Herne Bay

[TR 185 685]-[TR 224 693]

Introduction

Herne Bay is one of the most important Palaeogene sites in the London Basin and has been independently selected as a GCR site for its stratigraphical interest (Daley in Daley and Balson, 1999, p.34). It is also of considerable interest for palaeobotany, yielding the only significant flora from the Thanet Formation. It contains the only unequivocal Palaeocene flora known from Britain.

Plant fossils have been reported from several stratigraphical levels, the best documented being fruits and seeds from the A2 division of the London Clay Formation (see Herne Bay GCR site report in Chapter 8). However, the palaeobotany of the underlying Tertiary deposits has not been investigated to the same extent. Silicified pine cones (Prestwich, 1854; Gardner, 1883–1886a; Chandler, 1961a), fern stems (Carruthers, 1870b, 1872; Kidston and Gwynne-Vaughan, 1907; Chandler, 1961a, 1965) and angiosperm wood (Crawley, in press) have been described from the Thanet Formation. Ward (1978) lists other plants from the Thanet Formation and Upnor Formation, although none have yet been figured. Megaspores, both original and reworked, were described from the Thanet Formation by Collinson *et al.* (1985). Chandler (1961a, 1964) described fruits and seeds from the Oldhaven Beds.

Description

Stratigraphy

Daley (in Daley and Balson, 1999) gives an account of the geology at Herne Bay, including a review of the complexities of the lithostratigraphical nomenclature. Using the classification proposed by Ellison *et al.* (1994), the section here consists of 17.5 m of Thanet Formation, overlain by 5.6 m of Upnor Formation. This in turn is overlain unconformably by deposits of the Thames Group (Oldhaven Beds and London Clay Formation). The sequence is shown in (Figure 7.4), which also identifies the levels of the main plant beds.

Palaeobotany

Chandler (1961a) described from the Thanet Formation here two species of pinacean cone, *Pinus prestwichii* Gardner and *P macrocephalus* Gardner, and a silicified stem of the fern *Osmunda dowkeri* (Carruthers) Miller ((Figure 7.5); see also Carruthers 1870b, 1872; Kidston and Gwynne-Vaughan, 1907; Chandler, 1965; Collinson, in press a). From the *Astarte tenera* Bed in the middle Thanet Formation, Ward (1978) recorded *Canticocculus* sp. and *lodes multireticulata* Reid and Chandler), together with a fragment of the pine cone *Pinus macrocephalus* Gardner. Later he reported (in Daley and Balson, 1999) that these beds have yielded a rich seed flora, and Collinson (pers. obs.) has found distinctive but so far unidentified fruits and seeds from here. There is clearly considerable research potential here.

Ward (1978) also recorded *Iodes multireticulata* from the *Corbula regulbiensis* Bed near the top of the Thanet Formation, while Brett (1960) described wood from this level. The overlying Upnor Formation (lowermost Palaeocene–Eocene transition interval) has yielded *I. multireticulata*, *P macrocephalus* and seeds of *Vitis* sp..

Collinson *et al.* (1985) described numerous megaspores from the Thanet Formation at Herne Bay. Many were reworked from Mesozoic and Palaeozoic strata, and suggested that the sediments of the Thanet Formation were derived by longshore drift from the eastern coast of Britain. However, there were also original Tertiary megaspores here, including *Minerisporites glossoferus* (Dijkstra) Tschudy emend. Batten and Collinson (in press) and *Erlansonisporites* sp. (both of lycophyte origin) and *Azolla* cf. BeiträgeFlörschutz. Following a revision of the type material, Batten and Collinson (in press) have shown the presence of both *M. glossoferus* and *M mirabilis* (Miner) Potonié emend. Batten and Collinson in the Thanet Formation Flora (Figure 7.6).

Chandler (1961a, 1964) described a number of species from the Oldhaven Beds at Herne Bay, some new to science. This flora comes from the latest part of the Palaeocene–Eocene transitional interval. For those species marked below with '*', Herne Bay is the type locality.

Icacinaceae

Natsiatum eocenicum Chandler (see footnote to (Table 8.1))

Lauraceae

Laurocarpum sp. (Cinnamomum?)

