Hamstead Ledge

[SZ 402 918]

Introduction

Hamstead Ledge has extensive exposures of plant fossil beds in the Bembridge Marls and Hamstead Members (Bouldnor Formation), and is transitional in age between the Eocene and Oligocene epochs. It is the best site for the palaeoecological study of Tertiary floras in Britain and is of particular importance for understanding the evolution of the aquatic plant communities in this part of the world. It is also important because of its role in improving our understanding of the vegetation in Britain immediately after the global climatic cooling that took place near the end of the Eocene Epoch.

The classic site for plant fossils from the Bembridge Marls is near Thorness Bay (discussed above), but the cliffs there suffer from poor and intermittent exposure. In a search for sites better suited to palaeoecological studies, Collinson (1978a, 1983a) discovered floras from more extensive cliff and foreshore exposures of Bembridge Marls (and the lower Hamstead Member) further east along the Isle of Wight coast, at Hamstead Ledge. Although not yielding as diverse a flora as Thorness Bay, the foreshore exposures (Figure 9.30) at Hamstead Ledge, which are only available at low tide, allow the plant beds to be more easily sampled and their sedimentological context to be more easily investigated. Some of these fossils were also figured by Collinson (1978a,b; 1980b) and Collinson *et al.* (1993a). The floras formed a critical part of the studies by Collinson (1992) of vegetational change near the terminal Eocene event. Van Bergen *et al.* (1994a,b, 1995, 2000) included fossils from here in their studies of the chemistry of water-plant seed coats.

Description

Stratigraphy

Daley (in Daley and Batson, 1999) has described the stratigraphy of this section and its significance. The exposed sequence consists of about 21 m of mainly clays and mudstones of the Bembridge Marl and lower Hamstead Members (Bouldnor Formation). They are interpreted as mainly lagoonal or floodplain–lake deposits (Daley, 1973). (Figure 9.31) is a summary stratigraphical log showing the plant bed levels.

Palaeobotany

The only detailed published account of the plant fossils from this site is by Collinson (1983a), who studied both macrofossils and palynology. Almost uniquely, this includes details of the exact bed from which the fossils came, and the numbers of each species found within each bed. Twenty beds were sampled by Collinson, nine of which yielded plant fossils: eight in the Bembridge Marls and one in the lowest part of the Hamstead Member. A further two beds higher in the Hamstead Member were also sampled (Collinson, 1983a, pp. 195–7). Sixteen species of vascular plant were reported: 14 angiosperms (listed in (Table 9.3)) and the floating fern *Azolla prisca* Reid and Chandler *emend*. Fowler and the leather fern *Acrostichum anglicum* Collinson ((Figure 9.32); see also Collinson, 1978b). They are nearly all aquatic plants, except for rare examples of *Sambucus*, the fruit and seeds of *Spirematospermum* (see also the account of the flora at the Hordle GCR site) and the leaves *Dicotylophyllum pinnatifidum*. Collinson (1978a) and Collinson *et al.* (1993a) described an undetermined Alismataceae fruit. In addition, there are example's of the stonewort *Harrisichara tuberculata* (Lyell) Grambast.

When the clays are split along bedding planes, leaves of *Acrostichum* and *Dicotylophyllum* are often seen. However, the most instructive fossils are the very small fruits and seeds obtained by disaggregating the clays. Despite their small size, they are extremely well preserved and yield very fine details under the Scanning Electron Microscope. It was, for instance, possible for Collinson to show that some of the seeds had germinated while others had not, an important observation for understanding the palaeoecology of this site.

The higher floras in the Hamstead Member show little difference from those lower down in the section, although *Acrostichum angicum* has not been recorded above the basal-most Hamstead Member (Bed 9 in Collinson, 1983a). This may reflect a threshold level in cooling of the climate (Collinson, in press a).

Interpretation

This site has yielded only a fraction of the plant species that have been found at Thorness Bay. It is nevertheless the type and only known locality for several species: *Juncus vectensis, Alismaticarpum alatum, Carpolithes hamsteadensis* and *C. collumus.* It is also the type locality for the fern *Acrostichum anglicum* Collinson, 1978b (Figure 9.32).

The main interest of these floras is the potential for palaeoecological study as demonstrated by Collinson (1983a). No other site has such an extensive exposure of plant-bearing deposits in the Eocene–Oligocene transition interval of Britain. It allows detailed sampling from different levels within the Bouldnor Formation, thus providing an insight into the subtle changes of vegetation taking place during this part of the Tertiary sub-Era. Most beds are dominated by the remains of the *Typha–Acrostichum* marshland flora that was common in Britain at this time. However, there are also occasional remains of trees such as elder (*Sambucus*), suggesting the existence of localized islands of raised ground within the marsh. The macrofloral evidence is complemented here by the palynology, fauna and sedimentology, which together make this an internationally important site for interpreting the terrestrial biotas and environment of north-western Europe during late Palaeogene times.

