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OPEN-FILE REPORT

Palynological Investigations in the Upper Cretaceous and Tertiary of the Mississippi Embayment Region - II

by

Robert H. Tschudy

Denver, Colorado

This document has not been edited or reviewed for conformity with U. S. Geological Survey standards or nomenclature.

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[1965]

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Introduction

As a part of the cooperative mapping project between the Kentucky Geological Survey and the U. S. Geological Survey, a study of Cretaceous and Tertiary spores and pollen assemblages has been undertaken to aid in distinguishing formations and to facilitate surface and subsurface correlations of strata.

Reports completed from January 1, 1965 to the end of June 1965 are included in this report; others will be placed in open-file as they are completed and released for general use.

REPORT ON REFERRED FOSSILS

P&S Branch, Denver Lab, U.S.G.S.
Bldg. 25, Federal Center, Denver, Colo.

Stratigraphic range: Paleocene.

Kinds of fossils: pollen and spores.

General locality: Kentucky.

Quadrangle or area: Paducah East quad.

Referred by: W. W. Olive, 1/6/65.

Shipment No.: KG-65-1D
Regional Geology in Kentucky.

Report prepared by: R. H. Tschudy, 1/14/65.

Date material received: 1/8/65.

Status of work: Complete.

Report not to be quoted or paraphrased in publication without a final recheck by the Paleontology and Stratigraphy Branch.

Sample No. OPE-12 was sent to determine if it represented the Clayton or the McNairy Formation. The sample from 0.5 mi. S. Reidland High School, at an elevation of 320 feet on a small tributary of Clark River, Kentucky coordinates S1,186,500-258,300 was given USGS Paleobotanical Locality Number D3507.

This sample yielded an excellent palynomorph assemblage as shown on the chart below.

Sample OPE-12 (D3507) code species identified:

H-sm8	Tax-r2	P_3-sm1B	C_3-sm31
O-fov6	V_2S/sm1	P_3-sm2	C_3-sm32
TO-sm30	V_2S/rt1B	P_3-sm6B	C_3-r10B
TO-p21	S_1-sm5	P_3-sm19B	C_3-rt7B
TO-rug13	S_1-sm13B	P_3-sm31B	C_3-rt17
TO-rug11B	S_1-r22	P_3-sm32B	CP_3-sm14
TT-sm1	S_1-r17B	P_3-sm43B	CP_3-sm31
TT-sm2	S_1-rt8B	P_3-sm47	CP_3-sm45
TT-sm37	Gn-11B	P_3-sm48B	CP_3-r2
Tplan-sm1	Classo-1	P_3-sm58	CP_3-r31
Ea-rug1		P_3-sm60	Botryococcus
Gleich-4B		P_3-r16	Tub-com5
		Pa_3-sm30	

The presence of the species P_3-sm6B, P_3-sm1B, P_3-sm19B, CP_3-r31 and the absence of any rugulate bisaccate pollen definitely places this sample in the Tertiary rather than the Cretaceous. The assemblage is definitely of early Paleocene age, and probably is from the Clayton Formation.

Helen M. Pakiser

Helen M. Pakiser

Robert H. Tschudy

Robert H. Tschudy

RHT

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REPORT ON REFERRED FOSSILS

P&S Branch, Denver Lab, U.S.G.S.
Bldg. 25, Federal Center, Denver, Colorado

Stratigraphic range: Eocene

Kinds of fossils: Pollen & spores

General locality: Kentucky

Quadrangle or area: Graves County

Referred by: W. I. Finch, 4/17/63

Shipment No.: KG-63-4D
Regional Geology in Kentucky

Report prepared by: Robert H. Tschudy, 1/25/65

Date material received: 4/19/63

Status of work: Complete

Report not to be quoted or paraphrased in publication without a final recheck by the Paleontology and Stratigraphy Branch.

Your sample from NE corner Mayfield Clay Mine, 1 mile NE of Pryorsburg, Graves Co., Kentucky, was given USGS Paleobotanical Locality Number D3040. Supplementary to my memo of April 30, 1963, I have re-examined this material.