L. spp.

Menispermaceae

*Cocculus cooperi (Chandler) Mai 1987

*C.? serratus (Chandler) Chandler

Tinospora excavata Reid and Chandler

Potamogetonaceae

*Limnocarpus cooperi Chandler (see Collinson, 1982a)

*L.? magnus Chandler

L. sp.

Symplocaceae

?Symplocos sp.

Rutaceae

Zanthoxylon sp.

Theaceae

*Cleyera? cooperi (Chandler) Chandler

C.? variable (Ludwig) Chandler

Vitaceae

Vitis spp.

In addition, there were generically unattributable examples of ?palm, epacris, spurge and buckthorn families.

Brett (1966) described a wood of the cashew nut family from a loose beach specimen judged, on the basis of sediment infillings of *Teredo* borings, to have come from the Woolwich Formation (Palaeocene–Eocene transition) at Herne Bay.

Interpretation

Herne Bay is of outstanding palaeobotanical interest for yielding plant fossils from the Palaeocene and early Eocene strata, providing insight into the stratigraphical changes in the plant fossil record through this interval. However, it is significant that each of the three main plant-bearing units (Thanet Formation, Oldhaven Beds and the A2 division of the London Clay Formation) yields significant floras and each is worthy of selection as a GCR site on its own merit. The last is dealt with in the next chapter.

Herne Bay is the only known site to yield plant macrofossils from the Thanet and Upnor formations, making them the oldest known Tertiary plant fossils in Britain. The best documented are the silicified osmundacean fern stem (Figure 7.5) and two pine cones (Carruthers 1870b, 1872; Kidston and Gwynne-Vaughan, 1907; Chandler, 1961a, 1965).

Herne Bay is the type locality for *Osmunda dowkeri*. Two silicified pieces of stem have been found here, one described by Carruthers (1870b, 1872), the other by Chandler (1961a). The detailed anatomy was very finely preserved, including starch grains within the cells, and there is no doubt as to its osmundacean affinities (Miller, 1967, 1971). The stem is important for confirming the presence in the Tertiary deposits of Europe of the subgenus *Plenasium*, which today is restricted to East and Southeast Asia (Collinson, in press a). Other fossil evidence of this subgenus in Europe comes from sterile and fertile fronds known as *Osmunda lignitum* (Giebel) Stur from the Eocene to Miocene deposits of Europe (Barthel, 1976; Collinson, in press a).

The pine cones are known from both silica petrifactions and carbonaceous fossils. Two species have been distinguished on size and shape of the cone and on the form of swellings on the cone scale; for one of these species (*P. prestwichii*) Herne Bay is the type locality. The anatomy of both species is well preserved and unequivocally shows that they belong to the genus of living pines, *Pinus*.

Ward (1978) stated that the *Astarte tenera* Bed in the Thanet Formation yields abundant fossilized seeds. They are of considerable potential significance, being the oldest known Tertiary seed-flora in Britain, but they have yet to be described in the literature. Collinson (pers. obs.) has also found determinable wood in the Upnor Formation here but it has yet to be described. The megaspores from this horizon described by Collinson *et al.* (1985) provide some of the best evidence of lycophytes from the Tertiary rocks of Britain, including isoetalean forms and *Selaginella*-like forms. They confirm the importance of heterosporous lycophytes and water ferns in the British Palaeocene record, as in the floras of the same age in continental Europe (Collinson and Hooker, 1987; Batten and Collinson, in press).

From the Oldhaven Beds flora at Herne Bay, Chandler (1961a) described three types of seed thought to belong to the pondweed family, and which she assigned to the genus *Limnocarpus* Reid. Collinson (1982a) reviewed this genus and argued that it should be restricted to those species known to have had paired fruits. The Herne Bay species have endocarps with straight ventral margins and so may have originally been paired, but they have never been found preserved in pairs. Collinson thus argued that they can only be regarded as tentatively assigned to *Limnocarpus*. They are nevertheless of interest as the only known examples of this aquatic family from the Thames Group, and the oldest known from Britain.

