

western corner of the Coastal Plain in western Cumberland, Moore, Richmond and Scotland counties, where the coastal plain materials lie at greater elevations, would disclose well-developed terraces at these and greater elevations.

*Conclusions.*—In a short paper like the present it is impossible to go into details regarding the origin of these terraces. The present topography of the North Carolina coastal plain appears to be due to the successive formation, with the unlift of the coast, of the three sandy ridges described above, the latest of which is represented by the present banks or bars enclosing Pamlico, Albemarle and Currituck sounds, and the formation of the several terraces within the areas thus enclosed.

The marked difference in elevation of the coast in the northern and southern parts of the coastal plain of this state is due to the fact that the lowest lying terrace borders the coast from Bogue Inlet north while to the south the next higher terrace fronts on the shore.

Terraces at these same elevations appear on topographic maps in Virginia and Maryland.

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U. S. GEOLOGICAL SURVEY

#### PLANT ZONES IN THE ROCKY MOUNTAINS OF COLORADO

IN order to see the true relations of the flora of a mountain region some sort of classification into zones is necessary. Humboldt and later other students have pointed out the zonation on mountain sides and the zones have been delimited with greater or less accuracy. In order to call attention of my students to the zonation in our own Rocky Mountains I have prepared a classification which is proving useful for teaching purposes. It emphasizes to the student the various climatic and edaphic influences which accompany changes in altitude.

Schimper's three regions of mountains,<sup>1</sup> the *basal*, the *montane* and the *alpine*, are not

exactly represented in the Rocky Mountains. Thus the *basal* region of Schimper is "like that of moist stations in the lowlands." In the Rocky Mountains there is no such basal region. In fact there are no true lowlands near the mountains to be used for comparison and the foothill plants are not like those of gulch and stream-side in the plains region. Schimper's *montane* region has a flora "resembling that of the lowlands in higher latitudes." In northern Colorado this zone would extend from about 8,000 to 10,000 feet in altitude. Here the general character of the vegetation reminds one of the northern parts of New England, Michigan, Wisconsin and Minnesota. Above 10,000 feet I believe it more conducive to clearness to make two zones—an alpine and a sub-alpine—the former including everything above "timber line."

The following classification of the zones of plant life is suggested as pointing out what the limits of the zones seem to be. I am by no means sure that the names used are the best which might be selected. The zones here indicated are those recognized along the eastern slope of the Rocky Mountains, especially in northern Colorado. The names and characterizations are offered in the hope that they may call forth criticism from other students of Rocky Mountain vegetation.

1. *Plains Zone*.—Altitude up to about 5,800 feet. This is a grassland formation, the grasses interspersed with and sometimes displaced by coarse composites. Trees and shrubs occur only along water courses or on rock ridges and buttes.

2. *Foothill Zone*.—Altitude 5,800 to 8,000 feet. This is generally a rather open forest of rock pine (*Pinus scopulorum*) on hillsides with a few scattered cedars (*Sabina scopulorum*), while there is a mixture of Douglas spruce (*Pseudotsuga mucronata*) on north slopes with some deciduous trees in the canyons and draws.

3. *Montane Zone*.—Altitude 8,000 to 10,000 feet. This is a closer forest than that of the preceding zone. Lodgepole pine (*Pinus mur-rayana*) is the dominant forest tree, frequently forming dense, pure forests. Rock pine

<sup>1</sup> Schimper, "Plant Geography" (English translation), p. 702, 1903.

and limber pine (*Pinus flexilis*) occur at various places and Engelmann spruce (*Picea engelmanni*) comes in at the upper limit of the zone.

4. *Sub-alpine Zone*.—Altitude 10,000 to 11,500 feet. This zone is characterized by forests of Engelmann spruce with limber pine and balsam fir (*Abies lasiocarpa*) as secondary species. Huckleberries are abundant as shade plants on the forest floor. A considerable amount of grassland or steppe occurs in the form of mountain meadows in the upper part of the zone. "Wind timber" runs up in tongues to various altitudes and there are small patches of this scrub formation isolated from the main mass below. Numerous ponds and bogs occur along stream-courses.

5. *Alpine Zone*.—Altitude 11,500 to 14,000 feet and higher. This is a rock-desert and steppe zone. Mat-forming plants and deep-rooted perennials are common. Large areas, consisting of rock heaps and boulder fields, are practically destitute of all vegetation except lichens. Sedges and grasses are numerous in species but seldom form a dense sod, being mixed with various flowering herbs. Dwarf willows occur, often forming a dense scrub over large areas, but there are no other woody plants.

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#### THE INTERCOLLEGIATE GEOLOGICAL EXCURSION

THE seventh annual New England Geological Excursion was held at Providence, Rhode Island, on Saturday, October 26, under the leadership of Professor Chas W. Brown, of Brown University.

Friday evening a short conference was held at which the route planned was explained. The purpose of the trip was to study the undisturbed Carboniferous shales and sandstones with their fossil contents that occur east of the city of Providence and the graphite mine and sheaved basal conglomerate to the west of the city. Professors B. K. Emerson, J. B. Woodworth and Chas. W. Brown explained the structural and metamorphic features of the sections visited. The attendance of pro-

fessors and graduate students was rather larger than in previous years.

In addition to the advanced students and teachers from the high schools and normal schools the following institutions were represented in the party of seventy: Amherst, Professor B. K. Emerson; Brown, Professors Brown and Ward; Colby, Professor H. E. Simpson; Holyoke, Professor Mignon Talbot; Harvard, Professors Johnson, Wolff, Woodworth and Dr. Mansfield; Massachusetts Institute of Technology, Professors Jaggar and Daly and Dr. Shimer; Smith, Miss Aida A. Heine; Williams, Professor H. F. Cleland; Yale, Professors Barrell, Gregory and Schuchert; Worcester, Mr. J. H. Perry; Worcester Normal School, R. M. Brown.

The next meeting will probably be held in the northern Berkshires in the vicinity of Williams College.

HERDMAN F. CLELAND,  
Secretary

#### THE LAMARCK MEMORIAL

MR. ALEXANDER AGASSIZ, Professor Henry Fairfield Osborn and Professor Bashford Dean, members of the International Committee from the United States, have issued a statement to the effect that the International Committee entrusted to secure funds for the monument to Lamarck has up to the present time received subscriptions amounting to about 25,000 francs. And the prompt response to the notices sent out by the committee has been, in many cases, very gratifying—Montevideo, for example, sending in the names of seventy-seven subscribers. There remains to be raised, however, the sum of 5,000 francs. And it is with the hope of securing the final amount that the American members of the committee are sending out this second notice. It is earnestly wished that this sum be contributed from the United States, in view of the influence which Lamarck has had upon the evolutionary conceptions of many and prominent American naturalists.

Subscriptions should be sent, as soon as possible, to Bashford Dean (Columbia University, New York), who will duly acknowledge and transmit them to the headquarters of the committee in Paris.