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THE DISTRIBUTION OF HALITE (ROCK-SALT) IN THE MERCIA MUDSTONE GROUP (MID TO LATE TRIASSIC) IN SOUTH-WEST ENGLAND

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The subdivision of the Mercia Mudstone Group in south-west England into four formations (the Sidmouth, Dunscombe and Branscombe mudstones and the Blue Anchor Formation) and nine members, each with a distinctive suite of geophysical-log signatures, has made it possible to identify lateral lithological variations within the group. Prominent among these are halite-rich beds that are almost wholly confined to the Dunscombe Mudstone Formation. Their distribution is related to major faults in the underlying Variscan basement that gave rise to differential subsidence during the deposition of the Mercia Mudstone Group. Up to 30 m of halite is present within the Dunscombe Mudstone Formation in the Central Somerset Basin between the Quantock Hills and Mendip Hills structural highs, and up to 130 m of halite is present in the Wessex Basin on the south side of the Cranborne–Fordingbridge structural high. Thick beds of halite are absent from the Dunscombe Mudstone Formation over these structural highs and over a subsidiary structure that runs from the Quantock Hills to the east Devon coast between Sidmouth and the Axe Valley. Thin beds of collapse breccia in the Dunscombe Mudstone Formation in coastal exposures in east Devon may be residues derived from thin beds of halite.

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INTRODUCTION

The Mercia Mudstone Group crops out extensively in East Devon and Somerset, and is known from boreholes to underlie much of southern England east of Devon (Hawkes, Fraser and Einchcomb, 1998) (Figure 1). The group is poorly exposed inland where much of the outcrop occupies low ground and is covered by Quaternary deposits. The upper part of the group (about 100 m of a total of over 400 m) is

exposed in cliffs on the Somerset coast between Blue Anchor [NGR ST 023 435] and St Audrie's Bay [NGR ST 120 437]. The whole of the group except for a few tens of metres in the upper part is exposed on the East Devon coast in almost continuous cliffs between Sidmouth [NGR ST 129 873] and Culverhole [NGR ST 274 893], near Axmouth. The coastal sections in Somerset were described by Whittaker and Green (1983) and those in Devon by Gallois (2002). Much of our knowledge of the outcrop stratigraphy of the group inland is based on surveys by Ussher (1876, 1906, 1908) and more recent research by Ruffell (1990, 1991).