The following forms were found:

Carya
Betula
Proteacidites
Sapotaceoidaepollenites
cf. Caprifoliaceae
cf. Castanopsis
P3-r
M-P
P3-sm1B
P3-sm56 var.
CP3-rt
C3-rt
CP3-P

All of these are common to Eocene rocks, and some of them have been found only in samples from the Cockfield and Moody's Branch Formations. From the evidence I conclude that the sample probably is from the Upper Claiborne or Lower Jackson.

Robert H. Tschudy

Robert H. Tschudy

Raf

REPORT ON REFERRED FOSSILS

P&S Branch, Denver Lab, U.S.G.S.
Bldg. 25, Federal Center, Denver, Colo.

Stratigraphic range: Eocene

Kinds of fossils: Pollen and spore

General locality: Kentucky

Quadrangle or area: Westplains quad.

Referred by: R. W. Swanson, 8/28/64

Shipment No.: KG-64-26D
Regional Geology in Kentucky

Report prepared by: Robert H. Tschudy, 2/24/65

Date material received: 8/31/64

Status of work: Supplemental Report---Complete.

Report not to be quoted or paraphrased in publication without a final recheck by the Paleontology and Stratigraphy Branch.

This is a supplementary report on sample SWP-4 (D3460). See previous report on shipment KG-64-26D. When I made the previous report on this sample I was in error. The rapid determination was designed to distinguish Pleistocene Alluvium from possible Eocene. When I found the sample to be of Eocene age I discontinued the examination. The Sparta-Zilpha estimation was based on the belief held at that time that Sapotaceoidaepollenites was limited to Claiborne and younger rocks. We now know that its range extends into the lower Eocene.

I carefully re-examined samples SWP-4 and found the following code species (in addition to the ones reported previously.)

P_3-sm16	CP_3-rt14c
BCP_3-rt6	Pa_3-sm30B?
Pa_3-sm25c	CP_3-rt19
CP_3-r	P_3-sm91
CP_3-rt	CP_4-r2
BCP_3-r	
C_3-p	

The species P_3-sm16 is limited in our control material to the Hatchetigbee and Pendleton Formations of Wilcox age. Two of the species listed have been observed previously in the Tallahatta Formation, the remainder in the Pendleton Formation. This sample represents the Wilcox rather than the Claiborne.

N. B. This sample yielded an entirely different palynomorph suite than did sample SWP-5 (D3514).

Robert H. Tschudy

Robert H. Tschudy

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REPORT ON REFERRED FOSSILS

P&S Branch, Denver Lab, U.S.G.S.
Bldg. 25, Federal Center, Denver, Colo.

Stratigraphic range: Paleocene — Kinds of fossils: Pollen and spores

General locality: Kentucky — Quadrangle or area: Westplains quadrangle

Referred by: R. W. Swanson, 1/22/65 — Shipment No.: KG-65-2D
Regional Geology in Kentucky

Report prepared by: Robert H. Tschudy, 2/24/65 — Date material received: 2/10/65

Status of work: Complete.

Report not to be quoted or paraphrased in publication without a final recheck by the Paleontology and Stratigraphy Branch.

Your sample SWP-5 from Auger hole east side of West Fork of Clarks River at mouth of Tucker Branch, Kentucky coordinates S1189.8-N207.8 was given USGS Paleobotanical Locality Number D3514.

The palynomorphs recovered included the following code species:

Classo-1	P_3-sm75B	Dinoflagellates
P_3-sm1B	Pperi-sm5	Hystrichospheres
P_3-sm6B	Pa_3-sm30	Pterospermopsis
Tax-sm1	P_3-sm57	
P_3-rt12	P_5-rug	
P_3-sm43B	Gn 5B	
P_3-rt6?		

The palynomorphs definitely indicate a Paleocene age for this sample. The presence of Dinoflagellates, hystrichospheres and Pterospermopsis indicate also brackish or marine deposition. Even the organic debris suggests that it had been winnowed and only debris of one size range deposited with the pollen. This assemblage very closely approximates the assemblage we have previously found only in the Porters Creek Clay. I find it impossible to reconcile this sample with the one referred to in your transmittal memorandum of January 22, 1965 (D3460).

