

FIELD GUIDEBOOK
to
ENVIRONMENTS OF COAL FORMATION
IN
SOUTHERN FLORIDA

Trip Leaders
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pollen and spore materials. Certain species in the plant cover are not represented in the sediment by preserved pollen grains, others are over-represented. Accordingly, the plant community, and hence the environment in question, leaves a unique pollen "signature" in the fossil record. It is in connection with the interpretation of these signatures that the palynologist ceases to be a technician and must become a botanist.

In addition to providing a basis for distinguishing the cypress hammock environment from other environments, the pollen and spores may also provide a clue as to the stage of development reached by the vegetation in the cypress hammock - bay head hammock succession. If this is confirmed by the collection and analysis of additional data, it will demonstrate the extent to which precise reconstructions of past environments can be made once the required information is amassed through the study of modern sediment - environment - vegetational relationships.

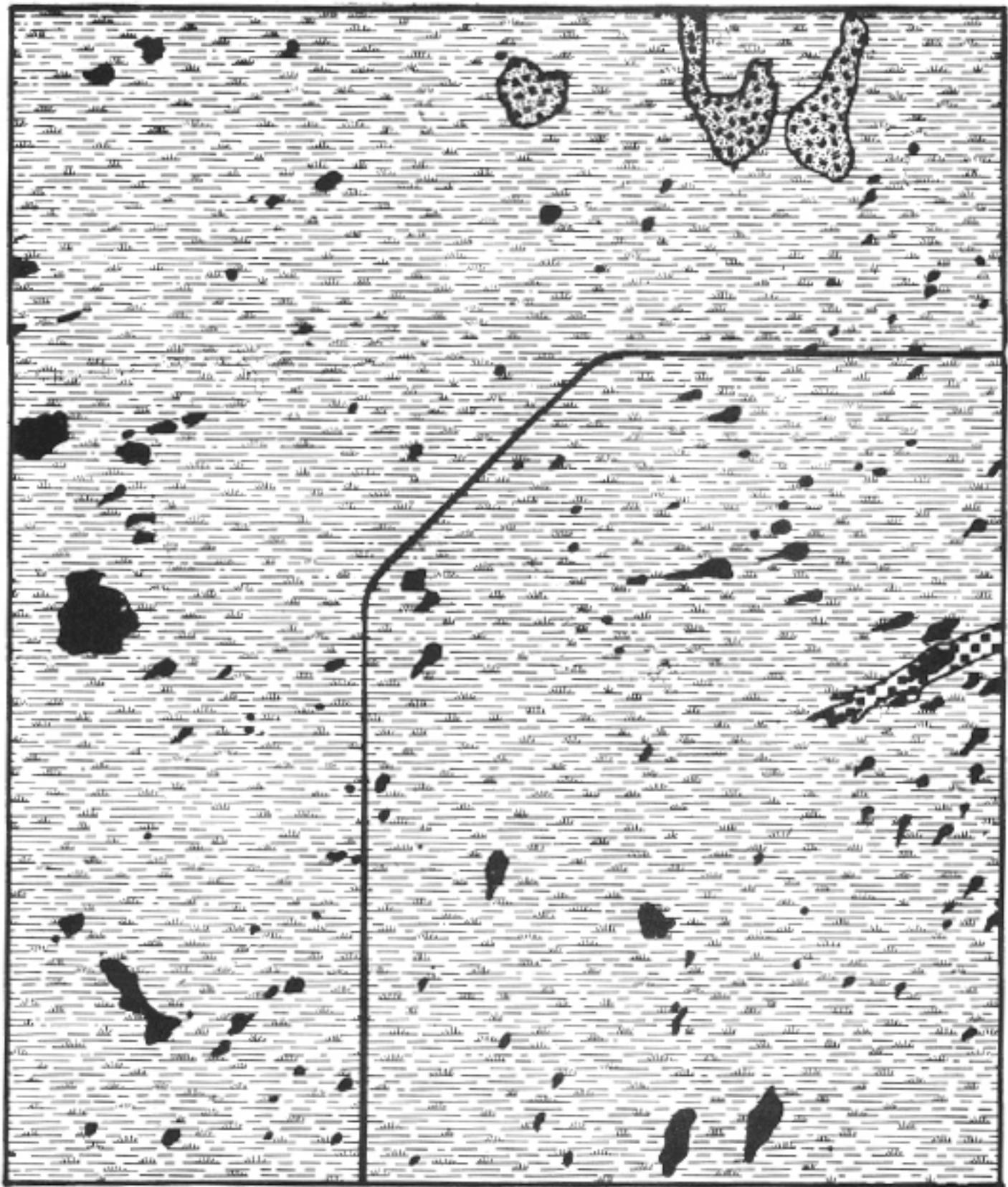
STOP 3: Bay Head

Objectives:

- A. Inspection of a Bay Tree Hammock.
- B. Comparison of cypress hammock surface litter and peat with bay head surface litter and peat.
- C. Discussion of sectional profiles through hammocks.
- D. Discussion of the role of cypress and mangrove in colonizing marshland areas.

Discussion:

Bay tree hammocks in the Shark River Slough area are known to be underlain by as much as 14 feet of peat. Such hammocks are surrounded by a saw grass marsh underlain by three to five feet of saw grass peat. Ideally, they should be inspected but their inaccessibility makes this impractical. The hammock at Stop 3 is reasonably similar and is typical of the bay heads east of the Slough area. It differs from some of the Slough hammocks in that a thick peat layer has not been developed beneath it and it is not surrounded by saw grass peat. Figure 9 shows that the hammock lies in a vast marshland area that is interrupted to the north by small outliers of the Miami Rock Rim (the Pineland environment). No



1/2 mile

LEGEND

- HAMMOCKS
- MARSH
- HAMMOCK SWALE
- PINELAND

MAP OF ENVIRONMENTS IN THE BAY HEAD AREA

Figure 9

peat is found in these pinelands, although some organic debris accumulates in the small solution holes that pit the bedrock surface. The marshland in the vicinity of Stop 3 is covered largely by saw grass but the plants are less abundant and the individuals smaller and less healthy than those in the better developed portions of the saw grass plain to the west and north. Plate V provides an aerial view of the site and gives some impression of the density of the forest cover. A few small cypress trees can be seen on the "downstream tail" of the hammock and an occasional tree may be seen near to, but not at, the margin of the hammock. It would appear that if this bay head has developed on the site of a cypress hammock, the transition from one vegetative cover to the other is essentially complete.

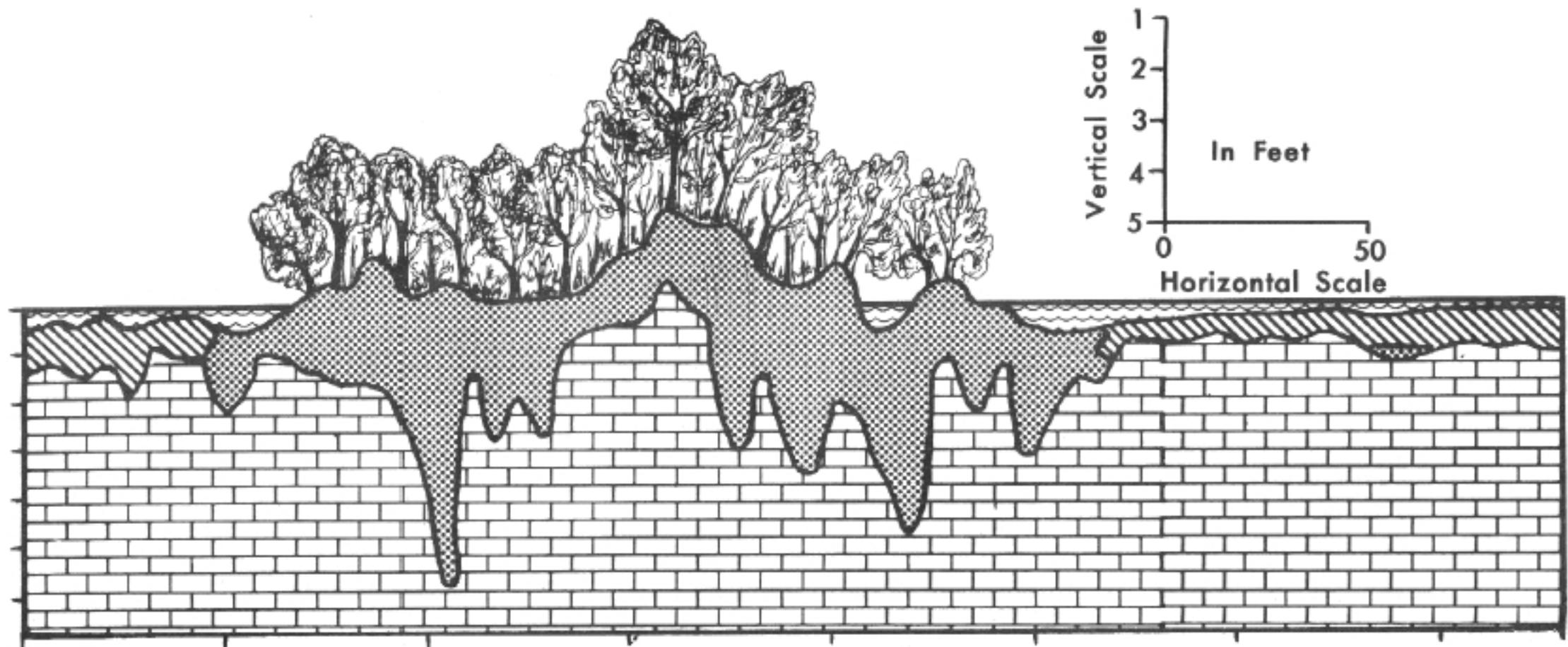
The hardwood trees, shrubs, epiphytes and vines that compose the vegetation include many species that need not be listed here. The "bay trees" from which this type of hammock takes its name are the sweet bay (Magnolia virginiana L.) and red bay [Persea borbonia (L.) Spreng.]. Other genera that often are conspicuous elements in this type of hammock are Chrysobalanus, Ilex, Ocotea, Myrica, Metopium, Smilax and Serenoa.

