
DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

**Pliocene palynomorph census data from the
Pinecrest Beds (Tamiami Formation) in Quality
Aggregates Phase 6 pit, southwestern Florida**

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INTRODUCTION

The U.S. Geological Survey is conducting a long-term study of the climatic and terrestrial conditions of the Pliocene. One of the major elements of the study involves the estimation of vegetational composition and abundance from palynomorph assemblages and the estimation of terrestrial paleotemperatures based on vegetational abundance and distribution. Many samples will be analyzed during the project, resulting in a large volume of raw census

data. In addition, it is likely that all or some of the census data from individual sites will be incorporated into analyses for more than one report over the course of the project. Therefore we have decided to make the raw census data available in a series of open-file reports that will provide basic data for future work. In this report, raw census data is presented for 47 palynomorph assemblages from the Pinecrest Beds (Tamiami Formation) of southwestern Florida (Fig. 1).

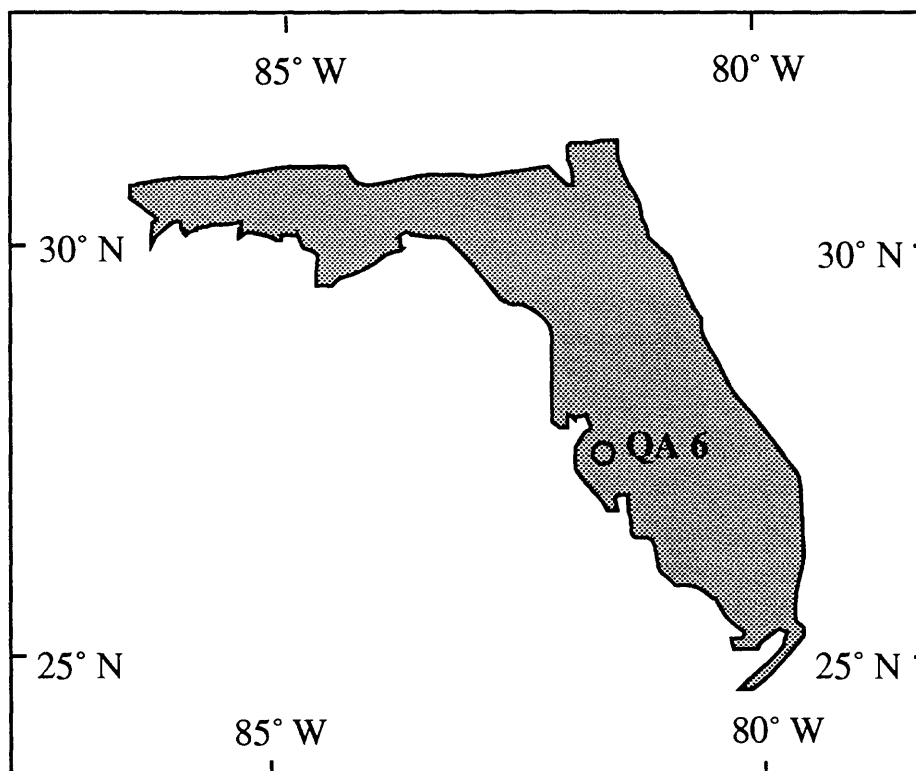


FIGURE 1. Location of Quality Aggregates Phase 6 Pit (QA6).

GEOLOGICAL SETTING

The Pinecrest Beds of the Tamiami Formation consist of coarse sands with an extremely diverse molluscan fauna, which has been studied intensively by paleontologists (Allmon, et al., 1991; Jones, et al., 1991). These units are exposed particularly well in the Quality Aggregates Phase 6 Pit (Lat. 27° 21'45" N, Long. 82° 26' 23" W) near Sarasota, Florida, hereafter referred to as QA6. The Pinecrest Beds range from about 2 Ma to more than 3.5 Ma (Jones, et al., 1991), and they have been subdivided informally into eleven units based on molluscan composition (Petuch, 1982). Of these eleven units, six are exposed at QA6 (Fig. 2), and these were sampled intensively to establish the composition of the regional vegetation throughout the time period, to determine how variable the vegetation was during mid- to Late Pliocene time, and to estimate Pliocene temperatures and precipitation. A detailed interpretation of the vegetational history of the site is provided in Willard, et al. (1993).