Sample SWP-4 (D3460) is a light gray variegated fine grained plastic clay. Sample SWP-5 (D3514) is much darker in color, more friable, and yielded an entirely different suite of fossils. (See supplementary report on sample D3460.)

Robert H. Tschudy

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REPORT ON REFERRED FOSSILS

P&S Branch, Denver Lab, U.S.G.S.
Bldg. 25, Federal Center, Denver, Colorado

Stratigraphic range: Eocene

Kinds of fossils: Pollen

General locality: Kentucky

Quadrangle or area: Westplains quad.

Referred by: Roger Swanson, 2/15/65

Shipment No.: KG-65-3D

Report prepared by: Robert H. Tschudy, 3/3/65

Date material received: 2/17/65

Status of work: Complete

Report not to be quoted or paraphrased in publication without a final recheck by the Paleontology and Stratigraphy Branch.

Your sample SWP-6 from cut bank, SW side of Ray Branch, 100 ft SE of Hollan Cemetery, Kentucky coordinates S1187.7, N-174.4 was given USGS Paleobotanical Locality Number D3515.

This sample yielded an abundance of well-preserved pollen grains including the following code species:

P3-sm56	P3-sp2	Pa3-sm25C
P3-sm16	CP3-sm	BCP4-r1?
P3-sm21	BCP3-sm6C	C6-sm new
P3-sm30B	BCP3-r new	CP5-sm
P3-sm40	BCP3-rt2B	Schizaea
P3-sm14B	CP3-r31	Hystrichospheres
P3-sm new	CP3-rt19	Dinoflagellates
P3-rt new	C3-3rt	

This assemblage is clearly Eocene in age. Because of the high proportion of new species, comparison with all control Eocene samples was made.

The presence of P3-sm16 limits this sample to the upper Wilcox or lower Claiborne. No control samples above the Recklaw have yielded this species. On the basis of the complete assemblage, I believe this sample to represent the upper Wilcox.

Robert H. Tschudy

Robert H. Tschudy

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REPORT ON REFERRED FOSSILS

P&S Branch, Denver Lab, U.S.G.S.
Bldg. 25, Federal Center, Denver, Colorado

Stratigraphic range: Eocene

Kinds of fossils: Pollen

General locality: Kentucky

Quadrangle or area: Jackson Purchase area

Referred by: W. W. Olive, 7/21/61

Shipment No.: CS-61-1D

Report prepared by: Robert H. Tschudy, 3/3/65

Date material received: 7/24/61

Status of work: Supplementary report

Report not to be quoted or paraphrased in publication without a final recheck by the Paleontology and Stratigraphy Branch.

Sample Olive 1a (D1667A) was re-examined as suggested in your memorandum of Feb. 26, 1965. In spite of the fact that control is now available, I had difficulty in satisfying myself concerning an age determination.

The following code species were identified:

C3-p4
M-p6
P4-p1
P3-sm56
BCP3-sm6C?
C3-rt1
P3-sm40
P3-sm12
C3-rt1
P4-sm
Tet-sm
C3-rt
P3-rt5A?
Peltate leaf hairs
Schizaea

The pollen indicates equivalence to the Claiborne rather than to the Wilcox. Qualitatively the assemblage resembles that from the Cockfield Formation, however, there is considerable disparity quantitatively. I believe this sample to represent a part of the stratigraphic column near the position occupied by the Cockfield Formation. Our control sample interval, however, is too wide to provide exact correlation.

Robert H. Tschudy
Robert H. Tschudy

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REPORT ON REFERRED FOSSILS

P&S Branch, Denver Lab, U.S.G.S.
Bldg. 25, Federal Center, Denver, Colorado

Stratigraphic range: Eocene

General locality: Kentucky

Referred by: W. I. Finch, 2/23/65

Report prepared by: Robert H. Tschudy, 3/15/65

Status of work: Complete

Kinds of fossils: Pollen & spores

Quadrangle or area: Lovelaceville quad.

