

## SOME ASPECTS OF STONE MOUNTAIN AND ITS VEGETATION.

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Stone Mountain is a huge dome-shaped rock, situated sixteen miles east of Atlanta, Georgia. It measures seven miles in circumference at its base and rises 686 feet above the adjacent land surface. This mighty stone includes 663 acres of exposed granite area.<sup>1</sup>

The purpose of this paper is to give a panoramic view of Stone Mountain and its remarkable vegetation.\* This view is prefaced by geological and botanical notes from some of the literature relative to the subject.

*Geology.*

Dr. Thomas L. Watson has set forth an invaluable collection of data concerning the geology of this most wonderful stone,<sup>1</sup> a small portion of which follows:

"Stone Mountain forms one of the few conspicuous, unreduced, residual masses found rising above the general surface-level of the Georgia Piedmont Tertiary penepplain. That this and the adjacent masses of hard contorted granite-gneiss, in the Lithonia area to the south, were not reduced to the same approximate level of the surrounding plain, can be readily accounted for, by differential rock-hardness, and remoteness from the major streams in the region. . . . ."

"The chemical composition of this granite mass is shown in the two following analyses made by Mr. R. L. Packard in the laboratory of the Survey from specimens collected by Professor Yeates from the Hayne quarry:

	I	II
Silica .....	72.56	71.62
Alumina .....	14.81	16.05
Iron oxide .....	0.94	0.86
Lime .....	1.19	1.07
Magnesia .....	0.20	0.17
Soda .....	4.94	4.66
Potash .....	5.30	4.92
Ignition .....	0.70	1.00
	100.64	100.39

I. Analysis of the perfectly fresh rock.

II. Analysis of a spawl, which was exposed for three or four years on the dump-pile at the quarry. . . . .

"Physical tests made on the Stone Mountain granite yielded the following figures:

Specific gravity .....	2.686
Weight of one cubic foot of stone expressed in pounds.....	167.90

<sup>1</sup> Bulletin 9A Geological Survey of Georgia.

\* The study was made in September, 1916.

Number of cubic feet of stone contained in one ton (2,000 pounds) .....	11.9
Percentage (ratio) of absorption .....	0.067

“Crushing strength tests made on the granite, in two-inch cubes, gave the following results:

	Strength in pounds	Strength in pounds per sq. in.
Stone Mountain, Ga.....	85,000	21,250
Stone Mountain, Ga.....	50,325	12,581
Stone Mountain, Ga.....	48,760	12,190
Stone Mountain, Ga.....	65,610	16,402

“A similar series of strength tests, made in 1890 at Purdue University, gave 12,438, 14,425, 12,904, 13,406 and 12,726 pounds per square inch.”

#### Botany.

Dr. H. W. Ravenel in the Bulletin of Torrey Botanical Club, June, 1876, gave an interesting note, as follows:

*Rudbeckia Porteri*.—“I found this species in 1848 at Stone Mountain, Georgia, growing abundantly on the ridges and top of the mountain with *Quercus Georgiana*. Professor T. C. Porter had just preceded me in its discovery and the uncertain genus was dedicated to him. I have never heard of it anywhere else.”

“The outlying granite peak in middle Georgia seems to have an interesting Flora. I found a well-marked variety of *Hypericum prolificum* and Mr. Canby has since (in 1869) found a new species of *Isoetes* growing in shallow pools on the summit.”

Dr. John K. Small in several numbers of the Bulletin of the Torrey Botanical Club of the year 1894 made references to the plant life of Stone Mountain as follows:

January, 1894. “*Asplenium Bradleyi*.—Contrary to its usual habitat, which is perpendicular or overhanging and rather damp disintegrating cliffs. *Asplenium Bradleyi* was found growing on horizontal moss-covered granite rocks at the northern base of Stone Mountain, De Kalb County, Georgia, in April, 1893, altitude 1,000 feet.”

“*Amorpha virgata*.—Found only on the northern and western slopes of Stone Mountain \* \* \* Fruiting in July. It is apparently restricted to a narrow belt ranging from 1,100 to 1,200 feet above sea level and grows in a few places where the granite rocks are flat enough to hold a layer of sand.”

“*Amygdalus Persica* L.—During the past season it was noticed at numerous localities in middle Georgia and was collected on the dry, rocky slopes of Stone Mountain \* \* \* early in July at an altitude of 1,200 feet, well established and producing abundant fruit.”

“*Nyssa biflora walt.*—Grows on the very summit of Stone Mountain \* \* \* altitude 1,686 feet. It is remarkable that this tree usually confined to the seacoast or seaboard from southeastern Virginia southward should occur in the above situations. There are a number of trees on the small dome-like top of the mountain and they seem to flourish although somewhat worn and torn by heavy winds which sweep by their exposed habitat and thrive notwithstanding the fact

that they grow in but a few inches of sand collected in depressions of the granite rock.

"*Lagerstroemia Indica L.*—The species is now well established about Stone Mountain \* \* \*."