As one might expect, the surface litter in the bay tree hammock differs markedly from that encountered in a cypress head. The latter contains appreciable quantities of plant substances and tissues that are poorly represented in the bay head litter, partly because the deciduous habit of the cypress involves shedding both twig and leaf material. The bay head litter is primarily a leaf litter. In the drier areas in this hammock and in similar sites in other hammocks that are located in areas affected by artificial drainage, the sub-litter organic material is quite similar to a forest "humus". A more typical peat is often found beneath this humus, although frequently the "sub-humus layer" is composed of slightly altered and thoroughly wetted humic material.

The sectional profile of the hammock at Stop 3 (Figure 10) shows considerable variation in surface elevation, in peat thickness and in bedrock surface contour. The variations in surface elevation may be unduly amplified by the exaggerated vertical scale. Such differences in level are not uncommon in the hammocks in this vicinity, however.



PLATE V



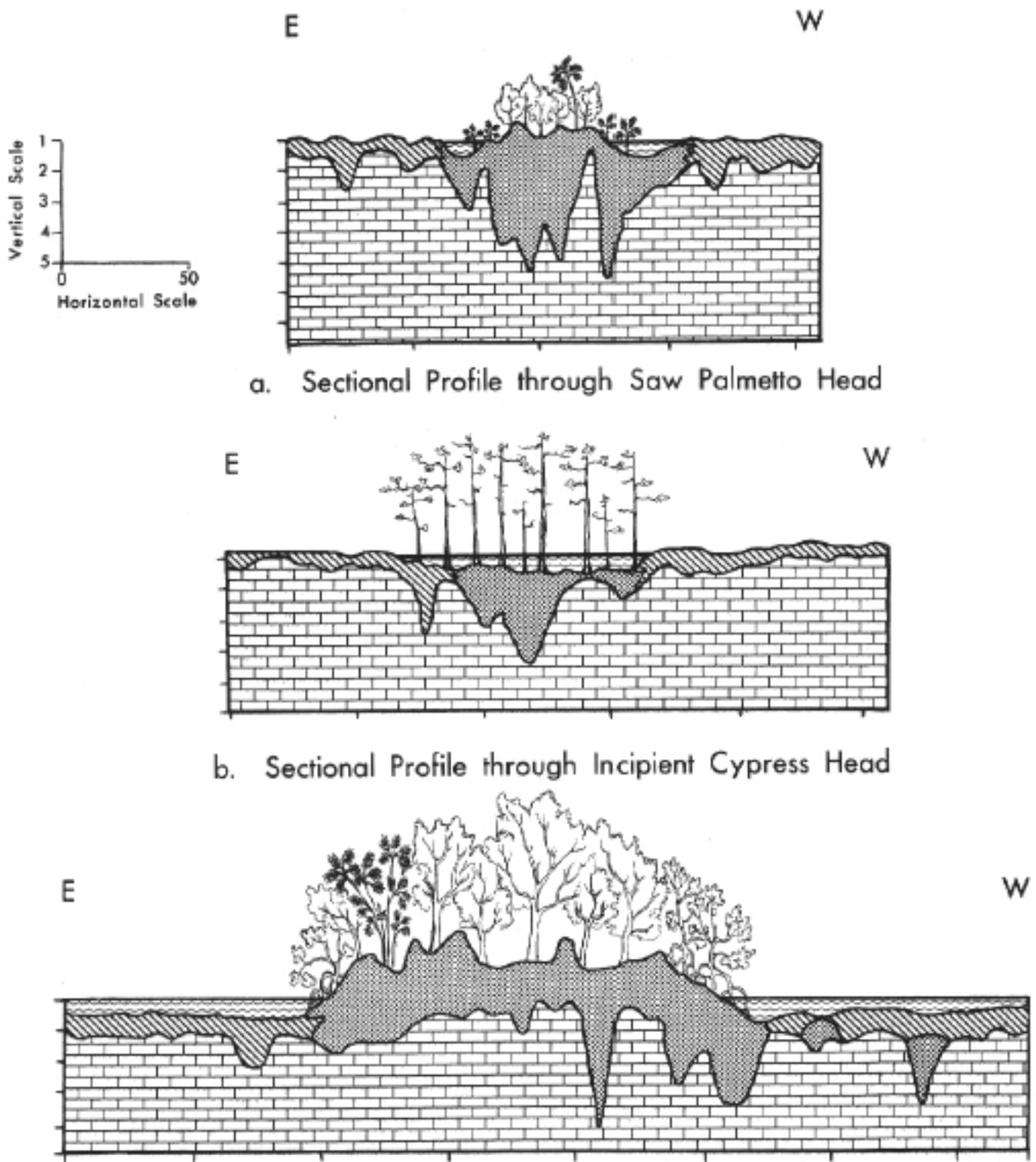
LEGEND

WATER  FRESH WATER MARL  PEAT  BEDROCK 

SECTIONAL PROFILE THROUGH A "BAY HEAD"
Figure 10

Depressed surface areas in the hammocks seem, in some instances, to be related to animal activities. In other cases, lower areas appear to have been the product of a differential decomposition of the peat or a differential compaction related, perhaps, to the recent lowering of the water level in this area by the hand of man. Mounds of slightly higher elevation develop around stumps and fallen logs and although these have only an ephemeral existence, there are always some present to contribute to the irregularity of the surface. Some