METHODS

Samples were collected at 20 cm intervals at four sampling sites in QA6 in order to maximize stratigraphic coverage. The relative locations of these sites, the units sampled, and the sample intervals are illustrated in Fig. 2. Samples weighing about 80 grams were collected for pollen preparation. Sediments first were screened through an 850 μ m mesh to remove shelly debris. Then, samples were decalcified using hydrochloric acid and demineralized using hydrofluoric acid. The neutralized residue was suspended in a dilute detergent solution to keep clay-sized particles in suspension and filtered through an 8 μ m nylon mesh to remove the clay-sized particles. Organic and mineral matter then were separated using a heavy-liquid flotation with zinc chloride (specific gravity =2.0). Organic material was removed, washed, and stained with Bismarck Brown before being mixed with warm glycerine jelly and mounted on microscope slides. For most samples, 300 palynomorphs (excluding pollen of aquatic angiosperms

and spores of lower vascular plants) were counted; for samples with relatively sparse pollen, data were included if at least 100 palynomorphs were counted. Raw counts for taxa (genera and families) contained in each sample are provided in Table 1.

ACKNOWLEDGEMENTS

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FORMATION	TAMiami
EPOCH	PLIOCENE

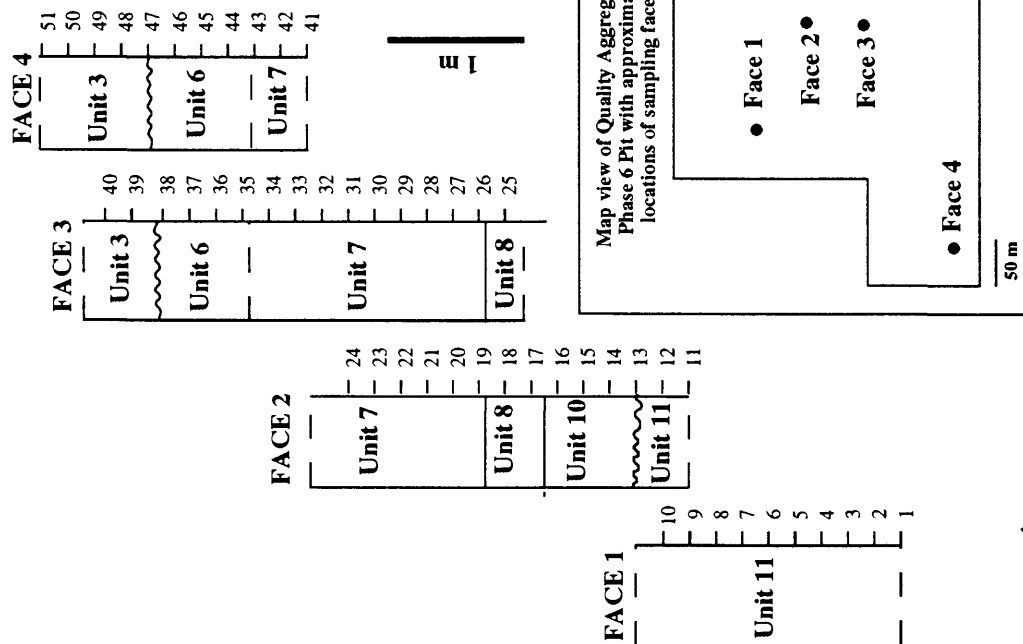
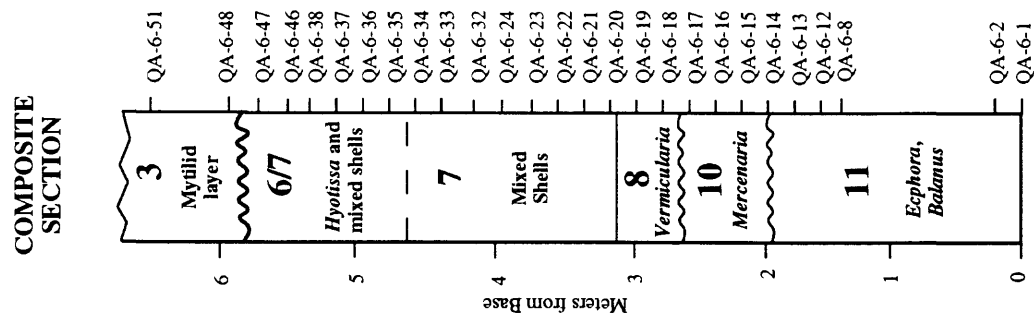