Shipment No.: KG-65-4D
Regional Geology in Kentucky

Date material received: 2/24/65

Report not to be quoted or paraphrased in publication without a final recheck by the Paleontology and Stratigraphy Branch.

Your sample FLO-1 from Coleman cut, Lovelaceville quadrangle, McCracken Co., Kentucky, Kentucky coordinates S1121.0-247.25 was given USGS Paleobotanical locality number D3521.

The following palynomorphs were found:

Tiliaepollenites 3 sp.	Schizocystia
Caryapollenites 2 sp.	Pediastrum
Alnuspollenites 2 sp.	P3-sm56
Pinuspollenites	P3-sp new
Ephedra-nevadensis type	P3-sm75
Pistillipollenites	P3-sm25D?
Ilexpollenites	P3-sm21
Ulmipollenites	CP3-sm new
Juglanspollenites	M-p8
Azolla massulae	Peltate leaf hair

This assemblage is clearly of Eocene age. The Juglanspollenites species found in your sample have not been found below the Tallahatta Formation. Pistillipollenites is present in the Wilcox and lower Claiborne. Characteristic Wilcox species were not found in your sample. Therefore, I believe that your sample came from lower Claiborne rocks.

Robert H. Tschudy

Robert H. Tschudy

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REPORT ON REFERRED FOSSILS

P&S Branch, Denver Lab, U.S.G.S.
Bldg. 25, Federal Center, Denver, Colorado

Stratigraphic range: Upper Cretaceous

Kinds of fossils: Pollen & spores

General locality: Kentucky

Quadrangle or area: Hico quadrangle

Referred by: W. W. Olive, 2/24/65

Shipment No.: KG-65-5D
Regional Geology in Kentucky

Report prepared by: Robert H. Tschudy, 3/18/65

Date material received: 2/26/65

Status of work: Complete

Report not to be quoted or paraphrased in publication without a final recheck by the Paleontology and Stratigraphy Branch.

The samples from the Hico quadrangle were given USGS Paleobotanical Locality Numbers as follows:

Sample	Locality	Number
OHI-2b	600 ft SE of Independence School, Ky. coords. 1,268,350-145,100, Hico quad., Calloway Co., Ky. Sample from 6" above stream.	D3522-D
OHI-2c	Same, except sample from 1-2 ft below stream.	D3522-C
OHI-2d	Same, except sample from 2-4 ft below stream.	D3522-B
OHI-2e	Same, except sample from 4-5 ft below stream.	D3522-A
OHI-9	0.9 mi. W. of Shiloh, altitude 145 ft., Ky. coords. 1,272,900-136,600, Hico quad., Calloway Co., Ky.	D3523
OHI-10	0.75 mi. SW of Shiloh, altitude 125-130 ft, Ky. coords. 1,275,650-134,100, Hico quad., Calloway Co., Ky.	D3524

Pollen and spores identified from samples OHI-2b, OHI-2e, OHI-9, and OHI-10 are shown below.

Code species	Sample OHI-2e D3522-A	OHI-2b D3522-D	OHI-9 D3523	OHI-10 D3524
Gleich-4	x			x
Fmen-sp1				x
Fmem-rt1				x
Vun-rug4				x
VOT-rt4	x			
App-1A				x
App-6				x
TC-sm24	x			
EO-sm2		x		
V2S/rt1	x	x		
V2S/r6	x			x
V2L/rug5	x	x	x	x
V2S/rug3	x	x		
S1-sm9	x	x	x	x
S1-sm12	x	x		
S1-p7		x		
S1-r17	x	x	x	x
S1-r18	x			x
S1-rt6		x		
S1-rt18		x		
P1-rt1	x	x	x	
P3-r16		x		
P3-r17	x	x		
P3-r18		x		
P3-rt3A	x		x	
P3-rt12	x			x
P3-sm58	x	x		x
P3-sm58B				x
P3-sm57	x			
P3-sm88	x			
Pa3-sm23	x			
C3-sm31	x			x
C3-rt1B			x	
C3-rt30			x	
CP3-r30	x	x		
CP3-r15				x
Tet-st1	x		x	x
Lecaniella	x	x		x
Schizocentia		x	x	

All of the species on this list are characteristic of or have been found in upper McNairy or Owl Creek control samples. I conclude that all are of Cretaceous rather than Paleocene age.

