general nature of the soil—not merely the surface soil, but the underlying beds.

The professional botanist will find these notes, if new in themselves, merely illustrative of general laws long familiar to him; but they are written in the hope that others may find them interesting, and may perhaps be stimulated to make similar observations elsewhere. It is surely desirable for horticulturists to pay more attention to such matters when selecting land and choosing what to grow upon it.

T. D. A. COCKERELL.

MESILLA PARK, N. M.

CURRENT NOTES ON PHYSIOGRAPHY.

THE NIAGARA GORGE.

WHEN the gorge of Niagara was first ascribed to work of the river, it was tacitly postulated that the volume of the water and the rate of recession of the falls had been constant. This postulate gave way before the suggestion that variations in river volume may have occurred during the disappearance of the ice sheet. Now it is attempted to correlate these variations in volume on the one hand with the retreating ice front, the northeastward elevation of the land, and the temporary discharge of the upper great lakes across Ontario, and on the other hand with the breadth and depth of the gorge. A recent paper by Taylor on the 'Origin of the Gorge of the Whirlpool Rapids at Niagara' (*Bull. Geol. Soc. Amer.*, IX., 1898, 59–84) explains the narrow part of the gorge, where it is crossed by the railroad bridges and occupied by the Whirlpool Rapids, as the work of the discharge of Lake Erie alone—that discharge being called the Erie-Niagara River—while the upper lakes ran to the St. Lawrence by the Nipissing-Mattawa channel, eastward from the then expanded Georgian Bay. Before the ice sheet had retreated far enough to open this outlet the upper lakes discharged through Erie, and the large volume of Niagara at that time caused the erosion of the wider gorge and deeper gorge just below and above the Whirlpool.

It is thus implied that the channel of Detroit River must have been laid dry while the Erie-Niagara was cutting its narrow gorge, and of this Taylor has found good evidence in the depth to which the valleys of small tributaries of the Detroit are eroded below the present river surface. The manner in which many independent factors are thus correlated is really of dramatic interest.

SOUTH CAROLINA.

L. C. GLENN describes the physical features of South Carolina (*Journ. School Geogr.*, II., 1898, 9–15, 85–92), giving a clear picture of the piedmont plateau and the coastal plain. The piedmont is a peneplain gently rolling over most of the surface, but much dissected by narrow and branching side valleys near the main streams. About the headwaters many rapids and falls interrupt the streams; farther down the valleys the larger rivers have opened narrow 'bottoms,' whose fertility has been much impaired by wash from carelessly farmed hillsides. The middle and outer parts of the plateau carry a number of monadnocks, such as Ruff's, Parson's, King's and other low mountains. On the inner part of the plateau the residual mountains are higher and more numerous, rising 1,000 to 1,500 feet above the peneplain. The coastal plain is hilly along its inner border, low and smooth over most of its extent. Here the chief rivers have broad swampy flood plains. The numerous channels that divide the islands along the coast are ascribed to the strong tides of the Carolina bight.

It may be noted in this connection that the *Journal of Geography*, edited by Professor R. E. Dodge, of Teachers College, New York, has published a number of first-hand

articles of value to teachers, and that it is now successfully entering on a second year. The *Journal* has commended itself to the Geographical Association of England, and one of their members has been at their suggestion appointed on the board of associate editors.

DUNES IN NORTH GERMANY.

THE drift plain of North Germany is intersected by broad valleys, many of which are the work of glacial rivers. Dunes are common on the valley floors, and those near the Elbe above Boizenburg are described by P. Sabban (Die Düne der südwestlichen Heide Mecklenburgs * * * Mitth. Meckl. Geol. Landesanst., VIII., Rostock, 1897). It is suggested that the dunes were chiefly formed when the glacial waters were withdrawn, leaving extensive barren gravelly plains; and that dunes, therefore, do not indicate a period of dry climate. Many of them are now more or less overgrown; some are forested, and one of these is shown in an excellent plate. Small dunes and sand deposits are found on the uplands, where the sands are blown up from the valleys. Mention is made of the manner in which dunes shed water, so that after a heavy rain they are wet to a depth of only a few inches—a point to which Shaler has called attention in this country.

In this connection, it may be stated that Keilhack reports an advance of about 9 meters yearly for several travelling dunes near the Baltic coast (Jahrb. preuss. geol. Landesamt. (1896), 1897, 194–198), giving a good view of a heavy dune invading a pine forest.

W. M. DAVIS.

CURRENT NOTES ON METEOROLOGY.

THE GULF STREAM AND THE TEMPERATURE OF EUROPE.

MEINARDUS, in the *Meteorologische Zeitschrift* for March, finds a relation between the temperatures of the Gulf Stream waters off the Norwegian coast and the temperatures of central Europe, which relation he expresses as follows: I. A high (low) temperature in central Europe in the late winter (Feb.–Mar.) and early spring (Mar.–Apr.) usually follows a high (low) temperature of the Gulf Stream off the Norwegian coast in early winter (Nov.–Jan.). II. The greater the difference in pressure between Denmark and Iceland in the period September (or Nov.) to January, the higher is the temperature of the Gulf Stream and of the Norwegian coast in the same months (Nov.–Jan.), and the higher is the air temperature in central Europe in the succeeding months (Feb.–Apr.). III. The difference in pressure above noted has only an indefinite relation to the temperatures prevailing at the same time in central Europe, and no relation to the temperatures of May and June.

ATMOSPHERIC DUST.

A SERIES of interesting observations on the 'dust' of the atmosphere is described by Melander in a recent work ('Sur la condensation de la vapeur d'eau dans l'atmosphère,' Helsingfors, 1897), as noted by Maurer in the *Meteorologische Zeitschrift* for March. The investigation was carried on by means of the Aitken dust counter, and included 3,000 observations in Finland, the Sahara, and elsewhere. Some of the results are as follows: The number of dust particles increases with the dryness of the air, there being usually a minimum in the afternoon. Winds from the land carry more dust than those from over the water, and those blowing out of an anticyclone, or down from high mountains, are very dusty. Products of combustion furnish a portion of the dust particles which cause condensation in the atmosphere. The important problem as to whether or not precipitation can occur without the assistance