Figure 2. Composite section selected from all four sampling faces at Quality Aggregates Phase 6 Pit (QA6), and sample intervals at each sampling face. Map view shows distribution of four sampling faces relative to each other in QA6.

Table 1. Raw counts of palynomorphs in samples from the Pinecrest Beds (Tamiami Fm.), Quality Aggregates Phase 6 Pit, near Sarasota, Florida. "P" indicates that the taxon was present in the sample but not encountered in the count.

Sample Number Petuch's Zones Collecting site	QA 6-1 Unit 11 Face 1	QA 6-8 Unit 11 Face 1	QA 6-9 Unit 11 Face 1	QA 6-10 Unit 11 Face 1	QA 6-11 Unit 11 Face 2	QA 6-12 Unit 11 Face 2	QA 6-13 Unit 11 Face 2	QA 6-14 Unit 10 Face 2	QA 6-15 Unit 10 Face 2
Arboreal Pollen									
<i>Acer</i>								3	
<i>Alnus</i>	1	2	1	P					
<i>Betula</i>	P	1	2	1	1	4			
<i>Bumelia</i>									
<i>Carya</i>	12	5	11	16	1	6	3	1	1
<i>Castanea</i>			2	1					
<i>Celtis</i>									
<i>Cercis</i>									
<i>Corylus</i>			1		1				
<i>Diospyros</i>									
<i>Fagus</i>	8	11	4	3		1	1		
<i>Fraxinus</i>	P	4		1	2	1			1
<i>Juglans</i>			1	1			1	1	
<i>Juniperus</i>									
<i>Liquidambar</i>		1		1				2	1
<i>Magnolia</i>				1					
<i>Myrica</i>	1								
<i>Nyssa</i>									
<i>Ostrya/ Carpinus</i>				P				P	
<i>Pinus</i>	49	175	155	228	172	234	230	146	90
<i>Platanus</i>			1						
<i>Quercus</i>	120	53	62	31	84	38	42	74	9
<i>Salix</i>	1								
TCT	57	37	37	8	14	10	15	52	7
<i>Ulmus</i>	2		2		3			2	
Non-arboreal pollen									
<i>Ambrosia</i>	10	1	4	4	4	2		1	1
<i>Artemesia</i>	8		2	P	4	1		2	
<i>Aster</i>	4		3	1	2			4	
Asteraceae indet.					1			1	
Chenopodiaceae	7	6	2		5	3		5	
Cyperaceae	1		5		1			2	
<i>Ephedra</i>									
Ericaceae								2	
<i>Ilex</i>	P			1					
<i>Iva</i>	3							1	
Labiatae			1					1	
Leguminosae		3							
Liguliflorae								P	
Poaceae	16	1	4	2	5		3		2
<i>Polygonum</i>									
Ranunculaceae									
Tubuliflorae									
Umbelliferae									
Total Pollen Counted	300	300	300	300	300	300	295	300	112
SPORES									
<i>Polypodium</i>				P				P	
<i>Isoetes</i>									
<i>Equisetum</i>									
<i>Osmunda</i>									
<i>Lycopodium</i>			P						
Trilete spores			P						
Trilete, zonate spores	P								
Monolete spores				P				P	

Table 1 (continued).

