THE FLORA OF MT. ORIZABA. By HENRY E. SEATON.

As botanist of the J. T. Scovell expedition during July and August, 1891, collections were made by the writer on Mt. Orizaba through a range of 3,000 to 14,000 feet.

The first collections of importance on the mountain were made by Frederik Liebmann in 1841. Others who have collected on the mountain, and especially in the valley of Orizaba and Cordoba, are Henri Galeotti, August Ghiesbreght, E. Bourgeau, M. Botteri and Frederick Mueller. The volcano of Orizaba is described by Liebmann as the most interesting mountain in North America. It has a latitude of 18 degrees and lies surrounded by the very fertile country of southern Mexico. It is only ninety miles from the gulf, and having such a situation there is presented upon its eastern slope every phase of vegetation from tropical to alpine.

The region in the vicinity of Cordoba, at an elevation of 3,000 feet and a distance of sixty miles from the coast, has a sub-tropical vegetation. Palms grow in abundance and orange, banana and coffee trees attain a high degree of cultivation. Prominent among the families that make up the shrubby and herbaceous flora are the Malvaceæ, Leguminosæ, Rubiaceæ, Compositæ, Asclepiadaceæ, Convolvulaceæ, Solanaceæ, Euphorbiaceæ and Bromelliaceæ, besides the grasses, sedges and ferns.

The town of Orizaba, 1,000 feet higher up the mountain, has a somewhat less tropical vegetation in the way of cultivated plants. At this altitude the Compositæ have their greatest display. The Helianthoideæ are the forms most abundant, and not only are they characteristic of this particular region but have in Mexico their greatest concentration, amounting, it has been estimated, to thirty-two per cent. of the species and two-fifths of the genera of all the Compositæ of the country. The sub-order Eupatoriaceæ ranks second in numerical strength, the genera Eupatorium and Stevia, however, contributing nearly all the species. The Asteroideæ have but little representation in the forms Aster, Erigeron and Solidago, which are so characteristic of the north. All the other sub-orders of the family are present excepting the Arctotideæ and Calendulaceæ, which are confined principally to southern Africa.

Collections were made at three successively higher stations till the altitude of 9,000 feet was reached, and this zone of 5,000 feet above the town of Orizaba may be considered as the temperate region, and that above 9,000 feet as alpine. Many plants of the sub-tropical region extend their range to the temperate and even to the alpine district, this being especially true

of the low growing plants like Oxalis, Stellaria Trifolium and several of the Malvas. The temperate zone is characterized, nevertheless, by many genera and families that are not present or are hardly noticeable in the more tropical regions. The genus Salvia and order Lythraceæ have a strikingly large distribution. Of these latter Cuphea is the most conspicuous element, growing in great abundance under all conditions of soil and moisture. There are many representatives from the Geraniaceæ, Borraginaceæ, Scrophulariaceæ, Verbenaceæ and Acanthaceæ, which take the place in a great measure of the Malvaceæ, Rubiaceæ, Asclepiadaceæ, Solanaceæ and Euphorbiaceæ in the tropics.

Great and rapid changes are experienced in the flora as the slopes are ascended above 9 000 feet, and there are well marked zones for the distribution of plants till the limit of vegetation is reached. Between 9,000 and 10,000 feet, species of Sisymbrium, Lepidium, Geum, Epilobium, Œnothera, Krynitzkia, Mimulus, Castilleia, Verbena, Salvia, Plantago and Chenopodium, are the most characteristic forms of the herbaceous flora. Prominent among the Compositæ are Steria, Avillea, Dahlia and Tagetes, and besides Eupatorium and Baccharis the shrubby flora is represented by Rubus, Symphoricarpos and Buddleia. Prominent among the grasses are Agrostis, Muehlenbergia and Bromus, and the ferns are represented by Adiantum, Cheilanthes, Woodsia and Asplenium.

Between 11,000 and 12,000 feet the forests are entirely of pines and spruce. The greater part of the herbaceous flora at this altitude is composed of Cerastium, Lupinus, Acaena, Eryngium, Arracacia, Halenia, Penstemon, Cnicus and Stenanthium. Penstemon and Stenathium are exceedingly abundant, though possessing a very limited range.

At 13,000 feet the vegetation consists principally of Cerastium, Arenaria, Potentilla, Castelleia and Lithospernum. The pine woods, beginning at 7,000 feet, disappear at 13,000 feet, excepting stunted forms that continue to 14,000 feet. At 13,500 feet the vegetation becomes scantier and the slopes more sandy and beset with masses of sharp pointed rocks. The dry, sandy soil produces species of Draba, Gnaphalium, Senecio, Cnicus, Agrostis, Bromus and Asplenium. Even at 14,000 feet on the higher slopes, just at the snow line, there exists quite a varied vegetation, with species of Draba, Sisymbrium, Gnaphalium, Cnicus, Asplenium and the grasses of the sandy plain below. This was the highest point collections were made, but several species extend their range a hundred feet higher, and Dr. Scovell secured a Draba at 15,000 feet.

The collection numbered 510 species, distributed among 459 Phanerogams and 51 Pteridophytes. In this limited space no mention has been made of species, the object being only to present the general character of the flora of the mountain, as shown by the distribution of certain families and genera. A more complete report will be published later, with notes on species.

AN APPARATUS FOR DETERMINING THE PERIODICITY OF ROOT PRESSURE. By M. B. THOMAS.

[ABSTRACT.]

The paper presented the need of a self-registering apparatus for determining the periodicity of root pressure, and gave an outline of the ones now in use, all of which were seen to need constant attention. An apparatus made in the following manner was suggested. The base of the instrument is about 1′x3″ and is supported by legs about 3″ high. About 10″ from one end and in the center of the base is erected a standard about 2′ high and 4″ in width. On the short end of the base and near the post is fastened a set of strong clock-works. The works are covered with a box and the end of a cylinder 6″ in diameter and 1′ 10″ high is fastened to the hour pinion of the clock by means of a pin passing through a hole in the end of the pinion and fitting in a slot in the end of the cylinder. The top of the cylinder is held in place by a pin passing through a support from the main pillar and a hole in the end of the cylinder. To the large upright pillar is fastened a U tube of about ½′ in diameter; one arm being nearly as high as the pillar and the other but half the height. The tube is filled with mercury to within about an inch of the top of the short arm. The stem of the plant is cut off near the base and placed in position. An inverted U tube is fastened to the stem in the usual way by means of a rubber tube fastened with wire while the other end of the U tube is connected with the larger one in the same way. The small U tube is filled with water through an opening in the top. The cylinder which is made of light tin is blackened by revolving it slowly in the flames of a candle or gas jet. The indicator consists of a light steel wire with a cork at the end somewhat smaller than the diameter of the tube. This rests on the mercury. It is then at the top of the tube bent twice at right angles and allowed to extend to the bottom of the cylinder where it is again bent twice at right