sumptive, whether living together, or dead. It also is intended to obtain whatever collateral information is possible relating to other members of the family.

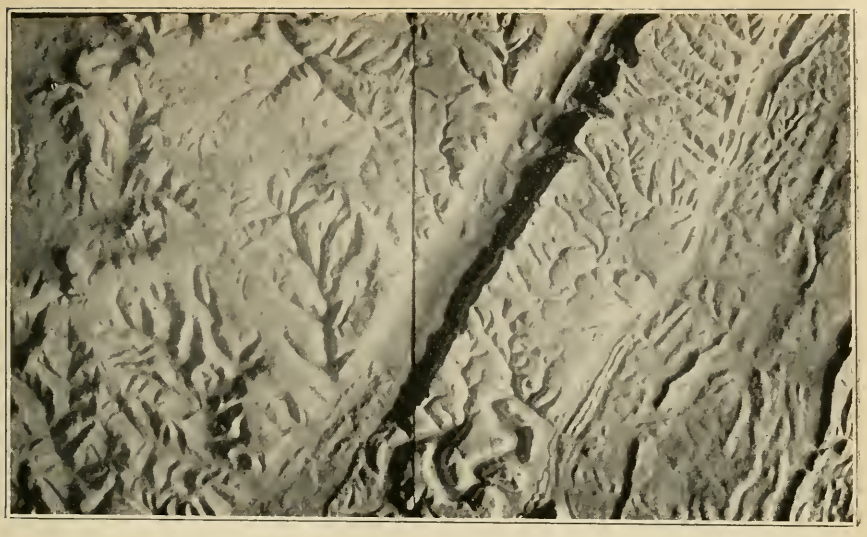
It is the purpose to extend this investigation, eventually, so that it will include the names of the inmates of all institutions coming under the supervision of the Board of State Charities. The information obtained is being registered upon cards, which are arranged after the manner of a library catalogue, so that everything known about each individual will be readily available in concise form. The purpose of this work is to learn, so far as possible, the causes of dependence and crime and the conditions under which they exist. The value of such statistics, either when one considers the case of the individual or of his descendants, can not be calculated. When fully covering the whole field and extending over a series of years, it will give the State the data from which to arrive at the most important conclusions regarding the treatment of its unfortunates and delinquents.

Aids in Teaching Physical Geography.

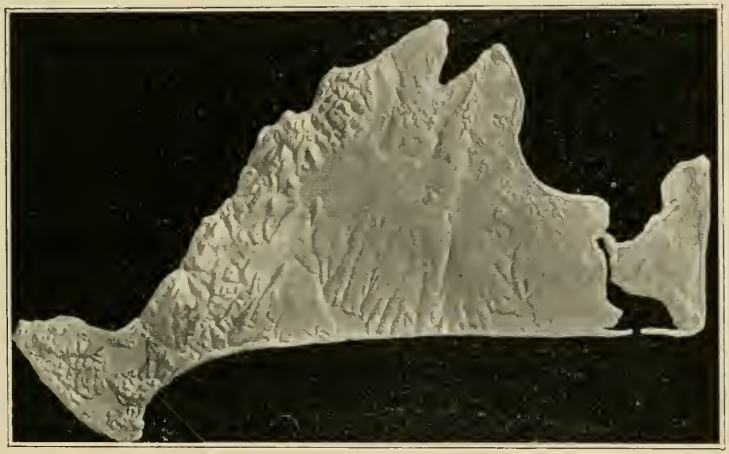
By V. F. Marsters.

For a number of years physical geography has barely received recognition in the high schools of this State. From the standpoint of accumulating useful knowledge, as well as achieving mental discipline, it is to be regretted that the subject has received so little attention. It would seem that it has been tolerated or simply permitted to exist, while the sister sciences have been fostered and developed in a manner commensurate with the means at hand. The past few years, however, have witnessed not only a remarkable advancement in geographical science, but also the introduction of new and rationalized methods in teaching the subject. The large accumulation of geographical facts accompanied by an increasing demand for rational explanation or interpretation furnishes the key to the recent interest in this subject.

The importance of geography as an educative science must be conceeded when it is known that the most progressive universities have



Sewanee Model. Chattanooga Model.



Martha's Vineyard.