Sample Number Petuch's Zones Collecting site	QA 6-16 Unit 10 Face 2	QA 6-17 Unit 10 Face 2	QA 6-18 Unit 8 Face 2	QA 6-25 Unit 8 Face 3	QA 6-19 Unit 8 Face 2	QA 6-20 Unit 6-7 Face 2	QA 6-21 Unit 6-7 Face 2	QA 6-22 Unit 6-7 Face 2	QA 6-23 Unit 6-7 Face 2
Arboreal Pollen									
<i>Acer</i>								1	
<i>Alnus</i>						2			
<i>Betula</i>	2	10	2	4	P	3	1		
<i>Bumelia</i>									
<i>Carya</i>	1	3		3		2	5		2
<i>Castanea</i>	1						P		
<i>Celtis</i>							1		
<i>Cercis</i>									
<i>Corylus</i>		2		1	1		P		
<i>Diospyros</i>									
<i>Fagus</i>	1	4	4	1		P			
<i>Fraxinus</i>	7	2	10	3		P			
<i>Juglans</i>			P	1		P	P	1	
<i>Juniperus</i>									
<i>Liquidambar</i>	1		P	1	P				
<i>Magnolia</i>				1					
<i>Myrica</i>		2				1	1		
<i>Nyssa</i>		1		1				1	
<i>Ostrya/ Carpinus</i>			P				P		
<i>Pinus</i>	194	197	205	208	204	260	258	214	253
<i>Platanus</i>						P			
<i>Quercus</i>	52	50	39	45	59	22	20	25	21
<i>Salix</i>		2				P			
TCT	22	14	27	20	16	10	7	16	13
<i>Ulmus</i>	1	1	2	1	1		P		
Non-arboreal pollen									
<i>Ambrosia</i>	7	2	3	3	1		1	2	
<i>Artemisia</i>			P		P				
<i>Aster</i>	1		1	1			1		1
Asteraceae indet.				P	3				
Chenopodiaceae	2	6	3	1	3	P	1	4	2
Cyperaceae	6	2	1	P	3	P	2	1	3
<i>Ephedra</i>									
Ericaceae	1	1	P	1	3	P			
<i>Ilex</i>		1	P				P		
<i>Iva</i>					5		P		
Labiatae			1						
Leguminosae			P	P					
Liguliflorae									
Poaceae	1		1	P	1	P	2		4
<i>Polygonum</i>									
Ranunculaceae									
Tubuliflorae									
Umbelliferae									1
Total Pollen Counted	300	300	300	300	300	300	300	265	300
SPORES									
<i>Polypodium</i>					P				
<i>Isoetes</i>									
<i>Equisetum</i>							P		
<i>Osmunda</i>									
<i>Lycopodium</i>									
Trilete spores									
Trilete, zonate spores									
Monolete spores	P					P		P	

Table 1 (continued).

Sample Number Petuch's Zones Collecting site	QA 6-24 Unit 6-7 Face 2	QA 6-26 Unit 6-7 Face 3	QA 6-27 Unit 6-7 Face 3	QA 6-28 Unit 6-7 Face 3	QA 6-29 Unit 6-7 Face 3	QA 6-30 Unit 6-7 Face 3	QA 6-31 Unit 6-7 Face 3	QA 6-32 Unit 6-7 Face 3	QA 6-33 Unit 6-7 Face 3
Arboreal Pollen									
<i>Acer</i>								P	
<i>Alnus</i>									
<i>Betula</i>		2	2		1			P	
<i>Bumelia</i>									
<i>Carya</i>			1		1	2	1	1	1
<i>Castanea</i>					1				
<i>Celtis</i>								P	
<i>Cercis</i>									
<i>Corylus</i>					1			P	
<i>Diospyros</i>					P				
<i>Fagus</i>									
<i>Fraxinus</i>									
<i>Juglans</i>		P						P	
<i>Juniperus</i>									
<i>Liquidambar</i>			2			P			
<i>Magnolia</i>									
<i>Myrica</i>								P	
<i>Nyssa</i>									
<i>Ostrya/ Carpinus</i>								P	
<i>Pinus</i>	272	253	234	288	230	248	282	260	127
<i>Platanus</i>					P				
<i>Quercus</i>	15	29	37	9	33	26	9	29	12
<i>Salix</i>									
TCT	8	11	7	1	21	16	6	5	4
<i>Ulmus</i>					1			P	
Non-arboreal pollen									
<i>Ambrosia</i>			1		4	P		P	1
<i>Artemesia</i>	1	P	1			P			
<i>Aster</i>		P	2		1			2	
Asteraceae indet.			1						
Chenopodiaceae		1	5	1	3	1	1	2	
Cyperaceae	3	1	7		2	4		1	
<i>Ephedra</i>									
Ericaceae		2			1	2		P	1
<i>Ilex</i>								P	1
<i>Iva</i>									
Labiatae						P			
Leguminosae									
Liguliflorae									
Poaceae		1		1		P	1	P	
<i>Polygonum</i>									
Ranunculaceae									
Tubuliflorae									
Umbelliferae	1				P				
Total Pollen Counted	300	300	300	300	300	300	300	300	147
SPORES									
<i>Polypodium</i>								P	
<i>Isoetes</i>								P	
<i>Equisetum</i>								P	
<i>Osmunda</i>								P	
<i>Lycopodium</i>									
Trilete spores								P	
Trilete, zonate spores								P	
Monolete spores			P						P