Sample OHI-2b, the highest sample stratigraphically in the OHI-2 series was examined with particular care because the podocarpaceous pollen with rugulate crests (V2/rug) was very scarce. I was unable to find any of the species that characterize our type Clayton in this sample. I re-examined slides of sample D1867 from almost the same locality as the present samples, and the Clayton species were conspicuous and the

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V2/rug group was absent. A re-examination of sample Whi-1 (D1864) confirmed a previous upper McNairy designation. A cursory examination of samples OHI-2c and OHI-2d revealed that sample OHI-2c was definitely of Cretaceous age, and OHI-2d although poor in pollen yielded a few Cretaceous forms but no characteristic Clayton species. An apparent progressive decrease in the proportion of podocarpaceous pollen with rugulate crests was observed in samples OHI-2e through OHI-2b. This group of species is not found in the Clayton. This notable decrease may indicate proximity to the Cretaceous-Tertiary boundary in this region.

Sample OHi-9 (D3523) was poor, yielding much tissue but comparatively few palynomorphs. Characteristic McNairy species were found, but no diagnostic Clayton species. I believe this sample represents the McNairy.

Sample OHi-10 (D3524) yielded a characteristic McNairy assemblage, leaving no room for doubt concerning its age.

Robert H. Tschudy

Robert H. Tschudy

REPORT ON REFERRED FOSSILS

P&S Branch, Denver Lab, U.S.G.S.
Bldg. 25, Federal Center, Denver, Colo.

Stratigraphic range: Cretaceous-Paleocene

Kinds of fossils: Palynomorphs

General locality: Kentucky

Quadrangle or area: Paducah West, Joppa, and Hico quads.

Referred by: W. W. Olive, 4/3/65

Shipment No.: KG-65-7D
Regional Geology in Kentucky

Report prepared by: R. H. Tschudy, 4/26/65

Date material received: 4-7-65

Status of work: Complete

Report not to be quoted or paraphrased in publication without a final recheck by the Paleontology and Stratigraphy Branch.

All 15 samples submitted for palynological examination were productive. They were given USGS paleobotanical locality numbers as follows:

Sample	Locality	Number
FJ-1	Kentucky Coordinates S1,094,590-308,200, Auger hole J-12, 1 mile from SW corner Joppa quadrangle McCracken Co., Kentucky. Depth 52-62 feet.	D3548-D
FJ-2	Ditto, depth: 62-77 feet	D3548-C
FJ-3	Ditto, depth: 77-93 feet	D3548-B
FJ-4	Ditto, depth: 93-98 feet	D3548-A
FPW-22	Kentucky coordinates S1141.3-269.95 Williams No. 1 well surface elevation 461, Paducah West quadrangle, McCracken Co., Kentucky. Depth 265-270 feet.	D3547-E
FPW-23	Ditto, depth: 270-275 feet	D3547-D
FPW-24	Ditto, depth: 275-280 feet	D3547-C
FPW-25	Ditto, depth: 285-290 feet	D3547-B
FPW-26	Ditto, depth: 335-340 feet	D3547-A
OHi-2k	Kentucky Coordinates 1,268,350-145,100, 600 feet SE of Independence School. About same horizon as D3522-D, but 100 feet upstream, Hico quadrangle, Calloway Co., Kentucky. 6½ Feet above base of lignitic clay bed.	D3546-F

Sample	Locality	Number
OHi-2j	Ditto, 5½ feet above base of lignitic clay bed.	D3546-E
OHi-2i	Ditto, 4½ feet above base of lignitic clay bed.	D3546-D
OHi-2h	Ditto, 3½ feet above base of lignitic clay bed.	D3546-C
OHi-2g	Ditto, 2½ feet above base of lignitic clay bed.	D3546-B
OHi-2f	Ditto, 1 foot above base of lignitic clay bed.	D-3546-A

Significant code species recovered from Auger hole J-12, Joppa quadrangle are shown in Table 1.