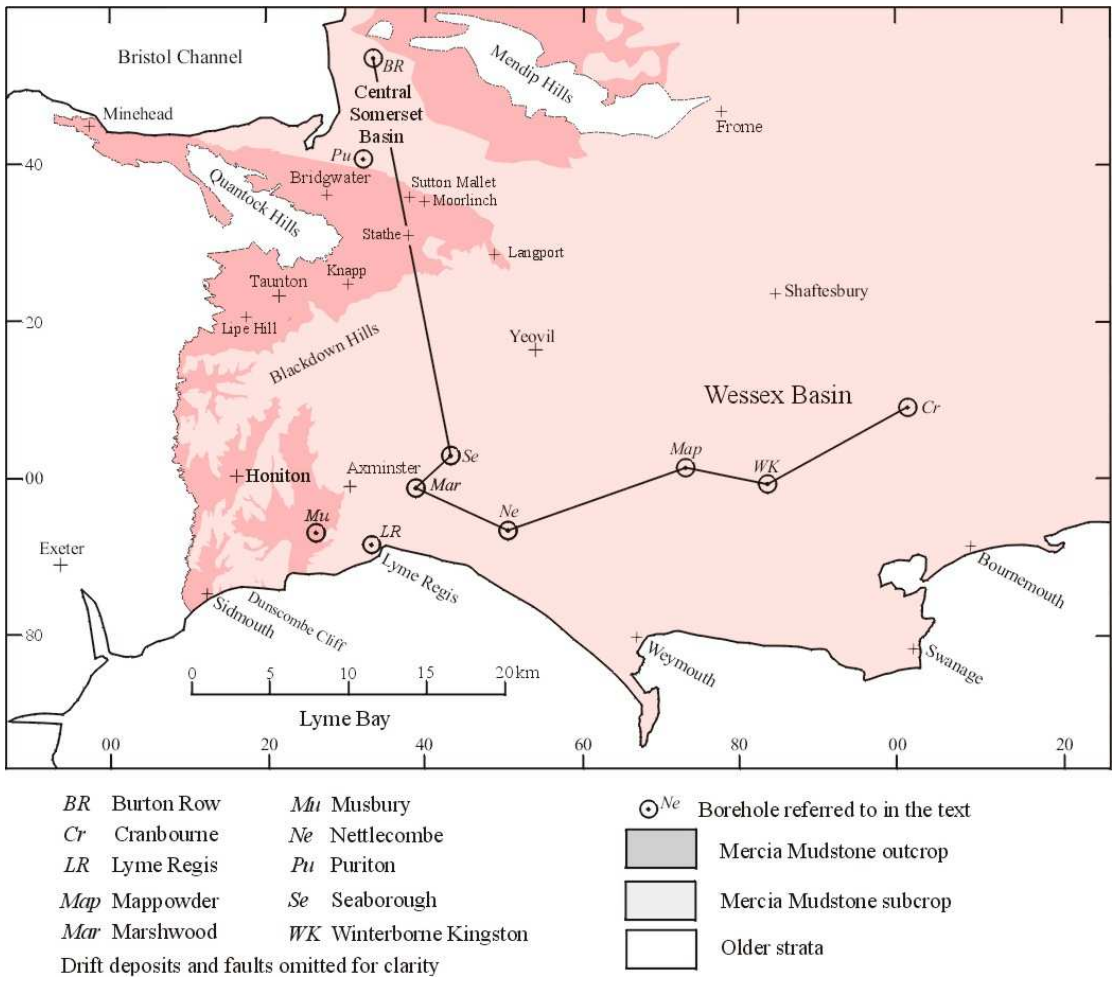

Figure 1. *Outcrop and subcrop of the Mercia Mudstone Group in south-west England, and the sites of boreholes referred to in the text. Outcrop linework after British Geological Survey (1956).*

The full succession of the Mercia Mudstone Group has been penetrated in a small number of deep boreholes drilled in the subcrop area in south-west England in the 1970s to 1990s, mostly for hydrocarbon exploration. Lott *et al.* (1982) divided the

group into six units (labelled A to F) based on the geophysical characters of the total-gamma-ray (GR) and borehole-compensated sonic (BHCS) logs. Thick beds of halite (characterised by very low gamma-ray counts and high sonic velocities) were recognised by Lott *et al.* (1982) to be locally present in the thickest unit (Unit C) in boreholes in the Wessex Basin. Harvey and Stewart (1998) showed that these extended offshore beneath a large part of Lyme Bay. The presence of thick beds of halite had already been proved in the Mercia Mudstone Group in the Central Somerset Basin in 1901 in a borehole at Puriton [NGR ST 3191 4086] (McMurtie, 1912) and in a research borehole at Burton Row [NGR ST 3356 5208], Brent Knoll (Whittaker and Green, 1983).

Comparison of the geophysical logs with the lithological succession exposed on the East Devon coast enabled the four formations and nine members recognised at outcrop to be correlated with the successions proved in selected inland boreholes (Gallois, 2002). Subsequent work has enabled the stratigraphical limits of the halite-rich zones to be closely defined and has shown them to be almost wholly confined to the Dunscombe Mudstone Formation (Figure 2). Halite (in the form of small concretions and veins) and the former presence of salt (as pseudomorphs) have been recorded at many stratigraphical levels in the Mercia Mudstone Group in south-west England. However, thick beds of halite are only known from the Dunscombe Mudstone Formation and, locally where the halites are thickest, from the Little Weston Mudstone Member in the highest part of the Sidmouth Mudstone (Figure 2).

No beds of halite were recorded in the Dunscombe Mudstone Formation or at any other stratigraphical level in the coastal sections, but thin beds of pinkish-brown stained breccia in the upper part of the formation may have been derived from the dissolution of thin beds of salt (Gallois, 2002). Beds of halite were not recorded in boreholes that penetrated the full thickness of the Dunscombe Mudstone Formation near to the coastal exposures at Lyme Regis [NGR ST 336 930] (Jukes-Browne, 1902) and Musbury [[NGR ST 2670 9510]. It could be argued that any halite in the coastal sections (where the formation came close to surface during the Cretaceous prior to being covered by the Upper Greensand) has been lost through dissolution. The same argument cannot, however, be applied to the Musbury or Lyme Regis boreholes. There, the top of the Dunscombe Mudstone Formation is currently 125 m and 292 m below ground level respectively, and local exposures of the basal Upper Greensand unconformity indicate that it was never less than 300 m below the surface

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during the Cretaceous. In Cheshire and elsewhere, thick beds of relatively pure halite are present at depths of less than 60 m below ground level (see below).

