in watching over market supplies of non-official preparations. Since that time the work of the laboratory has been greatly extended, it has aided the medical profession in taking a much more scientific attitude toward drugs, and has rationalized prescribing. It has also been the means of informing the medical profession whether compounds are of the chemical composition claimed. Gross deceit has lessened, though subtle forms of fraud are still practiced. It has been due in great part to the work of the laboratory that the boards of directors of progressive pharmaceutical firms have seen the necessity of maintaining high-grade scientific staffs in order that their products may be carefully watched and freed from criticism and that research may be along lines of genuine value. The laboratory has had a large part to play in scientific nomenclature, in controlling scientific names which twenty-five years ago were in a chaotic condition, and has done its part in developing better methods of standardization and maintaining the best chemical technic and procedure. It has been an aid to public health, in that certain new developments which could not meet its tests have gone no farther than the laboratory."

DISCUSSION

THE GLACIAL CONTROL THEORY APPLIED TO BERMUDA

OUT in the Atlantic Ocean, 675 nautical miles southeast of New York City, stands the submerged volcano making the limestone-covered islands of Bermuda, with their winter resorts, their international biological station, and their naval base of the far-flung British Empire. When this old volcano was active, and when its fires died out, is not known, but presumably at some time in the late Cenozoic. To these beautiful islands Dr. Robert W. Sayles, of the Harvard Department of Geology, went on a vacation trip during the winter of 1923, and in his walks he noted at many places the more or less red residual soils interbedded in the wind-blown dune limestones, now more or less consolidated. Then and there the thought came to him that in these soils, with their living and extinct land snails, might lie the means of correlating these strata with the various epochs of the Pleistocene glacial history of North America. Since then he has revisited Bermuda several times, and now we have his matured considerations, set forth in an interesting memoir[1] that shows much originality and industry. It blazes a new line of endeavor in testing the glacial control theory of Daly, and the method should next be applied to the Bahamas.

The residual soils, Sayles discovered, occur throughout the islands, and they contain 24 described forms of land snails, of which at least 6 and possibly 11 are extinct. These snails furnish the chief means of determining the age of the soils. Probably not enough detailed collecting and study was done to prove beyond a doubt the time correlations. However this may be, many of the local soils are arranged into five named horizons that are separated from one another by the dune limestones, and are correlated with the warm intermediate times between the Wisconsin, Illinoian and Yarmouth epochs of the glacial record. The underlying, much consolidated Walsingham limestone, also largely of dune origin, is correlated with the Kansan and older divisions of the Pleistocene. The underlying basis of interpretation is Daly's Glacial Control Theory, which holds that great quantities of water were subtracted from the oceans to form the continental ice-sheets:

> When the ice was at its maximum extent the strandline fell as much as 260 feet below modern sea-level. While the ice-cap grew, large parts of the Bermuda banks, covered by mollusc shells and unprotected by vegetation, were exposed to the sweep of the winds and the dried sands were piled up in great dunes. . . . When the sea rose at the close of each glacial stage, the source of supply for the dunes was buried beneath the ocean waves, the winds became less violent, and a permanent flora anchored the dunes. A long period of slow decay began, during which red and brown soils accumulated [p. 460].

Accordingly, the Bermudas are considered to have stood highest above sea-level, with the stormiest climate, during the glacial times, causing the formation of the dunes, now consolidated into eolianites, a term here proposed "for all consolidated sedimentary rocks which have been deposited by the wind." During the interglacial warmer times, the sea-level rose and the islands were reduced in size to about their present extent, and this is when the residual soils were formed and the snails entombed.

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[1] "Bermuda during the Ice Age." By Robert W. Sayles. Proc. Amer. Acad. Arts Sci., Vol. 66, No. 11, November, 1931, pp. 379–467, pls. 1–13, text figs. 1–18.

