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# THE FLORA AND VEGETATION OF SAND CAY (21° 12'N, 71° 15') IN THE TURKS AND CAICOS ISLANDS, SOUTHERN BAHAMAS

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## Introduction

A floristic survey of Sand Cay was made on January 15 and 16, 1985, during a Five College Oceanographic Expedition on R/V Rambler, arranged through the Oceanographic Research and Education Society (ORES). Sand Cay, approximately 1 square (259 ha) in area (Figure 1), is made up of two Pleistocene coralline sand uplands, connected by a modern sand beach with dunes and washovers. The uplands consist of cemented aeolian deposits, some of which are still forming.

Overall floras of the Bahama archipelago have been done (Correll and Correll 1982), but very few floras have been completed for specific islands. The object of this study was to compile a flora for Sand Cay and to determine qualitative values of abundance for each species. In another study, published in these proceedings, quantitative measurements of the plants along two transects across the dunes were taken (Godfrey and Herchenreder 1986).

## Methods

Vegetation was sampled by use of the relevé method (Mueller-Dombois 1974). Fifteen circular plots, each with a 10 meter radius, were sampled. Within each plot a list of all species present was made and each species was assigned a cover-abundance according to the Braun-Blanquet scale (Mueller-Dombois 1974)

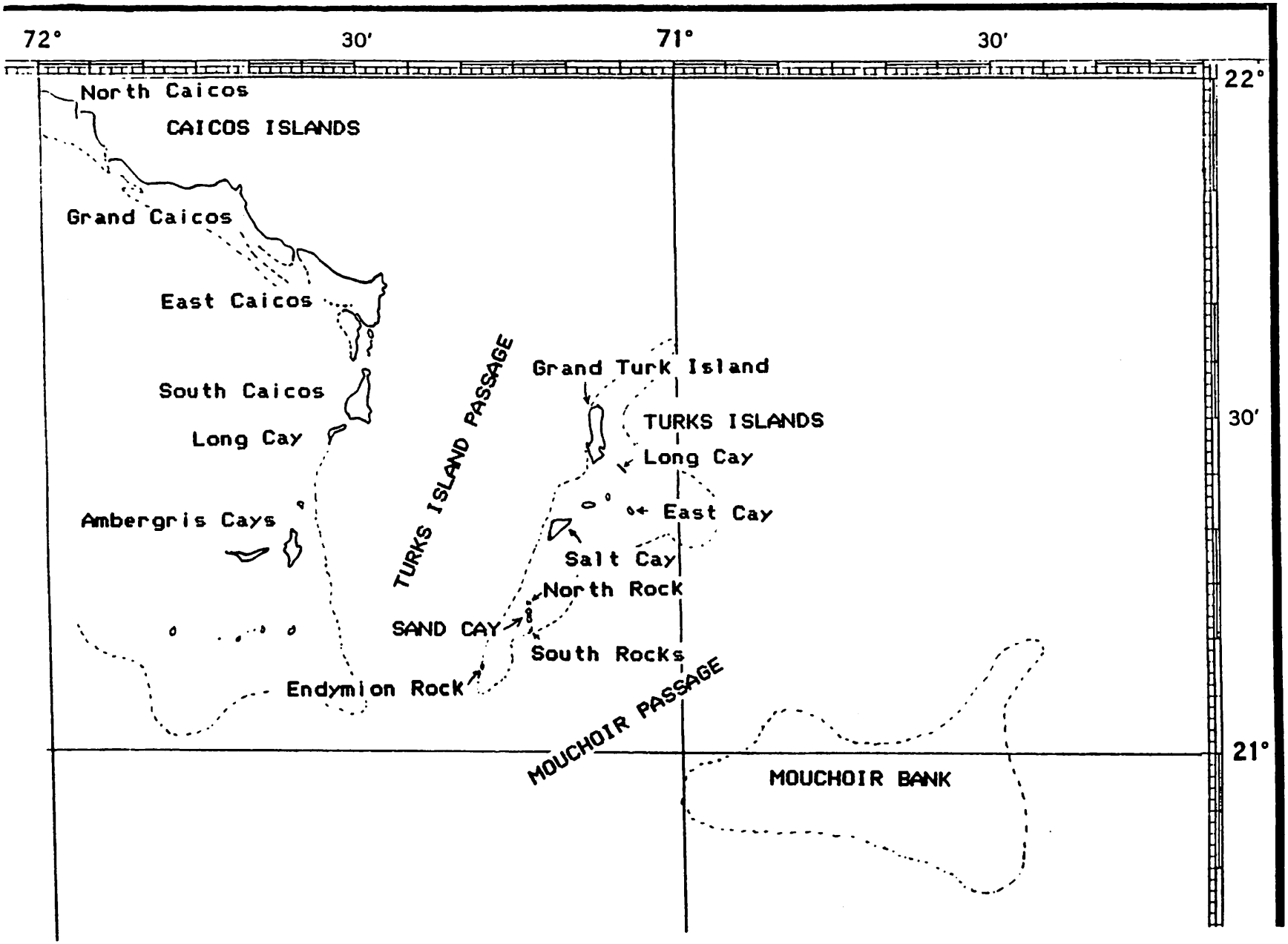


Figure 1: Map of the Southern Bahamas showing the location of Sandy Cay (21° 12'N, 71° 15'W) in the Turks and Caicos Islands.

5 Any number, with cover > 75%

4 Any number, with cover 50 - 75%

3 Any number, with cover 25 - 50%

2 Any number, with cover 5 - 25%

1 numerous, but < 5% cover

+ Few, with small cover

r Solitary, with small cover

