Among the other molluscan types the rudistids are at once most numerous and most significant. They are present in the majority of the newly discovered faunules, usually dominating them. The specimens do not appear referable to any described species but have much in common with the genus *Barrettia,* which characterizes the Upper Cretaceous of Jamaica. Several of the other molluscs are also related closely to Jamaican, Saint Thomas and Saint Croix forms of Upper Cretaceous age.

Fossils are not abundant in the older rocks of the Antillean islands, and this collection is larger and more varied than any other thus far reported. Its discovery promises ultimately to settle the differences of opinion that exist regarding the age of the pre-Oligocene rocks of Porto Rico,[2] and the facts already established warrant the following conclusions:

(1) The claim of E. T. Hodge[3] that the stratified rocks situated in the center of the island near Aibonito are Comanchean must be set aside. The specimen identified by Dr. Reeside as *Barroisiceras aff. habnerfellneri* was found in rocks which Hodge assigned to the Comanchean, and a reexamination of the unconformity which he postulated between the "Barranquitas-Cayey" shales of assumed Lower Cretaceous age and the Upper Cretaceous "Sierra de Cayey" conglomerates has shown the two formations to be clearly intergradational.

(2) Upper Cretaceous rudistids occur profusely in the "Rio Jueyes series," which, on the basis of a single specimen referred to the Eocene species *Venericardia alticosta,*[4] Hodge considered to be early Tertiary and Maury dated as Middle Eocene. Mr. Thorp and the writer visited the reported *Venericardia* locality and obtained a collection of rudistids from it.

(3) G. J. Mitchell[5] resolved Hodge's "Coamo Spring limestone," another postulated Eocene horizon, into two calcareous members, the Guayabal and Coamo tuff limestones, both of which he found to contain Upper Cretaceous rudistids.

(4) Mitchell[6] has demonstrated that Hodge's "Rio Descalabrados series," also assigned to the Eocene, is composed essentially of strata belonging to the "Rio Jueyes series" and Coamo Spring limestone," repeated in consequence of folding. Its limestone members contain Upper Cretaceous rudistids.

(5) The possible equivalence of the Corozal limestone and the Upper Cretaceous La Muda limestone has already been pointed out.[7] No additional support can be given that suggestion at present, but a study of the fauna of the Corozal limestone has demonstrated its Upper Cretaceous affinities.

Thus, nearly all the evidence adduced in arguing the presence of Lower Cretaceous and Eocene strata among the older rocks of Porto Rico has been contradicted by the discoveries of the past six years; and Matley and Earle's opinion that pre-Mesozoic materials are present in Porto Rico and the Virgin Islands is without foundation, other than the physical appearance of some of the rocks. The paleontological and stratigraphic data now at hand, although incomplete, indicate that all the ancient sediments and associated volcanic and intrusive igneous rocks are Upper Cretaceous, not only in Porto Rico, but also in the Virgin Islands.

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THE DEPENDENCE OF PHYSICS ON THE MATHEMATICAL PREPARATION

AT the beginning of last school year a number of questions in mathematics were prepared by the author to be given to the students of elementary physics at various institutions. The object of giving the test was to find out what correlation, if any, there is between the mathematical preparation of the student and his successes in the course of physics that he is about to take.

Some work of this kind was done at the University of Florida in 1929. The students of elementary physics were given an examination in the essentials of arithmetic and algebra, and the grades made in mathematics were later compared with those made in physics. As the correlations proved to be very high, it seemed worth while to ascertain this correlation on a larger scale by inviting the cooperation of a number of institutions in administering the necessary tests.

The institutions who cooperated in this enterprise were Cornell University, University of Virginia, Oberlin College, Virginia Polytechnic Institution, University of Richmond, University of West Virginia

[2] *Cf.* C. A. Matley and F. Higham, "The Basal Complex of Jamaica, with Special Reference to the Kingston District." *Quart. Jour. Geol. Soc.,* Vol. lxxxv, pp. 472 and *ff.;* also pp. 490–491, 1929; C. J. Maury, "Porto Rican and Dominican Stratigraphy," SCIENCE, n.s., 70: 1825, 609, 1929; H. A. Meyerhoff, "The Pre-Oligocene Stratigraphy of Porto Rico," SCIENCE, n.s., 71: 1838, pp. 322–323, 1930; C. J. Maury, "Correlation of Antillean Fossil Floras," SCIENCE, n.s., 72: 1862, pp. 253–254, 1930; H. A. Meyerhoff and I. F. Smith, *op. cit.,* pp. 219–229, 1931.