TABLE 1

Code Species	Sample D. Number: FJ-4 D3548-A	FJ-3 D3548-B	FJ-2 D3548-C	FJ-1 D3548-D
P_3-sm1B	X	X	X	X
Gn-11B	X	X		
Pa_3-sm30	X			
P_3-sm58	X			X
Pperi-sm5	X	X	X	
Ea-rug1	X			
TO-rug11B	X		X	X
Classo-3	X	X	X	X
TT-sm37	X			
Gleich 4	X			
P_3-sm47	X		X	X
Schiz	X			
Bot.	X			
Ill.	X			
P_3-sm21		X	X	
P_3-sm58B		X	X	
P_3-sm75		X		
P_3-sm71		X		
Hyst.		X	X	X
Dino.		X	X	X
P_3-r29			X	X
P_3-sm56C			X	X
P_3-sm57			X	
P_3-sm6B			X	
BCP_3-rt2E				X
Pa_3-sm30				X
P_3-sm78			X	X

Sample FJ-4 (D3548-A) yielded a characteristic Clayton assemblage. The remaining three FJ samples, although yielding poorer pollen suites, provided enough fossils to identify the samples as Porters Creek Clay equivalents. All three of these samples (D3548-B, D3548-C, D3548-D) yielded an abundance of hystrichospheres and dinoflagellates indicating marine deposition. The species P_3-sm78 and P_3-sm71 have not been found in any formation other than the Porters Creek Clay.

The five samples from the Williams No. 1 well were all productive. Significant code species found are shown in Table 2.

Table 2.

Code Species	Sample : FPW 26	FPW-25	FPW 24	FPW-23	FPW-22
	D Number: D3547A	D3547B	D3547C	D3547D	D3547E
P_3-sm1B	X	X	X	X	X
V_2s/rt1	X				
P_3-sm47	X	X	X	X	X
P_3-pl3	X				
V_2l/sm1	X				
Gleich 4	X				
P_3-sm32B	X				
P_3-sm43B	X				
P_3-rt12	X				
Fmem-sm2	X				
P_3-sm6	X				
S_1-rt22	X				
P_3-sm58	X	X	X	X	X
cfS_1-r26	X				
C_3-rt26	X				
S_1-rt7	X				
V_2L/rug5	X				
BCP_3-sm6C	X				
Gn11B	X	X	X	X	X
Pperi-sm5	X	X	X	X	X
Schizo	X	X			
Bot	X				
Ill.	X				
Classo-3		X	X	X	X
P_3-r29		X	X	X	
P_3-sm6B		X	X		X
P_3-sm78		X		X	
Hyst.		X	X	X	X
Dino.		X	X	X	X
CP_3-r21			X		
P_3-sm56C			X		X
M-rt4			X		
BCP_3-rt2E			X	X	X
P_3-sm57					X
Pa_3-sm30					X

Sample FPW-26 (D3547-A) yielded a characteristic Clayton assemblage. The Clayton control material at hand provided evidence of non-marine or deltaic deposition. On the other hand the Porters Creek control material definitely indicates marine deposition. The above mentioned sample yielded fossils indicative of a deltaic or paludal deposition site.

The four FPW samples from stratigraphically higher horizons, yielded assemblages indicating equivalence to the Porters Creek Clay. All of these samples (D3547-B, D3547-C, D3547-D, and D3547-E) yielded an abundance of hystrichospheres and dinoflagellates indicating marine deposition. The species BCP_3-rt2E and P_3-sm78 have not been found in any formation other than the Porters Creek Clay.

Samples OHi-2f through OHi-2k were sent from a 6½-foot thick lignite and lignitic clay unit underlain by a light grayish-brown sandy clay that has yielded fossils of Cretaceous age, and overlain by light gray sandy clay that has yielded fossils of Paleocene age. The Cretaceous-Tertiary palynological boundary should be located within this 6½-foot unit.