Three species of the form-genus *Myrtospermum* were recognized by Chandler (1961a). One was later provisionally transferred to the palms (Chandler, 1964), while the other two (*M. cooperi* and *M. variabile*) were placed in the tea family. Chandler (1964) suggested that the latter two species might belong to the living genus *Cleyera* although Collinson (1983b) stated that they could equally belong to *Eurya*.

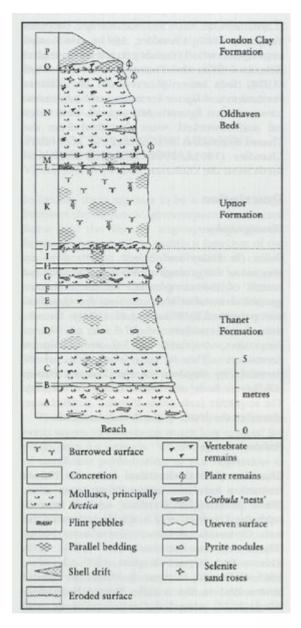
Chandler (1961a) assigned a seed of the moonseed family with a prominent serrated ornamentation to *Menispermicarpum serratum*. However, she subsequently discovered that the living *Cocculus* can also have such ornamentation and so provisionally transferred the Herne Bay species to this genus (Chandler, 1964). Mai (1987) also transferred Chandler's *Canticocculus cooperi* to the genus *Cocculus*.

Conclusions

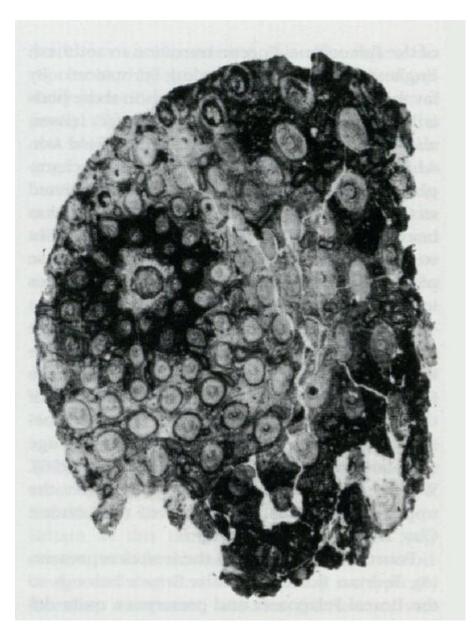
The Thanet Formation at Herne Bay yields the oldest known flora from Britain containing angiosperm fruits and seeds, and heterosporous plants, *c.* 55 Ma old. It has also yielded petrified fern stems and conifer cones, which show details of

their anatomy. Herne Bay is the only site to have yielded a fossil flora from the Oldhaven Beds, a distinctive lithology that is essentially coeval with the division A1 of the London Clay at Walton-on-the-Naze and Harwich, and with the Harefield Member at Harefield.

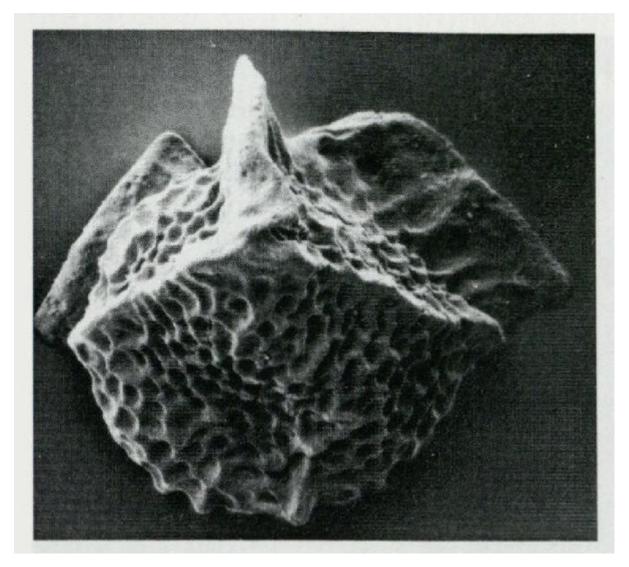
References



(Figure 7.4) Sequence exposed in the cliffs and foreshore at Herne Bay. (After Ward, 1978).