The data were analyzed by AGGLOM (Steiner 1982), an agglomerative cluster analysis computer program. This program performs a cluster analysis as described by Orloci (1967), producing a dendrogram as output.

## Results

From the 15 relevés, 16 species of plants were listed. Three other species were subsequently collected but did not occur in any of the relevés. Of these 19 species, 17 have been identified to genus and species. Nomenclature follows Correll and Correll (1982), and voucher specimens were deposited in the University of Massachusetts herbarium.

The following plant species occurred on Sand Cay:

| | |
|---|---|
| Ambrosia hispida Pursh. | Sweet Bay |
| Atriplex pentandra (Jacq.) Standl. | |
| Borrichia arborescens (L.) DC. | Seaside Ox-eye |
| Cakile lanceolata (Willd.) O.E.Shulz | Sea Rocket |
| Cenchrus incertus M.A.Curtis | Coast Sandspur |
| Casasia clusiifolia L. | Seven year Apple |
| Cyperus planifolius Rich. | Coast Cyperus |
| Eragrostis ciliaris (L.) R.Br. | Lovegrass |

| | |
|---|---|
| Erithalis sp. | |
| Euphorbia mesembrianthemifolia Jacq. | Coast Spurge |
| Heliotropium nashii Millsp. | |
| Mallotonia gnaphalodes (L.) Britt. | Bay Lavender |
| Opuntia stricta var. dillenii (Ker-Gawl) 1.Benson | Prickly Pear |
| Passiflora pectinata Griseb. | Pectinate Passion Flower |
| Sesuvium portulacastrum L. | Seaside Purslane |
| Sporobolus virginicus (L.) Kunth. | Seashore Rush-grass |
| Suriana maritima L. | Bay Cedar |
| Uniola paniculata L. | Sea Oats |

As a result of the dendrogram (Figure 2) generated by AGGLOM, the vegetation can be grouped into four categories. The first separation produces two basic vegetation types: the Sporobolus community and the Ambrosia-Euphorbia types (a, b, and c). The second bifurcation, at a level of 92% dispersion, separates the Ambrosia community (a) from the Euphorbia types (b and c). The third bifurcation, at 68% dispersion level, separates the Uniola community (c) from the Euphorbia community (b).