Identified code species found in these 6 samples are shown on Table 3.

Table 3

Code Species	Sample: D Number:	OHi-2f D3546-A	OHi-2g D3546-B	OHi-2h D3546-C	OHi-2i D3546-D	OHi-2j D3546-E	OHi-2k D3546-F
M-rt4				X	X		
Gleich-4		X	X	X	X	X	X
TO-rug11		X	X	X	X	X	X
TO-rug13		X	X	X	X	X	
TT-sm25			X				
Fnem-sm5						X	
App-1			X				
App-1A			X	X			
App7B			X				
App6				X		X	
V_2L/rug5		X	X	X	X	X	X
V_2S/rug3		X	X	X			
V_2S/rt1		X	X	X	X	X	X
V_2L/r5		X	X	X	X	X	X
V_2L/sm18			X				
Classo-3				X	X	X	X
Gn-5B		X					
Gn-11B					X	X	
S_1-r17B		X		X	X	X	X
S_1-sm12		[illegible]	X	[illegible]			
S_1-rt11		X	X	[illegible]			
S1-rt8C		X					
S_1-rt8B				X	X		X

Table 3 (Cont'd)

Code Species	Sample : OHi-2f D Number: D3546-A	OHi-2g D3546-B	OHi-2h D3546-C	OHi-2i D3546-D	OHi-2j D3546-E	OHi-2k D3546-F
S_1-rt18	X					
S_1-rtD	X	X				
S_1-rl7		X	X	X	X	X
S_1-rt7		X	X	X	X	
S_1-rl8			X			
S_1-rl1B			X			
P_1-rt1	X					
P_3-sm31B	X	X	X	X		X
P_3-sm47	X	X	X	X	X	X
P_3-sm43B	X					
P_3-sm58	X	X	X	X	X	X
P_3-sm49	X	X				
P_3-rt12	X	X				
P_3-sm6B		X	X			
P_3-rt1B		X		X		
P_3-sm88		X				
P_3-sp new		X				
P_3-rt3		X				
P_3-rt4A			X		X	
P_3-sm1B			X	X	X	X
P_3-sm56			X	X	X	X
P_3-sm32B						X
cf. P_3-sm71			X	X		
P_3-rt14			X	X		
P_3-sm57				X		
P_4-sm10	X	X				
Pperi-sm5			X	X	X	X
C_3-rt10	X	X	X			
C_3-rt18				X		
C_3-sm31	X	X				
C_3-rt30	X					
cf.C_3-rt1B		X			X	
C_3-rt13B		X				
C_5-rt1		X				
CP_3-r30	X	X				
CP_3-r21			X	X	X	X
CP_3-r31			X	X	X	X
CP_3-rt9	X	X				
cf. CP_3-r21B		X				
ECP_3-r8		X				

Table 3 (Cont'd)

Code Species	Sample : D Number:	OHi-2f D3546-A	OHi-2g D3546-B	OHi-2h D3546-C	OHi-2i D3546-D	OHi-2j D3546-E	OHi-2k D3546-F
O-fov5		X	X				
Lecan.			X				
Schizo.		X	X	X	X	X	X
Tet-stl			X			X	
Bot.				X	X	X	X
Ill.				X	X	X	X

Species underlined********are characteristic Upper Cretaceous species. Species underlined_____are characteristic Paleocene species. The species P_3-sm1B has never been found in any Cretaceous samples. On the other hand, the species V_2L/rug5 and V_2S/rug3 heretofore have been limited to the Cretaceous and never found in the Paleocene.

The control Clayton consists of 4 samples from the upper part of the Clayton Formation. The basal Clayton at that locality (D1966-A-F) consists of an arenaceous limestone, and was not sampled for palynomorphs. The evidence from samples of the OHi-2 series indicates that the range of the species V_2L/rug5 and V_2S/rug3 has been extended into the basal Clayton.