(Figure 7.5) Stem of the fern Osmunda dowkeri permineralized by silica, hence showing anatomical detail, × 1.8 (see Chandler, 1965) (specimen number BMNH V.29629c). The specimen was found at Herne Bay and judged to have been derived from the Thanet Formation. The specimen is the holotype of this species. (Photo: Natural History Museum, London.)



(Figure 7.6) Megaspore of Minerisporites mirabilis, an early member of the species tending towards M. glossoferus morphology, x 120 (see Batten and Collinson, in press). From the Thanet Formation, Herne Bay. (Photo: M.E. Collinson.)

mandens	Special Strengton proteined Charalter Charalters (Applications (Brist)	Stone Re	Brane	Proes.	Family control	Spring	Street, Sq.	han.	Hower.	- Specialist	Sales and Associated Spinish and	New Sec.	No.	æ
	Chromaton displacement throst	100		1	Tomation of	Marie Marie Caralle Ca	-		-	Minne	Marcha Compress No. and Charles (See Assess Comp			4
	and Charding Charles Characteristic adoptions in Red and	110				E digare liberally		_		-	Spragger automation and		-	#
	Oneder Subscriptor albertone College	-	-	-		F received that and Charles			-		I make Osmiller			#
	Special region (first and flowler)	-				(Controller)	-				T attached Street and Chapables	- A	-	#
	Character 1 produces plant and Characters	-	1	-		F parties had not Charife.				Permanent	Salary Street or Company of Street			Ŧ
			_			F salgesteine Deputie	_			Terropere	Deale, 1995. Sidentifica printing Book and Chamber			т
	colorage analytical and the set of the set o					take produces for an itemit.	-			Accordance		-	-	#
	Charles Perspecialist second district	1000				1 January State and Characterist	2.5		200	-	tempora qualificación foi la el Joseph Josep		100	1
	Charles Standard (first and Charles Standard, 1971 Standard Standard, 1971 Standard Standard Standard (first		110	AC		Machine (III) Machine, IIII Machine, IIII Machine, IIII Machine, IIII Machine, IIIII Machine, IIIII Machine, IIIII Machine, IIII Machine, IIIII Machine, IIII Machine, III Machine, III Machine, IIII Machine, III Ma	-			Supherine .	Application processes and processes from			т
	and Charalter	10.70				Stational partition for the Charles			_		6 September Charles			#
	and Chandles I subjects hill and Transfer Commission of Personal	_			Seese	Sales price Charles 1979.		-			A program Chandles A programming that and Chandles		-	#
	Description of the last and	_		-	Bergmann	Streets observed fraction and		-			A previous best put therefore	-		#
	Checks Sphages estimates that and			-	Name of the last	Studies (Studies Studies Studi	_	-			A select first and Charoline			#
						A segretary had not hander					E administration of the Control of		-	4
_	Security and an other part and	_	_			A totale Character					A adjointment to Late South			4
	A constitutions for and Chemistre	_	-	-		A condition Charles					A processor from and Chamber			4
	A common first and Charles	-	-			Proper people of surger first and		-	-		Application and Committee	-	-	4
	A compliance Opening	_	-			Charles (seems breefast) based (basels, 1876) (seemaning telephone) for an					A selection country. I make their process (see the country of the			#
	A representation and Character	_	100		Columbia Columbia	Street Elevitor STS					A absorption had per Standar		_	Ξ
	A character back and Character	-	-			Character and the deliver			-		A.C. providendors, Brisl, and Charolin.		_	4
	A president that and thanks										Character Ventoredia pariabile dissertant per			4
	A regions had any charles	_	-		of Female phofunion	Control of			2.0		Colombic contacts therefore con- colomic film (1986). Depute reputation for contacts first			
	Standard Sta	_	-	3.0		Stunding archives (See Stockey	377	200		Ferminen	Contract of the Contract of the			П
	Charde, 177			200	Consume .	Andrew represents for an		-	-		poli bando poli bando poli bando poli bando poli poli gerna bisi asi Chando	-		#
-	Observed a made from the Committee of Commit	100	-	1	Consens declaring	(Bedte)		-			and Chember Touristed Andrewson New and	-	-	4
			-			parties (NE)		-			Charles And registers great the state to a		-	4
-	Spread a Charle S'S		1			Bell and Cherolin'	100		-	1	and Charles			Ш
	Committee Code Str.	_		1		J. Beldholet No. of Deals'	- 1		-	-	And State Committee Commit		1	4
	CONTRACTOR NO. 1775			1		Checker					A.F. brigarine Standar		1	4
	Spelisted Surgery		-	1		A people had not been been	-				Andrews objects in the san by			d