of the hammocks observed in other areas possess surfaces that are relatively uniform in elevation, hence it appears premature to generalize from the few data available. With regard to the irregularity of the bedrock surface a more positive statement can be made. Sizeable differences in the elevation of the bedrock surface are easily detected by simple probing in any hammock. It is not uncommon to find a two or three foot difference in elevation in probe holes that may be only inches apart. Indications of pitting of the bedrock surface on a smaller scale is readily found as is evidence of the "rotted" nature of the sub-peat bedrock surface. Typically, the hammocks are located on what is now a very irregular bedrock surface, the irregularities being an expression of the presence of numerous solution pits, holes and cavities of various sizes and shapes. Figure 11 presents sectional profiles of three randomly selected hammocks showing the variations in the bedrock floor encountered in a transect across each hammock with probe holes located six feet apart. In addition to the irregularity of the rock surface, it is of interest that in none of these hammocks was marl encountered beneath the peat.

In general the surface peats in the bay tree hammocks contain only small quantities of identifiable pollen. The assemblages are recognizably different from the cypress hammock assemblages and are quite variable in composition. This variability is related in part to the important effects of differential pollen decomposition in this geochemical environment, and in part to the more complex nature of the vegetation. It makes evident that a more extensive sampling is required in this type of environment before data comparable to those described for the cypress peat are obtained.