COBALT IN PLANT ASH

IT was observed when vegetables were being ashed for calcium determinations that some gave a white

to brown ash, others a green or blue ash. The latter produced a green or blue water solution which turned pink on the addition of hydrochloric, nitric or sulfuric acid. The hydrochloric acid solution soon faded, but the nitric and sulfuric acid solutions retained their color for twenty-four hours.

The tendency to form the green or blue ash depends on both the soil and the vegetable. Of the plants grown on the Alabama Experiment Station at Auburn, New Zealand spinach and chard gave an intense green ash; tendergreen and Chinese cabbage gave a medium green ash; while the ash from turnips varied from green in some cases to brown in other cases. Cabbage grown in the greenhouse on Norfolk, Cecil and Hartselle soils gave a green ash of varying intensities; that grown on Eutaw soil gave a white ash. Turnips similarly grown on Oktibbeha soil gave a pale green ash.

Since the Allison apparatus[1] gives one or more light minima characteristic of each compound present and since it will detect approximately four parts in 10^{12}, it seemed a desirable means to determine the cause of the green color referred to above. Several samples of vegetables were ashed, dissolved with hydrochloric acid and examined for the chlorides of iron, chromium, manganese, cobalt, nickel and copper. Cobalt was always absent in the white or brown ash but always present in the green or blue ash, nickel was always absent and the other elements listed above were always present. Hence, it is concluded that the green or blue ash is due to the presence of cobalt. No relation was observed between plant growth and the presence or absence of cobalt in the ash.

We wish to express our appreciation to Dr. Allison for the use of his apparatus and his interest in the work.

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THE RELATIONSHIP OF THE GRANITES TO THE RHYOLITES IN SOUTHEASTERN MISSOURI

HAWORTH,[1] in his account of the igneous rocks of Missouri, states that the granites, with few exceptions, grade into the porphyry (rhyolite). He cites many localities where such gradation can be seen and draws the following conclusion. "It is therefore useless to attempt to decide which is the older, the granite or the porphyry." He emphasizes the fact that the granite occurs in the lower ground between the higher hills of porphyry and concludes that the porphyry represents the more rapidly cooled portion at the surface, and the granites and granite porphyries the slower cooled portion deeper down, and that all the rocks belong to the same eruption of igneous material and hence grade one into the other.

This relationship, as interpreted by Haworth, has been accepted by the present Missouri Bureau of Geology and Mines, as is shown by the following quotation from its report on the "Quarrying Industry of Missouri" (p. 61). "The gradation of rhyolite into granite and *vice versa* can often be traced horizontally and vertically."

For many years, I have doubted that a granite in which the grains average nearly one half inch in diameter (which is true of some of those occurring in southeastern Missouri) could change to a dense rhyolite showing flow structure within a few feet, as, under the Haworth gradational theory, would be required by the relationship of many occurrences of these two rocks. It was not until 1919, however, that I found the first positive proof that the granite was instrusive into the rhyolite. This locality was near the top of Knoblick Mountain in St. Francis County, which is in the northeastern part of the area of igneous rocks. The contact found was so sharp and clear-cut that there was absolutely no doubt that the granite was later than the rhyolite and that it was intrusive.

During subsequent years, I have searched for further evidence on the problem, and have been rewarded from time to time by finding other localities where similar relationships exist, although the widespread mantle rock has handicapped the search for actual contacts.

During the last three years, an intensive search throughout the area of igneous rocks of southeastern Missouri has resulted in finding evidence that the granites are not only younger than the rhyolites, but that they were injected into them. Sharp contacts of medium to coarse-grained granites with the dense rhyolites that were undoubtedly surface flows have been found in every locality where the relationship of the two rocks has been determined. This intensive study has shown that probably more than one granite injection occurred, or else that there was marked differentiation within a large intrusive; more probably the former. A detailed account of the relationship of these two rocks was given at the meeting of the Geological Society of America in December, 1931.

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[1] Allison and Murphy, *J. Am. Chem. Soc.*, 52, 3796, 1930.

[1] E. Haworth, "The Crystalline Rocks of Missouri," Mo. Geol. Surv., Vol. 8, 84–220, 1895.