	Straphone College, 160, 1686; Straphone Applicated at	-	-	1	Tonas and	R party first and Charles	-1-	-	-	Section 1	Marks county beauty		-	4
	Owells				400	Comment State		-		-	Appropriate angeletative Destina	1		
						per Sta, your services of control for the Control of Co			-		Comments of the Comments of th			á
	Taxas	Barrier Brit	T Berry	The same of	(New York)		Barry Brill	100	No.	Park I	Seeks	Base St.	Berry	
	American Company And and Company Compa	1000	1 .	- 5	Sanity Section 1988	Agenda Allegers described by and				Service cost	Species Colonida como ball sel (bardo Colonida bardonida ball sel Standa	-		4
enter.	Millerin Registered Charles		Hors			Charles Lampania Charles					Commoder Reportment Services			
	Sangaran Commission Work and					Amount of the control			- 1		Address of Checks After their part Checks After their part Checks After their part Checks After their part Checks			4
	Conde Conde Conde Conde South and Conde Conde South and Conde Conde South and Conde	3	-			Cartes Sander			- 8		A gliffering that and Charles			ź
	T.O. Appropriate first and describe		-			A postured from and Character			- 0.00		Compacted and Guester	_	_	Ŧ
-	State of the Park State of Charles					Company Charles	-				Classific 4. republisher Outside:			4
- space	Additionable Storie Builded	- 4	_	-		C made find and Standar		-	-200		American Control	-		Ξ
			-	-		() screens had not Depoles			-50		A Assessment Character			4
-	Adaption to an invalid and control of the control o		2.0			C. seriester Charolin					American State of Viscolar minimum State of Viscolar minimum State of Viscolar produces for an Viscolar produces for an Viscolar produce State of Viscolar department State of Viscolar produces State of Viscolar	100		#
-	Agin to go one and goes had		-	-		Contractors from and Chamber	-		-50		A security first and blacks		-	Ŧ
	A Supplement Charles		1000	-		2 seems from and Chamber	-		- 1		A profess that and Character			4
	A regard Danille	- 1				Administration and the Charles					A Appropriate front and Obserber			Ξ
	A properties first and Charles	-	-			Astrophysics and parket and			- 5		citeta, jargherini, best and Charafter		-	Ŧ
	A Marie Red and Charakter		-	-		Annual but and Sparks	-300	-00	1		Checke		100	4
	A officer has not break					And and Charles Street, and Charles					Opposition (Specific			4
	A seleptional Character									lower .	September 1 and 1 and 1 and 1 and 1			Т
	A their start first and Character					1 majorina filial and Standar September 19 majorina filial and			-	Gebruise	meter's reliates but ad			4
	Systematics responsible	-	-		Indicate	Depleted and section from and			7.55		and Charoline Charoline religiosists from and Charoline	_		÷
	I manufacture to the control of the		-			/ Septe (September)	- 1	_	4		Standard Standard Standard			4
	J. dem het en Deelle					Committee for and changing interest being and changing in the committee of					per Cherche Consultation of the per Cherche A great of the per Cherche A description for the Cherche A description of the per Cherche A d			4
	A Chapterson for an Charles		-	\rightarrow		Appropriate from and Character			-		Street, and process first and			
	Ingenerate retirement first part					A service Charles	- 30		-800	Majoritotes	Agents agent for an Checks			4
	Francisco Control of C	#		4		Charles INI	10.700	100			A Acost Charles		-5	3
-	Street, would be the street but	-		-		A eligible Character, 1978			- 000					
	And Charles	-	-	-	-	Anti-Invalle September Stanfor		-300			E digente l'issulte E des literate E dépte démokrati, but sui chaule			4
	and thereby			-		All presents to the part (Seeding			-		4 Adja Streethalt, No. and		-	4
	and blooks to dealer programs had not thought for any professions had					A remain leaf and Charles	_	_	-50		A beautiful Brownian Brown	-	-	÷
marrie .	And against the second second second			4		A Ultimor had and Chandle A paperson had and Chandle A suppress photocologic, had and			8.00		State of the last		-	4
1000	Cophage would be County					A supplies (School Section)	107.04		200		A Japanes Charles	_	-	4
	Control Contr		1			E amplement faces and Chandles Commences philosophe faces and	-1-				A region Charoline A manufacture had not the fire	- 1	-	ã
	S.M.			-		Checks		200	100		A Maria (Immediate), Not and Charles A Longiano (Immedia A Maria (Immedia Maria (Immedi		1	ń
	and Public Cities					Committee of Commi	-1	- 1	- 1		A adventure but on Teach.			ś