Discussion

The four plant communities delimited from the dendrogram generated by AGGLOM correspond well with the geology of the island. This delimitation was made at the 60% dispersion level (Figure 2). At any lower level, delimitation of communities would be based only on the presence of one or two infrequent

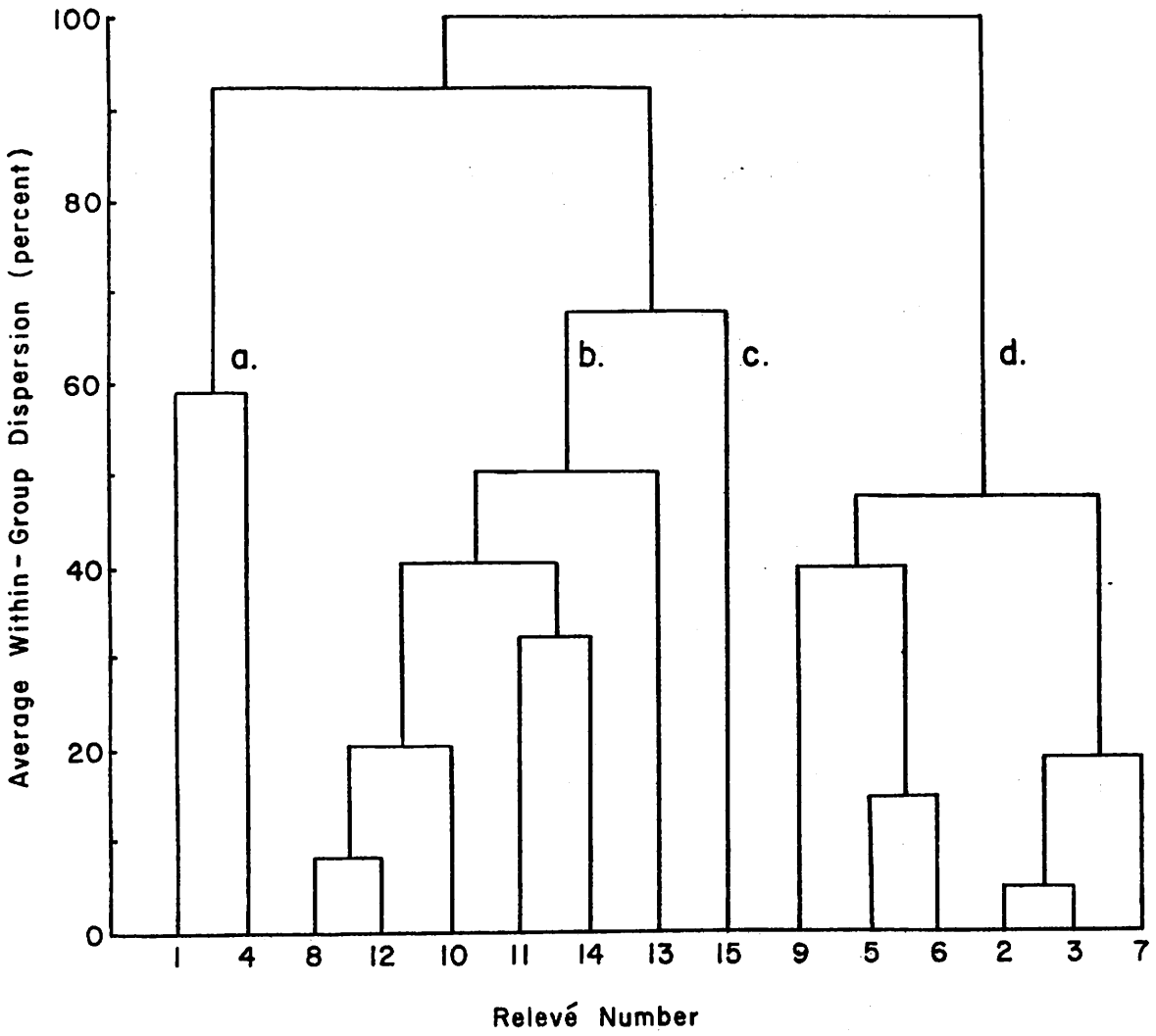


Figure 2: Dendrogram generated by AGGLOM showing the relationships between the releves and the separtion of communities based on similarity indices; a = Ambrosia community, b = Euphorbia community, c = Uniola community, d = Sporobolus community.

plants, and would be described only by a single releve.