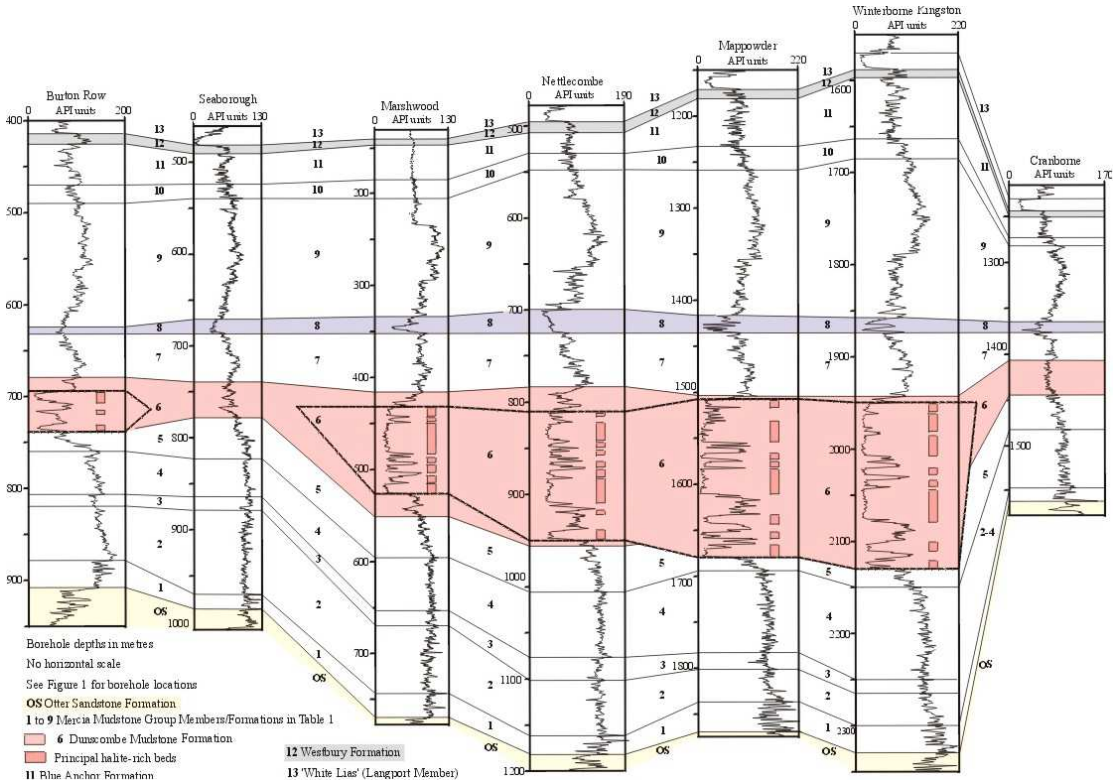

***Figure 2**. Correlation of the Mercia Mudstone Group successions in selected boreholes in the Somerset and Wessex basins based on total-gamma-ray logs. Boreholes depths in metres below ground level. No horizontal scale. See Figure 1 for borehole locations and line of section.*

HALITE PROVED IN THE MERCIA MUDSTONE GROUP IN BOREHOLES IN SW ENGLAND

The Puriton Borehole, drilled for coal exploration on the stratigraphically highest part of the Triassic outcrop in 1910 (McMurtie, 1912), proved 'rock salt' in the 'Keuper Marl' (now Mercia Mudstone Group). The salt was worked by brine pumping for domestic and industrial purposes between 1911 and 1922 (Whittaker, 1971, 1972). The principal halite beds occurred between 183 m and 219 m below ground level, at a similar stratigraphical level to halite beds proved in the Mercia Mudstone Group in 1971 in the Burton Row Borehole between 693.76 m and 742.40 m (Whittaker and Green, 1983). The latter borehole was continuously cored and

geophysically logged through the full thickness (484 m) of the Mercia Mudstone Group, which was divided into seven divisions based on bulk lithological characters (Whittaker and Green, 1983). Comparison of the geophysical logs with those from Mercia Mudstone Group successions proved in boreholes in the Wessex Basin suggest that halite-rich Division 3 of Whitaker and Green (1983) is the correlative of the Dunscombe Mudstone Formation and possibly the top part of the Little Weston Mudstone Member (Figure 2).