-	Administration of the Control of the	-		-		Company Standar	-			Sec.	Salaria referenci (Analis, (No.	-	-	4
	Security of the Control of the Contr			- 1		and Character of Street Street		7.44	200		Dodg			
	ALL AND ADDRESS OF THE PARTY OF				-		-		-	-	Little III		100	1
	- Species		- Dispose	Street,	Supplement.	E artesta (Charalles) Sta, 1879.	-	Brights	Stephen.	hards ask	Agentin Completion and completion Charles			ø
4	Comproposition Charles	Acres from			cont.	F. purella three and Characters No.	770	000	- X	100000	700		1000	μ
A.	Strangers Andre Sonie	-												
Ą	Print centres Cardin Palas Ingarra Angele Cardin F ales (Nachr F g. tot. (Nilsson, 1881)				Service Co.	getroops analis from pur Character			18.7		Agreeghmen het und Demily			
A	Compromise Charles Control Control F. Alex Charles C. g. A. (Wilson, 1981) Sales S.				Name of Street	gelevate analis front and Cheroline behavior and contains all the part Cheroline States in States and Edition			-15		Appropheres fact and Complex Security State and Complex Complex State and Complex			ŧ
S	Other contents (Auction Contents of Auction Contents of Auction Contents of Auction Contents of Auction (Auction Contents of Auction Contents of A	7	.,.		No. of Contract	princes angle hert and Cheroline Strends unformation filed and Cheroline the to the and Father (NOT)					Piles Control (Control (Contro			į
S	Ottos contento (Jacobs Jahos Spanico (Jacobs J. data (Jacobs 1991) J. data (Jacobs 1991) John v. J. Harrison 1991 John v. Joseph Land (Jacobs J. data hat and Jacobs J. data hat and Jacobs J. data hat and J. data J. data hat hat J. data hat J. data J. data hat J. data hat J. data J. data hat J. data hat J. data J. data hat J. data hat J. data hat J. data J. data hat J. data hat J. data hat J. data J. data hat J. data hat J. data hat J. data J. data hat J. data hat J. data hat J. data J. data hat J. data hat J. data hat J. data hat J. data J. data hat J. data hat J. data hat J. data hat J. data J. data hat J. data hat J. data hat J. data hat J. data J. data hat J. data J. data hat J.	ī		Ì	books .	princes and hard on Combination of Combination of Combination of Combination (Combination Combination (Combination Combination			1		1 carrie (homohad), half and			
S	Colombia (Sandia Sprain) Sprain (Sandia Sandia San	ī			None of the last o	Species J. American (American) State J. Property State and Colombine State J. Property State and Colombine State J. Property State and Colombine J. Property State J. Property Sta	1				1 carrie (homohad), half and			
	Ottomorrow Charles False Standard, America Charles False Standard	7			None and American	principal part of Confinence o	1				Commission of the collection o	17.9	1	
2	Cathodolius And and Dopolius Cathodolius Stat and Dopolius	1			Nones	gebreste van de Nord van Oberfor Strander Strander Strat van Strander Strander Strat van Strander Strander Strat Strander Strander Strat Strander Strander Strat Jacobses service Strat van Oberfor produkter versier Strat van Oberfor produkter versier Strat van Oberfor produkter versier Strat produkter versier Strat produkter versier Strat 1 of Superinter (Stratie 1 of Superinter (Stratie Superinter Stratie Superinter Stratie Stratie Superinter Stratie Superinter St	1				Company Secretary, Ball and Sealer of Secretary Secretary Secretary of parties (Secretary), Ball and Sealer Secretary Secretary), Ball and			
A	Cathodolius And and Dopolius Cathodolius Stat and Dopolius	1			Name of Street	gebreen might have and Combine Security Berlin Kay and Espira (Martin Berlin Kay and Espira (Martin Martin Array Shad and Combine Berlin (Martin Array) (Martin Combine Berlin (Martin Array) (Martin Berlin (Martin) Filmanism Martin (Martin (Martin Berlin (Martin Martin Martin (Martin Berlin (Martin Martin Martin Martin (Martin Berlin (Martin Martin Mart					Company Newschart, National Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company			
M	Cathodolius And and Dopolius Cathodolius Stat and Dopolius	1			None State S	of the second behavior		r			Company Newschart, National Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company			
A.	Catholica And and Depute Catholican Stat and Smaller	1			Notice Supposes Supposes Supposes Supposes	And the second s					Company Newschart, National Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company			