The Sporobolus community covers much of the limestone uplands (Figure 3). It is comprised of very low plants: Sporobolus, Ambrosia, Cyperus, Opuntia and rarely Borrichia. Rarity of the larger shrubs is most likely due to the exposed environment of the limestone uplands.

The Ambrosia community is also found on the uplands (Figure 4). The vegetation is comprised of Ambrosia, Cyperus,

and Eragrostis, with occasional bushy shrubs of Casasia, Borrichia, or Sesuvium. A small zone in the Ambrosia community on the exposed limestone cliffs is of interest because of the occurrance of dense patches of Erithalis sp. and Heliotropium nashii (Figures 5 and 6). The form of Erithalis we found here had extremely small leaves and was closely appressed to the rock surface giving it a very different appearance compared to other examples of the genus that we have encountered. It also was very fragrant with an odor of lilac. The characteristics of the Ambrosia community suggest very severe environmental conditions and great difficulty for plant growth. This vegetation type can be described as a "coastal rock community" (Correll and Correll 1982, Smith 1982).

The Uniola community is located on the west side along the interface of the coral sand beach and the uplands (Figure 7). There is one small patch of Uniola, in which only one relevé was possible. Growing with the Uniola is Euphorbia, Cenchrus, Ambrosia, and occasionally Suriana.

The beach connecting the two uplands consists of overwash areas and building dunes. Here we found the Euphorbia community, which includes Ambrosia, Cenchrus, Sporobolus, Borrichia and Suriana (Figure 8).

## Conclusion

Relevés are a good method for quick community descriptions, but are not intended for standard quantitative analyses, i.e., density, frequency, and cover. In the short period that we were on Sand Cay we were able to complete a species list, delimit four major communities, and within each