Table 1 (continued).

Sample Number Petuch's Zones Collecting site	QA 6-34 Unit 6-7 Face 3	QA6-41 Unit 6-7 Face 4	QA 6-42 Unit 6-7 Face 4	QA 6-35 Barren unit Face 3	QA 6-36 Barren unit Face 3	QA 6-37 Barren unit Face 3	QA 6-38A Barren unit Face 3	QA 6-38B Barren unit Face 3	QA 6-38C Barren unit Face 3
Arboreal Pollen									
<i>Acer</i>	1								
<i>Alnus</i>	P								1
<i>Betula</i>	2		2	P	1	1		1	3
<i>Bumelia</i>									
<i>Carya</i>	1	4	5	4		1	4	1	3
<i>Castanea</i>			1		1				1
<i>Celtis</i>									
<i>Cercis</i>			P						
<i>Corylus</i>			P					P	
<i>Diospyros</i>									
<i>Fagus</i>	P		1				1		
<i>Fraxinus</i>			1						
<i>Juglans</i>	1	1	1	P		P	2	1	
<i>Juniperus</i>						1			
<i>Liquidambar</i>	P		1				1	1	3
<i>Magnolia</i>									
<i>Myrica</i>									
<i>Nyssa</i>									1
<i>Ostrya/ Carpinus</i>									
<i>Pinus</i>	224	260	244	265	268	229	236	246	228
<i>Platanus</i>									
<i>Quercus</i>	44	18	24	14	2	46	22	30	27
<i>Salix</i>	1								1
TCT	21	12	13	13	26	19	25	13	22
<i>Ulmus</i>					1	P			
Non-arboreal pollen									
<i>Ambrosia</i>	2	1	2				4	3	4
<i>Artemisia</i>				1	P	P		P	
<i>Aster</i>	P				P			1	
Asteraceae indet.				P		1			
Chenopodiaceae	2	1	3	2		P	2	1	1
Cyperaceae		1		1	1	P	1	P	2
<i>Ephedra</i>			P						
Ericaceae	P	2	1	P	P	P			1
<i>Ilex</i>				P			1		
<i>Iva</i>				P					
Labiatae				P					
Leguminosae									
Liguliflorae									
Poaceae	1		1			1	1	1	1
<i>Polygonum</i>	P								
Ranunculaceae									
Tubuliflorae						1			
Umbelliferae								P	1
Total Pollen Counted	300	300	300	300	300	300	300	300	300
SPORES									
<i>Polypodium</i>	P						P		
<i>Isoetes</i>									
<i>Equisetum</i>									
<i>Osmunda</i>									
<i>Lycopodium</i>	P								
Trilete spores	P						P		
Trilete, zonate spores									
Monolete spores	P								

Table 1 (continued).