Conclusions

Hamstead Ledge is an extensive foreshore exposure of the Eocene–Oligocene transition Bembridge Marls and lower Hamstead Members, about 34 Ma old. These offer an unrivalled opportunity to study the marsh vegetation dominated by bulrush and leather ferns, which covered large parts of southern Britain at this time.

References



(Figure 9.30) Foreshore exposure (at low water spring tide) of the lower part of the Bembridge Marls at the eastern end of Hamstead Ledge. The Bembridge Limestone ledge is at the far right, out to sea. (Photo: M.E. Collinson.)

Daley (1973)	Facies			
Hamstead Member				
* Gastropod band				
	Floodplai	Floodplain lake		
F-Ironstone concretions				
∯ ∯+ Gastropod band				
Corbicala shell band	Lagoon	-		
φ				
g+ Gastropod band	in lake			
a weight the standard a				
	Lagoon	agoon		
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	ke			
	Lagoon	r 2		
Rephridar Lingunge		metres		
· · · · · · · · · · · · · · · · · · ·		0		
Olive to yellowish green of Ol	clays with gastro	opods pods		
Greenish blue clay with P	ohomesoda			
Greensh clay with Melan	owers and Mela	nopsis		
Polymesoda	and any most			
Blue-grey clay with Serpts	la			
Grey to greyish blue clay	with Polymesov	4		
Plant bed				

(Figure 9.31) Stratigraphical section through the Bembridge Marls Member, Bouldnor Formation at Hamstead Ledge, showing position of main plant beds. (After Collinson, 1983a.)