"July, 1894. *Cuscuta arvensis.*—Grows about the base of Stone Mountain, Georgia, in mats on *Gymnolomia Porteri* where this species forms dense patches."

Dr. Roland M. Harper, in the Bulletin of the Torrey Botanical Club, August, 1901, reported plants found on or near Stone Mountain as follows:

Antennaria calophylla Green.	Juncus Georgianus Coville Small.
Lomicera flava Sims.	Scirpus sylvaticus L.
Opuntia vulgaris mill.	Asplenium angustifolium."
Polygala Curtissii Gray.	

At present it is hardly possible to view the plant distribution of this unique mountain without feeling the spirit of these botanical notes. One imagines he sees the same "dense patches" of *Gymnolomia porteri*, and the "*Amorpha virgata*" on the little shelves of accumulated sand; and the same "*Nyssa biflora*" in its extremely strange, anchorage on the summit, growing in company with ancient and weather-beaten specimens of *Juniperus virginiana*, and the same assemblage of "*Rudbeckia porteri*" grouped with their more rugged associates "*Quercus Georgiana*" situated high up toward the top of the mountain; and no doubt some of the woody individuals standing here today were standing here a century ago, and to be sure the herbaceous species beheld now, have beauties and habits similar to the beauties and habits of their ancestors in generations past when botanists and nature adorers beheld them and loved them and praised them.

#### PHYSICAL FEATURES AND TREE DISTRIBUTION.

The geological notes cited above indicate the chemical constituents and the physical durability of this granite dome of nature. It stands as a physiographic marvel, a figure unique among the geological curiosities of the world.

It may be interesting to note, that today plant life is one of the most powerful natural forces operating against the eternal existence of this mountain.

*The North Side*—Here almost the entire area stands like a stone wall perpendicular to the adjacent plains at the base, but this granite face bends gradually inward towards the crest, giving an oval outline to the mountain as viewed from the north. (Fig. 1.) The surface is unbroken and void of phanerogamic vegetation. The waters of all the regional rain storms that have beaten upon this mighty rock through untold ages have rushed unhalting down its sides, and yet the most marked physical features on the extreme north are numerous clean streaks, some of which are several feet in width, extending from summit to base. On close examination these streaks are found to be extremely shallow and perfectly beveled furrows in which no lichens are



Fig. 1. A view of the steep bare north side of Stone Mountain and the pure broad leaf forest on the narrow talus at the base.



Fig. 7. A mixed forest southeast of Stone Mountain.

growing. One might fancy these as the ravines on the north side of Stone Mountain that a million years or more have wrought.

In these clean, shallow grooves, or water courses, the pure, light grey granite is exposed, while the areas between them are covered with lichens of a dark grey color. This gives the north side a striated aspect.



Fig. 8. A pure stand of *Andropogon virginiana* on the northwest side of Stone Mountain and dwarfed red cedar in the background.

The vertical north side merges westward into a graded slope the surface of which becomes progressively less steep and more broken toward the west, and thence, on around to the south. On the eastern portion of this slope no flowering plants are found, except in depressions or around weathering fragments of granite. Further west, however, there is a meager forest associated with a limited number of herbaceous species (Fig. 8). The north talus broadens as it extends westward and for a considerable distance the tree formation is dense, composed purely of broad-leaved species (Fig. 2).



Fig. 3. A south side view near the crest where the tree growth is composed largely of red cedar and loblolly pine.

*The South Side*—The surface of the south side is broken and irregular, having a general slope of about 45 degrees. Near the summit the tree growth is spare, red cedar and loblolly-pine being practically the only species found. About midway from top to base pine is the only



Fig. 4. A view about half way to the summit on the south side of Stone Mountain, showing the broken surface and the uneven distribution of the vegetation. Broom-sedge (*Andropogon virginiana*) in one of the few cracks of the mountain.



Fig. 5. A pure stand of pine at a high elevation on the south side.

woody species, all the trees being scrubby and very much dwarfed. The south talus, however, is densely covered by a pure stand of pine, each tree having a remarkably long and clear bole.

Figures 3, 4, and 5 give a progressive view of the forest on the south as it spreads from summit to base. On the south side of Stone Mountain, in fact on all parts except the extreme north side, the topography is unique, and the landscape is unsurpassed in grandeur.

Deep forested ravines (Fig. 7), cedar trees a century old or more (Fig. 3), tumbled heaps of massive granite blocks (Fig. 5), garden-like shelves of accumulated alluvium, radiant and fragrant with flowering plants (Fig. 9), cracks in the exposed granite filled with growing *Andropogon virginiana* (Fig. 4), a broken, scaly, cracking, wavy surface, all tell a tale of dynamics contrary to the static north side with its mere clean, light grey streaks alternating with the dark grey lichened areas.



Fig. 2. A view on the northwest side of Stone Mountain. The almost bare slope is gradual and the somewhat broad talus supports a pure stand of broad leaf trees.



Fig. 9. A pure stand of *Gymnolomia Porteri* in full bloom, on the south side of Stone Mountain.