	Catholica And and Depute Catholican Stat and Smaller	1			Name	Participants for all lights (Chapters Streets) (Chapters Streets)					Company Secretary, Ball and Sealer of Secretary Secretary Secretary of parties (Secretary), Ball and Sealer Secretary Secretary), Ball and			
	Catholica And and Depute Catholican Stat and Smaller	1			Name of the same o	pund threaten that and therefore extraction that are threaten by tagent (baseline types of the content of the content of the content of the content of the content of the content of the content of the content of the content of the content of the content of the punish that (baseline punish that (baseline puni					Commission Statements (See See See See See See See See See Se			
	Catholica And and Depute Catholican Stat and Smaller	1				pund threaten that and therefore extraction that are threaten by tagent (baseline types of the content of the content of the content of the content of the content of the content of the content of the content of the content of the content of the content of the punish that (baseline punish that (baseline puni					American (M.) 442 description for any Control description for any Contro			
	Catholica And and Depute Catholican Stat and Smaller	1				pund threaten that and therefore extraction that are threaten by tagent (baseline types of the content of the content of the content of the content of the content of the content of the content of the content of the content of the content of the content of the punish that (baseline punish that (baseline puni					American (M.) 442 description for any Control description for any Contro			
	Catholica And and Depute Catholican Stat and Smaller	1				pund threaten that and therefore extraction that are threaten by tagent (baseline types of the content of the content of the content of the content of the content of the content of the content of the content of the content of the content of the content of the punish that (baseline punish that (baseline puni	1				Commission Statements (See See See See See See See See See Se			
	Appealment of the control of the con	1				periodication for an incident periodication for an incident periodication of the incident period					American (M.) 442 description for any Control description for any Contro			
	Appealment of the control of the con	1				periodication for an impair strategic for an impair (1) Suppose Strategic (1) Suppose Strategic (1) Suppose Strategic space of the strategic space of the strategic space of the strategic space of the strategic periodic foliate pagents for impair pagents for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose (1) Suppose (1				Comments that all the control of the	1		
	Appealment of the control of the con	1				periodication for an impair strategic for an impair (1) Suppose Strategic (1) Suppose Strategic (1) Suppose Strategic space of the strategic space of the strategic space of the strategic space of the strategic periodic foliate pagents for impair pagents for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose (1) Suppose (Comments that all the control of the	1		
	A production of the control of the c	1				periodication for an impair strategic for an impair (1) Suppose Strategic (1) Suppose Strategic (1) Suppose Strategic space of the strategic space of the strategic space of the strategic space of the strategic periodic foliate pagents for impair pagents for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose (1) Suppose (Includes September 1	Comments that all the control of the	1		
	A production of the control of the c	1				periodication for an impair strategic for an impair (1) Suppose Strategic (1) Suppose Strategic (1) Suppose Strategic space of the strategic space of the strategic space of the strategic space of the strategic periodic foliate pagents for impair pagents for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose (1) Suppose (Indiana Palmani Indiana Farinasi Indiana Farinasi	American (M.) 442 description for any Control description for any Contro	1		
	A production of the control of the c	1				periodication for an impair strategic for an impair (1) Suppose Strategic (1) Suppose Strategic (1) Suppose Strategic space of the strategic space of the strategic space of the strategic space of the strategic periodic foliate pagents for impair pagents for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose (1) Suppose (minima particular de la constanta de la consta	Comments that all the control of the	1		