Family	Species	Thorness Bay (Insect Limestone)	Hamstead Ledge	Bouldner	Family	Species	Thorness Bay (Insect Limestone)	Hamstead Ledge	Bouldner
Acanthaceae	Acanthus rugatus Beid and Chandler	×	100000		Monsceae	Ficus sp.	×		
Actinidiaceae	tAcrimidia sp.	×	100.00		Najadaceae	Natar oligocenica Reid and Chandler	x		
Alismataceae	Alismaticarpum alatum Collinson		×	2012 10 10	Nymphaeaceae	Nymphava Identista Collinson*		×	
Аросупасеве	Apocynospermum striature Reid and	×	strain, seeds	and the second s		Sabrenia chandlerae Collinson	×	×	×
	Chundler ¹					Nelambiam buchti Ettingshausen		5. C.	×
	A rostnatum Reid and Chandler ¹	x	24	1	Papaveraceae	Popuver picture Reid and Chandler	. н	Par anna anna anna	
	A. elepana Reid and Chandler'	×			Potamogetonaceae	Potomogeton pygmanus Chandler (see	ж	the second second	1.000
	A. alubium Reid and Chandler	X.	10 10 10 10 10 10 10 10 10 10 10 10 10 1		and the second sec	Collinson, 1983a)	States of the second	Internet and the	
Aquifoliaceae	Allex sp.			. ×	And the second s	P. tenssicarpus Reid and Reid emenal.		×	×
Araceae	Epiprennites ornata (Reid and	×		A CONTRACTOR OF	Internet States of States and States	Collinson, 1983a			
	Chandler) Gregor and Bogner (see Mai				and the second state of the	P. spp.	×	×	
	and Walther, 1991)*					Limmocarpus forbrail (Heer) Chandler	×	×	×
Агесвселе	Palmophyllum sp.	×	1-			evond. Collinson, 1982a			-
	Sabal major (Unger) Heer'	×	1	×		L (7) sponosses Reid and Chandler (see	×		
Asclepiadaceae	Phyllanthera vectorats Reid and	х		20000		Collinson, 1982a)	-		
	Chandler				Ranunculaceae	Clematu reclenate Reid and Chardler	×	-	-
	Tylephone antique Reid and Chandler	×			District Condensation	Myosarws beterostylas (Reid and	×		
Setulaceae	Autorocurpinau sp.*	x			A DESCRIPTION OF THE OWNER OF	Chandler) Mai in Mal and Walther,	A	The second s	1000
Ngoniaceae	Catalpa ragoar Brid and Chandler	X			A DESCRIPTION OF A DESC	Ly/m			
	Incarvillea pristina Reid and Chandler	x			Contract of Contract of Contract	Administrative could only (were and			and the second second
Subdates Th	Radermachera pulchra Reid and	×				Chandler) Chandler			
	Chundler				Rhamraccac	Zizyphea paraatatacea (Unger) Reid			
Caprifoliaceae	Dipelta europana Reid and Chandler	×			Bernand	and Chandler			~
	Sambucus parenda Chandler entend.		×	Contraction (1)	Rosaccac	Autor sp.			*
	Collinson, 1983a				ADDREEDE	Charaffee			-
Cyperaceae	Caricoidea obscura Chardler	1	×		E	Consider Red and Red and			-
	C nittens (lieer) Chandler*		×		Spargareaceae	Spargariners Miserarcenary Reso and		and the second s	
	Gares gurnardif Beid and Chardler	×				- Countrier			~
	Maricoldra minima (Chandler)			×	Thickness	Nobel and the set of t	-		-
	Chandler				rypenaceae	Chandles (see Collinson, Mildus)	100 C		and the second sec
	C sp	×	×	×	And and a support of the support of	F an (Collinson tilling)		~	× 1
	Clashocarya Joevolata Reid and	×		STREET, STREET,	Zinethermone'	Youther on		-	
	Chardler	1			Museurar	Disconstruction and deal (Herer)	-	~	
	Genus indet. (Collinson, 1983a)		×		Property and	Chandler"		-	1.00
Droscraceae	Chardler	×		×	Incertae sedia	"Abelia" quadrialata Reid and	×		
Hydrocharitaceae	Ottelia britannica Reid and Chandler	×			and the second second second	10 Construction Build and Characteria	~		
	Stratiotes neglectus Chandler	×	×	1		A gamperation first and Chancier	0		
	S. arebateri (Brongmant) Chandler			×		A manual Reid and Chardler	×		-
	5. acuticostatus Chandler			×		Carponing Constant Courson			-
	5. sp. (leaf margin teeth - see		×			C. Building and Courses			
	Collinson, 1983a)					c. spp.	×		
Juglandaceae	Palaeocarya macroptera (Broegniart)	×		S'enconere		and Chandler	×	.*	and the second second
	Jahrschen, Friedrich and Takac (see			Contraction of the		Habellicula applica Reid and Chandler	× .		
	Summer Work 1987	~				Monocortelophyllium an	×	1	
	Zagrandrana sp.	0				Rhammostermann bilohatum Chandler	×	×	×
	Chandler			1.1.1.1.1.1.1.1	-	A CONTRACTOR OF A CONTRACTOR O			-
hunencene	American contrasts Collinson				1 See Reparent 4	ise Table 8.7. this volume.			
Laminore .	Makers have Reid and Chapter	×			1 Formerly Dainey	unam? ornata Reid and Chandler			
and the second second	Acceptance of a contract and the second				* This may put be	a true Sahul (Collinson, pers. obs.).			
and an and a second sec	Patheone Internation Internation	÷			⁴ Described by Reid and Chandler (1926) as Carpinus sp. and Abelia sp. 4. each from a single				
Lauraceae	Experiegene and realized enger				specimen. They	were transferred to Asterocarpinas by Man	chester and Dos	noghue (1995,	p. 721).
	Neoclana sp.	~			1 Includes C. cf. m	axima Chandler emend. Chandler sense C	ollinson, 1988a	(see Mai and W	alther.
					1978) Formerly Eugeth Reid and Chard Walther, 1978, 1 The generic point massed of Colling	analytic macropters (Beorgeniari) Reid and C fer (1526) referred to this as <i>Cimutmonume</i> 985). Siton of this species as a <i>Nymphanet</i> has been on and sure Bernern, work in preserven).	bandler. Janceolation (1 n confirmed by (Onger) Heer (so new, more con	e Mai and splete
					* Formerly Ranam	cubus beterostylus Reid and Chandler. Hordle GCR site for discussion of Spiremate feed as incretate and/t by Marchester and De-	opermum.		

(Table 9.3) Angiosperm floras from the Bouldnor Formation. Species descriptions or references to them may be found in Chandler (1963a) and Collinson (1980b, 1983a) unless otherwise referenced. The family classification used here is summarized in Chapter 1 of the present volume. (Note: records of Fagus and Quercus by Reid and Chandler (1926) are here considered indeterminate.)



(Figure 9.32) Sporangium of the fern Acrostichum anglicum, containing a residual trilete spore, × 280 (see Collinson, in press a). From the Hamstead Ledge GCR site. (Photo: M.E. Collinson.)