Sample Number Petuch's Zones Collecting site	QA 6-39 Unit 3-4 Face 3	QA 6-40 Unit 3-4 Face 3	QA 6-43 Barren unit Face 4	QA 6-44 Barren unit Face 4	QA 6-45 Barren unit Face 4	QA 6-46 Barren unit Face 4	QA 6-47A Unit 3-4 Face 4	QA 6-47B Unit 3-4 Face 4	QA 6-47C Unit 3-4 Face 4
Arboreal Pollen									
<i>Acer</i>				P		1			
<i>Alnus</i>		1	2			2	1		1
<i>Betula</i>	1	1	1	3	1	P	2		4
<i>Bumelia</i>				1					
<i>Carya</i>	4	4	2		6		2	1	3
<i>Castanea</i>			2						
<i>Celtis</i>									
<i>Cercis</i>									
<i>Corylus</i>	P		P	1		P			1
<i>Diospyros</i>									
<i>Fagus</i>		1	P		1	P	1		1
<i>Fraxinus</i>			1						1
<i>Juglans</i>	P		1		1	1			1
<i>Juniperus</i>									
<i>Liquidambar</i>			P	P	4	1	1		2
<i>Magnolia</i>			P						
<i>Myrica</i>			P						
<i>Nyssa</i>						1			
<i>Ostrya/ Carpinus</i>						1			
<i>Pinus</i>	272	254	258	214	238	179	216	234	231
<i>Platanus</i>				P		1			
<i>Quercus</i>	10	21	19	38	28	45	30	1	37
<i>Salix</i>				1					
TCT	12	12	7	35	16	53	31	24	8
<i>Ulmus</i>						1	1		
Non-arboreal pollen									
<i>Ambrosia</i>	P	5	3	P	3	6	3		2
<i>Artemesia</i>				1		P			1
<i>Aster</i>					P				
Asteraceae indet.						P			1
Chenopodiaceae	P	1	2	4	1	1	4		1
Cyperaceae	P		P		P	4	6		1
<i>Ephedra</i>								2	
Ericaceae	P		2	P	1	1		1	2
<i>Ilex</i>	P			1	P	P			
<i>Iva</i>	P								1
Labiatae									
Leguminosae			P						
Liguliflorae									
Poaceae	P		P	P	P	2	1		1
<i>Polygonum</i>									
Ranunculaceae							1		
Tubuliflorae									
Umbelliferae				1					
Total Pollen Counted	300	300	300	300	300	300	300	263	300
SPORES									
<i>Polypodium</i>			P			P			P
<i>Isoetes</i>									
<i>Equisetum</i>									
<i>Osmunda</i>									
<i>Lycopodium</i>									
Trilete spores									
Trilete, zonate spores									
Monolete spores					P	P	P		P

Table 1 (continued).

Sample Number Petuch's Zones Collecting site	QA 6-48 Unit 3-4 Face 4	QA 6-51 Unit 3-4 Face 4
Arboreal Pollen		
<i>Acer</i>	1	
<i>Alnus</i>	P	1
<i>Betula</i>	2	P
<i>Bumelia</i>		
<i>Carya</i>	4	
<i>Castanea</i>		
<i>Celtis</i>		
<i>Cercis</i>		
<i>Corylus</i>	1	
<i>Diospyros</i>		
<i>Fagus</i>	P	1
<i>Fraxinus</i>		
<i>Juglans</i>	1	P
<i>Juniperus</i>		
<i>Liquidambar</i>	3	
<i>Magnolia</i>	1	
<i>Myrica</i>		
<i>Nyssa</i>		P
<i>Ostrya/ Carpinus</i>		P
<i>Pinus</i>	262	251
<i>Platanus</i>		
<i>Quercus</i>	19	24
<i>Salix</i>	P	
TCT	5	13
<i>Ulmus</i>	P	
Non-arboreal pollen		
<i>Ambrosia</i>	P	7
<i>Artemesia</i>	P	
<i>Aster</i>		
Asteraceae indet.		
Chenopodiaceae	1	P
Cyperaceae		2
<i>Ephedra</i>		
Ericaceae	P	P
<i>Ilex</i>		1
<i>Iva</i>		
Labiatae		
Leguminosae		
Liguliflorae		
Poaceae		
<i>Polygonum</i>		
Ranunculaceae		
Tubuliflorae		
Umbelliferae		
Total Pollen Counted	300	300
SPORES		
<i>Polypodium</i>	P	P
<i>Isoetes</i>		
<i>Equisetum</i>		
<i>Osmunda</i>		
<i>Lycopodium</i>		
Trilete spores	P	
Trilete, zonate spores		
Monolete spores		