Cape Cod Model.

placed the subject on an equal footing with the other sciences which have for years found a respected place in the college curriculum. That this fact is being recognized beyond the walls of the university must be admitted when we see a number of the larger cities of the country employing specialists to instruct their teaching force and familiarize them with a rational method of teaching. I am informed that the city of Indianapolis has employed a well-trained man for this specific purpose. This is a step taken in the right direction. Moreover, about all the commissioned high schools of the State have placed physical geography on the schedule of studies, although in many cases but a short period is devoted to the subject. These facts point to the conclusion that physical geography has gained a deserved place in the public schools, and, moreover, with due recognition, it is destined to play as important a role as any of its allies as an educative science because of its recognized disciplinary value.

Let us look for a moment at some of the recent methods of teaching the subject. Ten years ago it was all sufficient for the student to describe a geographical element, or simply to accumulate facts. If the student knew all the capes on the Atlantic and Pacific coasts and their locations, nothing more was to be learned about them. The question was not asked why any geographical element should appear here or there, why this or that territorial limit of topographical expression should exist; it was sufficient to be able to know the fact of its existence, location and general features without calling for an explanation. Such knowledge is empirical. The serious student is no longer satisfied with empirical description, but he demands explanatory description. It is in this particular phase that marked advancement has been made. Empirical description is rapidly giving way to rational explanation of geographical phenomena. The absence of an educative discipline in the former, and its necessary inherence in the latter, fully accounts for the recent growth of the so-called new geography. Thus, rational geography demands not only the *collection of facts* by personal observation, but it also calls for an *explanation* of the *observed facts*; such a process must employ comparison and deduction. Moreover, the conclusions reached or the method of explanation derived by comparison and deduction must explain not only all the facts at hand, but they must also account for many other related facts yet to be collected. It is only by the employment of these broad and fundamental principles that the accumulation of useful knowledge and, above all, a valuable mental discipline can be attained.

There are many aids towards this end. It is, however, only within recent years that much of this material so useful to the geologist, as well as to the geographer, has come within the reach of the secondary schools. The apparatus, which should be found to some extent at least in all schools and colleges purporting to teach geography, may be described under the following headings:

1. Photographs and lantern slides.
2. Maps.
3. Models.

1. Photographs.—The collections of photographs, made by the usual dealers, furnish very little material that has any special geographical significance. Such collections are usually made with reference to depicting some artistic expression in a landscape, and invariably fail to bring out such topographic outlines as would be of significance to the student of geography. A fairly useful selection can be made from a collection made by various members of the Geological Society of America, and placed in the hands of a committee for classification and distribution. Further information may be obtained by applying to G. P. Merrill, Washington, D. C., or to Prof. F. L Fairchild, Rochester, N. Y.

Lantern slides are even more useful than photographs because they present a more vivid picture, and details more easily discerned. Moreover, the relation of parts are more clearly brought out because of the enlargement; in fact, it is the next best to seeing the actual thing illustrated. In the use of the lantern, however, care should be taken not to introduce this method of illustration as simply a species of entertainment, but rather as an essential part of the course to be absorbed by the student as well as text or lecture.

What has been said of the insufficiency of the dealers' photograph collections is equally true of their lantern-slide collections. An examination of the stock of a number of dealers furnished but little useful material. This long-felt want has in part been supplied by Prof. W. M. Davis, who has made a very excellent collection of about one hundred and fifty slides, illustrating the prominent and essential features of the forms of the land, rivers, lakes, glaciers, shorelines, waves, etc. The entire collection may be obtained from E. E. Howells, Washington, D. C.

In the interest of Indiana geography, it is proposed to make a collec-

tion of photographs and lantern slides during the coming year, which may illustrate the most common and prominent topographic features of the State. It would, of course, be desirable to have both series in the schools, but when the purchase of a lantern is not possible, photographs, of course, may be substituted. It is hoped that such a collection of laboratory material may create and stimulate further interest in the subject and help to place it on an equal footing with the other observational sciences observed in the school system.

Maps.—There are a number of sources from which many selections of useful illustrations of topographic types may be obtained. The United States Geological Survey has prepared a large number of topographical and geological sheets covering portions of the United States. It is to be regretted that this national organization has not published a single sheet covering any portion of the State of Indiana. A part of this neglected work is being done by the Geological Department of Indiana University. In addition to the series of sheets mentioned above, the National Survey has lately prepared a large number of folios, forming a part of the "Geologic Atlas of the United States." These have been made to serve educational purposes in particular, but strange as it may seem, a large number of the best equipped high schools of the State have failed to make use of the opportunities offered. The folios contain a topographic sheet, a second showing the areal geology, a third illustrating the geology in cross section, and sometimes a fourth devoted to the economic geology. Each folio is accompanied with an explanatory text.