LEGEND

WATER [wavy lines] PEAT [stippled] FRESH WATER MARL [diagonal lines] BEDROCK [brick pattern]

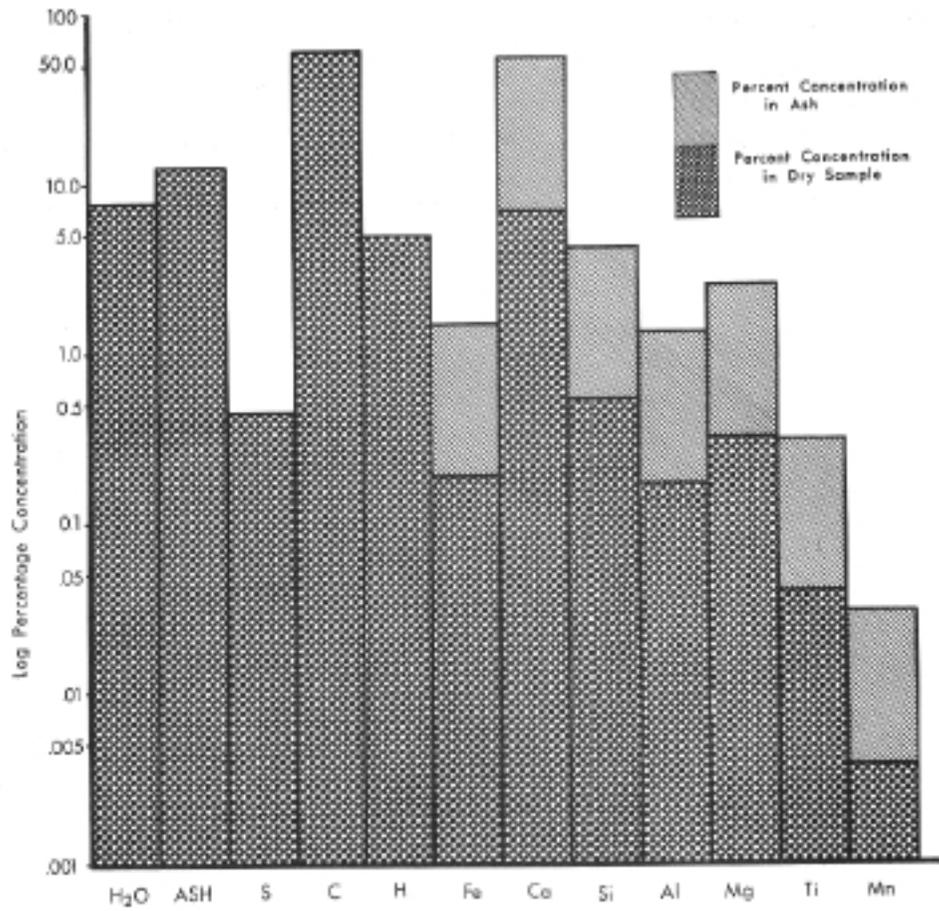
TYPICAL HAMMOCK PROFILES

Figure 11

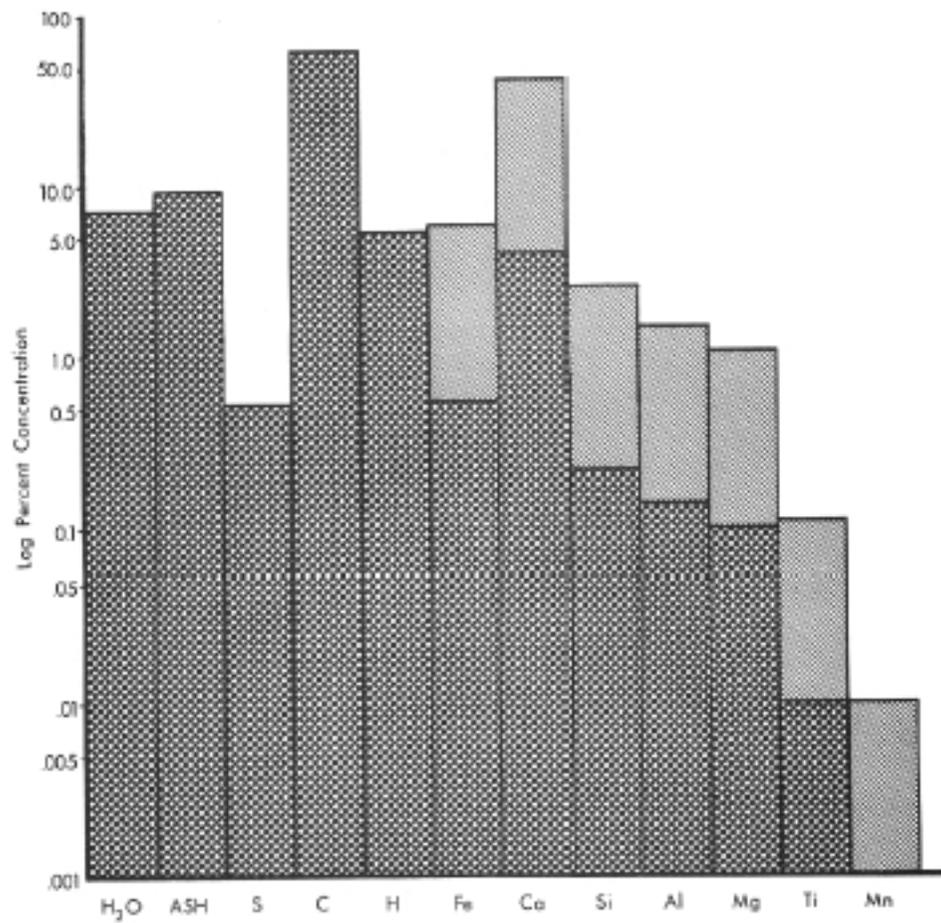
With respect to the concentration of various elements in the peat mass, the bay head type of sediment is remarkably similar to the cypress hammock peat. Figure 12 presents the two sets of data for comparative purposes. The manganese content in cypress head peat appears to be slightly lower than that encountered in bay head peats and the iron content seems to be somewhat higher, but the differences are so small that their significance should be questioned.