	A production of the control of the c	1				periodication for an impair strategic for an impair (1) Suppose Strategic (1) Suppose Strategic (1) Suppose Strategic space of the strategic space of the strategic space of the strategic space of the strategic periodic foliate pagents for impair pagents for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose (1) Suppose (ministra, parlimante indicato	Comments that all the control of the	1		
	generation of the best of the control of the contro	1				periodication for an impair strategic for an impair (1) Suppose Strategic (1) Suppose Strategic (1) Suppose Strategic space of the strategic space of the strategic space of the strategic space of the strategic periodic foliate pagents for impair pagents for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose (1) Suppose (Residence (1976), The green (seepers than (1976))	Section of the control of the contro		(IRI), 4	
	generation of the best of the control of the contro	1		-		periodication for an impair strategic for an impair (1) Suppose Strategic (1) Suppose Strategic (1) Suppose Strategic space of the strategic space of the strategic space of the strategic space of the strategic periodic foliate pagents for impair pagents for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose (1) Suppose (Residence (1976), The green (seepers than (1976))	Section of the control of the contro		(IRI), 4	
	generation of the beautiful control of the control	1				periodication for an impair strategic for an impair (1) Suppose Strategic (1) Suppose Strategic (1) Suppose Strategic space of the strategic space of the strategic space of the strategic space of the strategic periodic foliate pagents for impair pagents for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose the strategic for impair (1) Suppose (1) Suppose (1			Residence (1976), The green (seepers than (1976))	Section of the control of the contro		(IRI), 4	
	granten and control benefit of the control be	1				productions that per lamping and control of the con	* * * * * * * * * * * * * * * * * * * *			Residence (1976), The green (seepers than (1976))	Section of the control of the contro		(IRI), 4	100
	American de la composition del la composition del la composition de la composition de la composition del la composition del la composition del la composition della compositio	1				productions that per lamping and control of the con	1			Residence (1976), The green (seepers than (1976))	Comments that all the control of the		(IRI), 4	
	American de la composition del la composition del la composition de la composition de la composition del la composition del la composition del la composition della compositio	1				productions that per lamping and control of the con	* * * * * * * * * * * * * * * * * * * *			Residence (1976), The green (seepers than (1976))	Section of the control of the contro		(IRI), 4	
	generation of the banks of the common of the	1				productions that per lamping and control of the con	* * * * * * * * * * * * * * * * * * * *			Residence (1976), The green (seepers than (1976))	Section of the control of the contro		(IRI), 4	
	generation of the banks of the common of the	1				production that or in liquid Assembly to the second of th				Residence (1976), The green (seepers than (1976))	Section of the control of the contro		(IRI), 4	
	generation for each break. generation of the control of the contr	1				production that or in liquid Assembly to the second of th	* * * * * * * * * * * * * * * * * * * *			Residence (1976), The green (seepers than (1976))	Section of the control of the contro		(IRI), 4	
And the second s	American de la composition del la composition del la composition de la composition de la composition del la composition del la composition del la composition della compositio	1				productions that per lamping and control of the con				Residence (1976), The green (seepers than (1976))	Section of the control of the contro		(IRI), 4	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

(Table 8.1) Angiosperm fruit, seed, wood and twig fossils from the Eocene London Clay GCR sites. Species and details from Reid and Chandler (1933) and Chandler (1961a), unless otherwise referenced. The family classification used here is summarized in Chapter 1 of the present volume.