From the United States Coast and Geodetic Survey may be obtained a series of maps giving the minutest details of shore-line topography. For a list of the maps address this department at Washington, D. C.

It is gratifying to learn that in a few of the high schools of this State the daily weather maps are being used with a considerable degree of success. These may be obtained by addressing the local forecast official, C. F. R. Wappenhans, Majestic Building, Indianapolis.

Another source for information of meteorological interest is the United States Hydrographic Department, which issues each month a series of pilot charts of the North Atlantic and North Pacific oceans. On these charts are shown the storm tracks, the date of their occurrence and the direction of their course (from which can be determined their rate of movement), calms and prevailing winds, derelicts and wrecks, icebergs and field ice, regions of frequent fog, etc.

The most available source for information on all these publications, and offering assistance in the selection of types from each group, is a little manual entitled "The Use of Governmental Maps in Schools," by Messrs. Davis, King & Collie, and published by Henry Holt & Company, New York.

For information concerning foreign maps, the teacher is advised to consult an article by Prof. W. M. Davis on "Large Scale Maps for Geographic Illustrations," published in the Journal of Geology. A reprint of this article may possibly be obtained by addressing Prof. T. C. Chamberlain, Chicago University.

Models.—One of the most novel and still most effective means in the teaching of geography as well as geology, is supplied by models illustrating the topographic form and the rock structure upon which the topography is made.

Models are of two kinds: One may represent the actual topography of a surveyed section of country and the other may be an idealized land form, depicting the essential and expectable features. The latter may be called "types of land form." Of all the materials mentioned, as forming equipment for a geographical laboratory, models may be regarded as of special value. It is indeed unfortunate that the cost of models in general is so excessive that a large number of the secondary schools may not be able to purchase the larger and most expensive illustrations of land forms, but still there are many that come within the reach of schools with but meagre appropriations.

During the past year the Department of Geology and Geography, Indiana University, has given a course in physiographic geology. Practice in the construction of relief maps may be taken as part of the laboratory work required in the course. It is of course evident that a knowledge of the various methods of making relief maps is of great advantage to the teacher who may be called upon to accumulate material for a geographical laboratory. As a result of this course, the following relief maps have been constructed, the data having been obtained from the topographic and the geologic atlas sheets, published by the United States Geological Survey:

Chattanooga and Sewanee Sheets, Tennessee, horizontal scale, 1″=1 mile; vertical scale, 1″=1,600 feet.

Harper's Ferry Sheet, Baltimore, Md., horizontal scale, 1″=1 mile; vertical scale, 1″=1,600 feet.

Martha's Vineyard Sheet, horizontal scale, 1″=1 mile; vertical scale, 1″=400 feet.

Cape Cod, horizontal scale, 1″=1.5 miles; vertical scale, 1″=600 feet.

Amsterdam Sheet,* New York, horizontal scale, 1″=1 mile; vertical scale, 1″=1,000 feet.

The following models are in process of construction: Boston Harbor Sheet, Mass., and the Sun Prairie Sheet, Wisconsin. These models will show some very excellent types of glacial topography. The completed series of models illustrate some of the most common and conspicuous types of topography and geological structure. It is, indeed, just the kind of material that should be found in the laboratories of the secondary schools. In order that some assistance may be given in this direction, the geological department has preserved the negatives of the models mentioned. From these any number of positives may be prepared; and it is proposed to supply copies of one or more of these to any high school desiring to establish a geographical laboratory. Copies will be sold at the cost of construction, so that the school with but meagre appropriations can at least make a beginning by adding one model each year to the laboratory equipment. It is hoped that the high schools of the State will not be slow in taking advantage of the opportunity here offered. Effective work in geography can not be done without a laboratory; and of the kinds of available material mentioned, maps and models should form a prominent part of the equipment. The writer will gladly correspond with any one desiring further information.

Geological Laboratory, Indiana University.

*Constructed by E. R. Cumings, Instructor in the Department of Geology, Indiana University.