The sun's rays have always struck Stone Mountain in such a way as to make the summer temperature abnormally high on the south side and abnormally low on the north. In like manner the sun's rays make the disintegrating effects of the short winters abnormally great on the south (frequent thawing and freezing) and abnormally small on the north (less frequent freezing and thawing). Thus Stone Mountain has, in close proximity, virtually two climates and two types of topography, and under these physiographic and climatic differences two remarkably diverse floral types have developed.

*The East and West Sides*—The east and west surfaces are strikingly similar, each having a slope which seems to be about a mean between the steep north and the gradual south, and a tree formation of near a half and half mixture of deciduous broad leaf and coniferous evergreen (Figs. 6 and 7).



Fig. 6. Mixed forest on the west side of Stone Mountain.

#### GENERAL DISTRIBUTION OF PLANTS.

Based on tree distribution, as an index, the general vegetation of Stone Mountain may be grouped as follows:

##### *I. Pure Deciduous Broad-leaved on the North Side.*

Here woody specimens were collected and identified as follows:

Castanea dentata.	Styraciflua.
Cornus florida.	Liriodendron Tulipifera.
Diospyros Virginiana (Fig. 1)	Magnolia acuminata.
Fraxinus Americana.	Nyssa sylvatica.
Hamamelis Virginiana.	Oxydendron arboreum.
Vitis rotundifolia.	Quercus alba.
Vaccinium arboreum.	Quercus Georgiana.
Carya glabra.	Quercus prinus.
Kalmia latifolia.	Cornus stolonifera.
Liquidamber Styraciflua.	

Associated with this group of woody species is a typical herbaceous flora, but here, as might be expected, in September the landscape presents an aspect of quiet and maturity rather than one of blossom and vigor, and the fragrance of spring time have given place to such inviting odors as the ripened fruit of the muscadine, whose drooping laden boughs hang from many a tree and crown almost every rugged clump of granite debris. A small number of herbaceous specimens were taken and identified as follows:

Clitoria mariana.	Asplenium Bradleyi.
Lespedeza frutescens.	Asplenium angustifolium.
Desmodium Dillenii.	Solidago odora.
Desmodium paniculata.	Aspidium marginale.
Silene stellata.	Pteris aquilina.

The following mature spring blooming plants were observed in abundance:

Violets.	Legumes.
True Solomon's Seal.	Mints.
False Solomon's Seal.	Honeysuckle.
Composites of various kinds.	

## II. *Pure Coniferous Evergreen on the South Side.*

Here the tree list is notably short. *Pinus Taeda* and *Juniperus Virginiana*. This so-called pure evergreen forest is slightly diluted by the following deciduous species: *Nyssa sylvatica*, *Quercus prinus*, *Quercus Georgiana*.

The talus on the south is covered by a pure stand of *Pinus Taeda*. This pure stand grades inland into a mixed forest with a herbaceous flora more or less like that found in any broad leaf forest of the region. The herbaceous vegetation of the exposed areas on the south



Fig. 10. *Eupatorium capillifolium* growing in the pure granite debris of the quarry on the southeast side of Stone Mountain.



Fig. 11. Quarry on the east side of Stone Mountain.

side, however, is composed almost wholly of three species: *Andropogon virginiana* (Fig. 8), *Solidago odora*, *Gymnolmia Porteri* (Fig. 9).

### III. *The Mixed Forests on the East and West Sides.*

On these areas there is a general mingling of the north side vegetation with that of the south, but in this mingling there is a notable absence of certain of the north talus species and the occurrence of certain species not found on the north or south.

*Pycnanthemum albescens.*

*Amorpha virgata* (small).

*Liatris polyphylla.*

*Prunus Persica.*

*Eupatorium capillifolium* (Fig. 10).

*Hypericum prolificum.*

are species more or less peculiar to the east and west sides.

#### SUMMARY.

In the study of plant ecology on Stone Mountain, certain rather remarkable conditions have been noted.

1. The north side is a vertical unbroken wall whose face is beveled toward the summit, and is only partially covered with lichens, its only form of vegetation.

2. The rich narrow talus on the north, which must have been formed by a very remote falling of granite fragments from the summit, bears a dense forest of broad-leaved trees with a typical herbaceous association.

3. The south side surface stands at an angle of about 45 degrees and is sparsely overgrown with conifers and flowering herbs.

4. The broad talus on the south is covered by a pure stand of pine merging into a mixed forest toward the outer margin, where are found many broad-leaved deciduous species, as oaks, hickories, tulip, sweet gum, black gum, and a herbaceous formation approaching in character that found in a pure regional deciduous forest.

5. The east and west slopes seem to be a mean between the steep north side and the gradual south side, and the east and west floras are partial blends between the north and south floras.

#### CONCLUSIONS.

1. A steep north side and a gradual south side have been made possible by certain conditions of the past, viz., differential exposure to the sun's rays, prevailing winds, and proximity to major streams.

2. The same conditions that have produced a physiographic distinction between the north and south sides have also made possible a floral distinction.

3. The physiographical and vegetational aspects of the east and west are but natural blends between the extremes of the north and south.

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