If we consider the first appearance of P_3-sm1B as indicating the lowermost Paleocene sample, then the Cretaceous-Tertiary palynological boundary lies between samples OHi-2g (D3546-B) and OHi-2h (D3546-C) or somewhere between $2\frac{1}{2}$ and $3\frac{1}{2}$ feet above the base of the lignitic clay.

The species O-fov5, Lecan., Schizo., and Bot. suggest lacustrine or deltaic deposition rather than marine. The absence of abundant hystrichospheres and dinoflagellates supports this hypothesis.

Robert H. Tschudy

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REPORT ON REFERRED FOSSILS

P&S Branch, Denver Lab, U.S.G.S.
Bldg. 25, Federal Center, Denver, Colorado

Stratigraphic range: Upper Eocene

Kinds of fossils: Pollen and spores

General locality: Kentucky

Quadrangle or area: Westplains quad.

Referred by: Finch & Swanson, 5/5/65

Shipment No.: KG-65-8D
Regional Geology in Kentucky

Report prepared by: Robert H. Tschudy, 5/21/65

Date material received: 5/12/65

Status of work: Complete

Report not to be quoted or paraphrased in publication without a final recheck by the Paleontology and Stratigraphy Branch.

Two samples were sent for palynological examination. Sample FBL-1 yielded only tissue fragments and no pollen. The sample was processed twice in an attempt to obtain pollen. No pollen was seen in either preparation. Sample OBL-1 from essentially the same locality also yielded only tissue fragments and no pollen.

Sample SWP-7 from spoil pile at SE corner of clay pit, bed K-33 of Old Hickory Clay Co., Kentucky Coordinates E1163.0-N174.2, Westplains quadrangle, Graves Co., Kentucky, yielded a good suite of pollen and spores. It was given USGS Paleobotanical locality number D3558.

The following is a partial list of the palynomorph content of the sample:

Sapotaceoidaepollenites
Cupaneidites
Nyssapollenites
Symplocoipollenites
cf. Momipites
cf. Engelhardtioidites
Tiliaepollenites
Gothanipollis
Ulmipollenites
Caryapollenites
Proteacidites
Ephedra (distachya type)
Triporopollenites (Onagraceous type)
Tricolporopollenites
Monosulcites
cf. Pollenites ventosus of Engelhardt*

All of the above forms have been found in the Cockfield or Moodys Branch Formations; most of them occurring in both. Gothanipollis and Onagraceous type pollen is limited in our control material to the Sparta and Cockfield Formations.

I conclude that this sample is from the lower Jackson or Upper Claiborne Groups. It probably is equivalent to the Cockfield Formation of late Claiborne age.

*Engelhardt, D. W. Plant Microfossils from the Eocene Cockfield Formation, Hinds County, Mississippi. Bull. 104, Miss. Geol. Econ. and Topographical Survey, Jackson, Miss., p. 65-96. 1964.

Robert H. Tschudy

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To accompany

Weld - Int. 2905

GEOLOGIC DIVISION
U. S. GEOLOGICAL SURVEY
Washington, D. C.

For release July 22, 1965

The U. S. Geological Survey is releasing in open files the following reports. Copies are available in the Geological Survey Libraries, 1033 GSA Bldg., Washington, D. C.; Bldg. 25, Federal Center, Denver, Colo.; 345 Middlefield Rd., Menlo Park, Calif.; and in other offices as listed:

1. Palynological investigations in the Upper Cretaceous and Tertiary of the Mississippi Embayment Region - II, by Robert H. Tschudy. 19p., 3 tables. U. S. Geological Survey, 496 Southland Drive, Lexington, Kentucky; and Kentucky State Geological Survey, 307 Mineral Industries Bldg., 120 Graham Avenue, Lexington, Kentucky.

2. Plant and miscellaneous microfossils from the Thermopolis and Mowry Shales, by Robert H. Tschudy and Sharon D. Veach. 6 p., 4 fossil plates. Copy from which reproduction can be made at private expense is available at the USGS Library, Denver, Colorado.

3. Field determination of nanogram quantities of mercury in soils and rocks, by Margaret Hinkle, Kam Wo Leong, and F. N. Ward. 14 p. including 2 tables.

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