The saw grass marsh that occupies most of the area in the vicinity of Stop 3, and, that which dominates the Saw Grass Plain and the Ridge and Slough Sectors of south Florida shown in Figure 3, is clearly a fresh water environment.

As is evident from the isolated trees, the small groups of trees, the small cypress stands and the cypress heads of various sizes, the bald cypress is one of the few trees that can colonize in the open fresh-water marsh in the absence of the occurrence of bedrock at the surface. As one proceeds from Stop 3 toward Florida Bay, evidences of saline conditions begin to appear. Small red mangroves now occur in the open marsh and the cypress is no longer present. Salinity data show that the water is somewhat brackish even at Stop 3. In colonizing the open marsh the mangrove does not form heads or hammocks nor does it occupy only the areas of somewhat deeper water as does the cypress. As soon as the environment is slightly saline, the mangrove is able to invade the area and compete effectively with the saw grass. The saw grass seems able to persist with the mangrove for an appreciable period of time and may even form small pure stands within the mangrove forest. The area to the south of Stop 3 can be viewed either as a stable and typical transition zone between the fresh and salt water environments, or it can be viewed as an area being actively invaded by marine environments. In the former case the small mangroves would be considered as dwarf forms, some of which might be very old but modified in growth form by virtue of the ecology of the marginal site in which they live. The opposite view is that these small mangroves are "young pioneers" that have occupied the site recently and whose progeny are furthering the invasion inland. Plate VI casts some light on determining which



A. ELEMENT CONCENTRATIONS IN BAY HEAD SURFACE "PEAT"



B. ELEMENT CONCENTRATIONS IN CYPRESS HEAD SURFACE PEAT

Figure 12



PLATE VI

interpretation is correct. In this photograph the typical hammock and glade physiognomy is partially obliterated by the numerous mangrove trees that become more abundant and larger as one progresses toward the south. This suggests that the mangrove forest has been superimposed on the hammock and marsh environmental complex, after the latter was well-developed. It is difficult to conceive of the synchronous development of these three components.

STOP 4: Saw Grass Site

Objectives:

- A. Inspection of saw grass environment, saw grass surface litter and saw grass peat.
- B. Discussion of marsh environments.
- C. Discussion of element concentration and the pollen and spore content in saw grass peat.

Discussion:

Areally the saw grass marsh is the most important environment in south Florida. It is also the most important peat-forming environment accounting for at least 400,000,000 tons of Florida's available peat reserves.

The general setting in which Stop 4 is located is not typical of either the Saw Grass Plains to the north or the Ridge and Slough Sector to the west. The site is located in a small patch of saw grass that is merely a remnant of the saw grass marsh that occupied this general area in the past. It is surrounded by a mangrove forest that has engulfed the hammocks of the area and destroyed the saw grass glades. In spite of these facts, the saw grass at the site itself forms a vigorous growth of closely spaced plants that is quite similar to that encountered in more typical settings. Moreover, the peat at the site appears quite comparable to that examined in sites in the Slough area and in the Plains to the north. In view of this, inspection of the site will provide much of the desired information on this type of marsh environment.

Figure 13 depicts the areal relationships of the major environments in this vicinity. The surrounding area includes a swamp dominated by