[3] E. T. Hodge, "The Geology of the Coamo-Guayama District, Porto Rico," N. Y. Acad. Sci., "Scientific Survey of Porto Rico and the Virgin Islands," Vol. I, pp. 138, 192–193, 1920.

[4] This specimen can not be found, and it is therefore impossible to verify the identification.

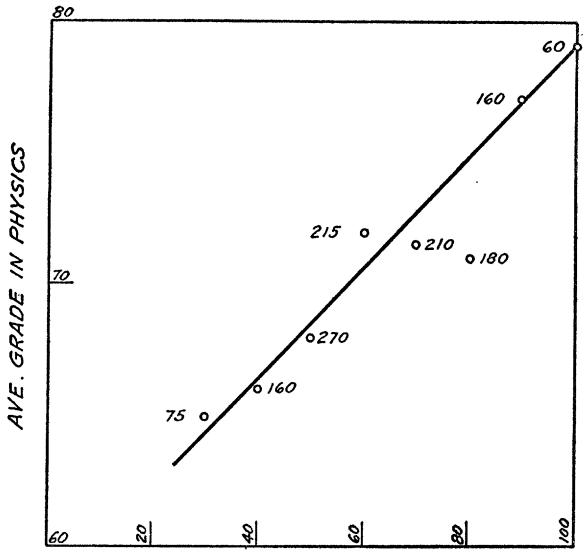
[5] G. J. Mitchell, "The Geology of the Ponce District, Porto Rico," N. Y. Acad. Sci., "Scientific Survey of Porto Rico and the Virgin Islands," Vol. I, 255–257, 1922.

[6] *Ibid.,* pp. 255–257; plate VI, section H-H′; geologic map. *Cf.* Hodge, *op. cit.,* pp. 161–164 and geologic map.

[7] H. A. Meyerhoff and I. F. Smith, *op. cit.,* pp. 221–225 and 263, 1931.

and Bowdoin College. The tests in mathematics were given at the beginning of the school year 1930-1931. The grades of the students made later in physics were sent to the author, and the results about to be presented were obtained from these reports.

Graph A represents the results of the comparison

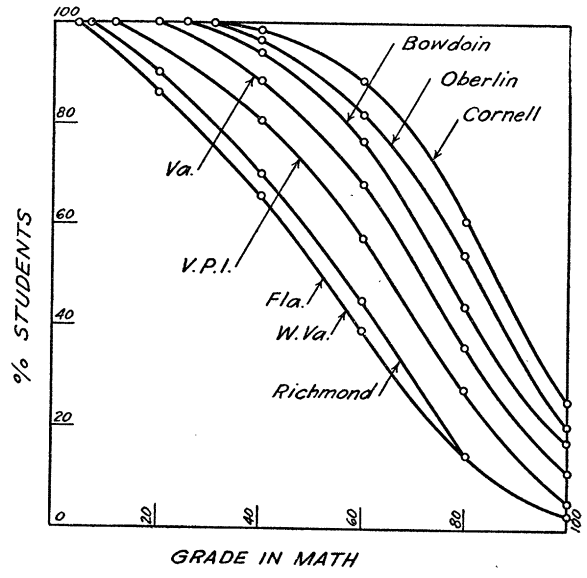


GRAPH A

of grades. Opposite each point is the number of students who made a given grade in mathematics. The ordinate is the average grade in physics made by these students. As is evident from the graph, the averages made in physics seem to be directly proportional to the grade which represents the mathematical preparation of the student. Only in the middle of the range, where the preparation is neither very good nor very bad, is it difficult to predict the success of the student in physics from his mathematical abilities.

In most institutions physics is considered one of the hardest courses on the campus. The number of failures in physics is usually very high. A great deal of this mortality is undoubtedly due to the very poor preparation of the student in the elements of the mathematics. After all, algebra and trigonometry is a part of the language of elementary physics, and if a student has to spend a great deal of time in unraveling the mysteries of this language he is bound to lose sight of the physical principles involved. It would seem advisable to give suitable tests in mathematics to all who are about to take the beginners' course in physics, and to dissuade from taking the course those students who show very poor preparation.

The results of the mathematics tests gave the opportunity also to compare the preparation of students in various colleges. In graph B, the percentage of the students in a given college is plotted against the



GRAPH B

mathematics grade these students have attained or exceeded. The three upper curves are those of the endowed colleges.

As it was to be expected, the students of the privately endowed institutions showed a much better preparation than the students of the state institutions. The average grade in the mathematics of the students in Cornell, Bowdoin and Oberlin is about 20 per cent. higher than the average grade of some of the state institutions of the South.

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