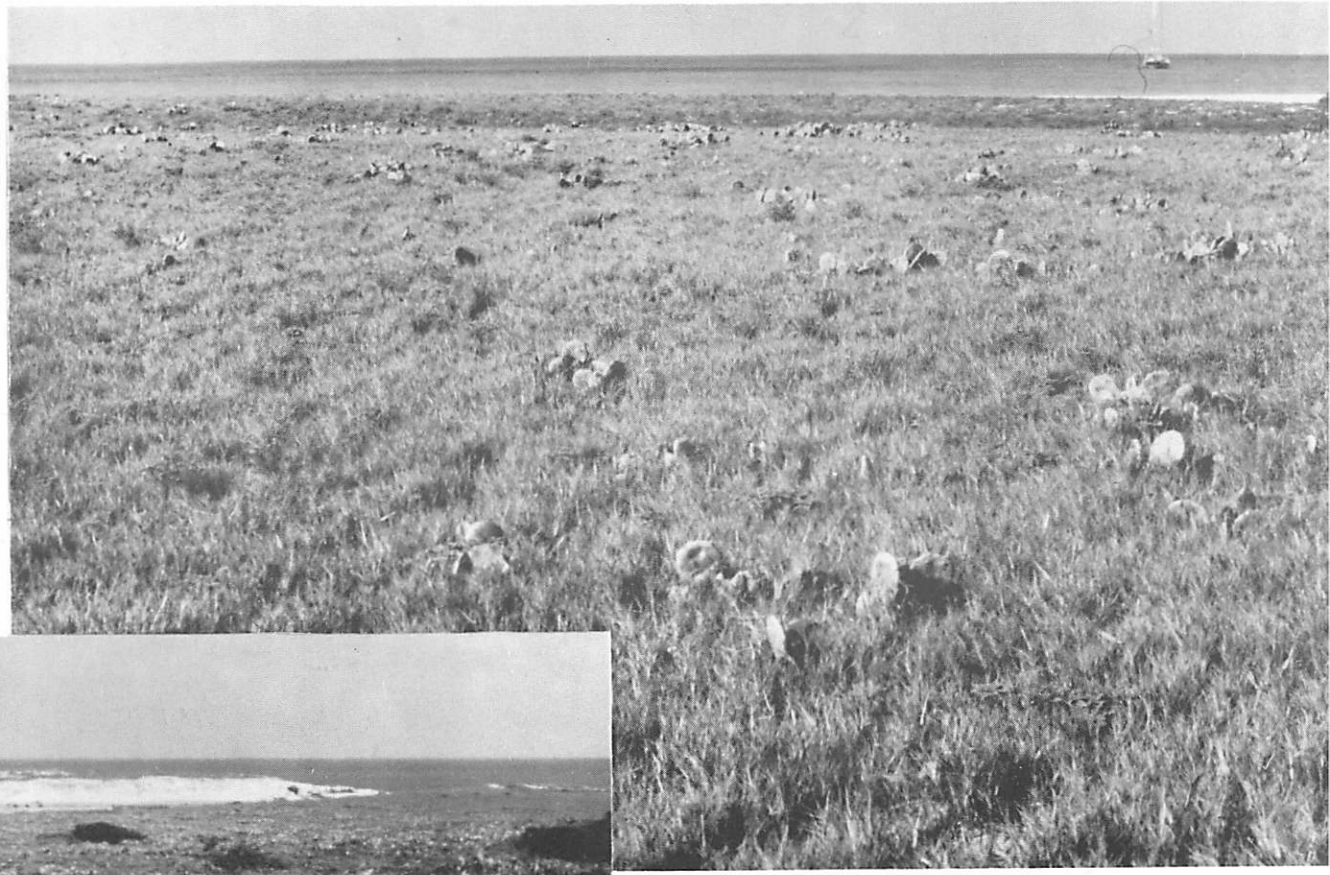

Figure 3: An example of the Sporobolus community located on the southern uplands of Sand Cay. The cover of Sporobolus is quite high, and mixed in with the grass in Opuntia stricta var. dillenii. The R/V Rambler can be seen anchored on the right horizon.

Figure 4: The uplands on the northern section of Sand Cay are covered by the Ambrosia community in which shrubs of Casasia clusifolia are scattered about, along with Opuntia. The view is north and shows the effects of salt spray on the Casasia shrubs from easterly winds.

Figure 5: The exposed limestone uplands along the east side of Sand Cay support a very low and depauperate example of a "coastal rock community". The plants are pressed closely to the rock surfact, probably as a result of severe winds and salt spray on this exposure. The plants are mainly Sporobolus, Ambrosia, and creeping shrubs of Heliotropium nashii and Erithalis sp. This is clearly a very extreme habitat for growth.

Figure 6: A close-up of the very small leaved Erithalis sp. which is quite unlike more typical examples of the genus found on other Bahamian islands. Growing in the shrub mat is Sporobolus virginicus.

Figure 7: A typical Uniola community located on a small area of dunes along the west side on the southern upland.

Figure 8: The Euphorbia community located mainly on the barrier beach connecting the two uplands contains several other species visible in this photograph: Ambrosia, Sporobolus, Borrichia, and Suriana in the background.

community rate species according to abundance.

Analyses such as AGGLOM, which are designed for relevé data, provide a graphic display of how various communities are related. Agglomerative techniques develop dispersion units by comparing the similarity of the vegetation of all the groups in the study. The more varied the groups entered, the earlier similar groups will be combined. With only 19 species found on Sand Cay, it is apparent that many of the species will exist in all of the communities. In fact, the vegetation is so similar that the final groups are separated by a difference of one or two species. Three of the groups, Euphorbia, Uniola and Sporobolus communities, can probably be considered components of one major vegetation type, the "sand strand formation" of Correll and Correll (1982) which covers most of the island. The very open and sparse vegetation of the Ambrosia community suggests that conditions are very extreme and the community here may be called a "coastal rock community" (Correll and Correll 1982, Smith 1982). These communities we have described on Sand Cay differ slightly from those depicted by Correll and Correll (1982) due to the low diversity of vegetation.

The application of agglomerative classification provides a great deal of flexibility. On a large scale vegetation can be grouped into major vegetation types, but on a smaller scale the major vegetation types can be divided into their structural components. This can lead to further investigations comparing the structural components of plant communities from island to island.

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