In the Wessex Basin, geophysical Unit C of Lott *et al.* (1982) includes parts of two formations, the Sidmouth Mudstone and the Branscombe Mudstone formations, and the whole of the Dunscombe Mudstone Formation (Gallois, 2002). The base of Unit C does not correlate with any obvious lithological change or marker bed in the coastal exposures. In contrast, the top of the unit correlates with the base of the Red Rock Gypsum Member, a highly distinctive lithology on the coast and a prominent marker bed that gives rise to a low-gamma-ray/high-resistivity/high-sonic-velocity signature in geophysical logs throughout southern England. The boreholes in Figure 2 are shown in the same order as those in Lott *et al.* (1982, fig. 2) to allow direct comparison.

The lithological successions inferred from the geophysical logs in boreholes in south-west England show the halite-rich beds to be laterally variable in thickness and mud content. In the Cheshire Basin, where the distribution and composition of the halite has been extensively explored, the purer seams contain <2% insoluble material (Poole and Whiteman, 1996). The less pure beds consist of mudstone/halite mixtures (‘haselgebirge’: mudstones with displacive halite) both in Cheshire (Rees and Wilson, 1998) and in the Burton Row Borehole (Whittaker and Green, 1983). The geophysical logs of the Wessex boreholes suggest that there is a similar range of mudstone-halite mixtures in that area.

Few boreholes in south-west England other than those shown in Figure 2 have either penetrated the full thickness of the Mercia Mudstone Group or that of the Dunscombe Mudstone Formation. The Lyme Regis Borehole drilled on the Blue Lias outcrop for coal exploration in 1901, proved a complete ‘Rhaetic’ succession resting on several hundred metres of ‘Keuper Marl’ (Jukes-Browne, 1902). Comparison of the succession recorded by Jukes-Browne (1902) with that exposed in the almost continuous coastal sections between Sidmouth and Culverhole, 7 km to 20 km west of the borehole (Gallois, 2002), suggests that the total thickness of the Mercia Mudstone

Group is about 450 m at both localities. The Dunscombe Mudstone Formation, described as "colour banded mudstones" by Jukes-Browne (1902) is present at 252 m to 283 m below the top of the Mercia Mudstone Group in the borehole, and at 248 m to 283 m below the same datum in the coastal sections (Gallois, 2002). The Musbury Borehole penetrated the full thickness of the Dunscombe Mudstone Formation (Gallois, 2002): neither it nor the Lyme Regis Borehole proved any beds of halite.

HALITE AT OUTCROP IN THE MERCIA MUDSTONE GROUP IN ENGLAND

The earliest exploitation in Britain of natural brine for salt extraction was in the Iron Age, notably around Nantwich and Northwich in Cheshire and Droitwich in Worcestershire (Sherlock, 1921). At each of these localities, the subcrop of thick beds of halite beneath 'wet rock head' (the salt surface where dissolution has occurred) is commonly marked by brine springs that emerge from collapsed mudstones from which the salt has been removed by solution (Poole and Whiteman, 1966). The springs were initially free flowing, but from Roman to medieval times most had to be pumped. In Cheshire, beds of relatively pure halite up to 30 m thick were mined from the 17th century onwards at depths of less than 60 m below ground surface (Salt Manufacturers' Association, 2002). At Droitwich, the top of the highest bed of halite (c. 6 m thick) was reported to be at about 13 m below Ordnance Datum (c. 60 m below ground level) (Mitchell *et al.,* 1961). In addition to the brine springs and extensive thicknesses of collapse breccias, the subcrops of halites at wet rock head in Cheshire are pockmarked by natural subsidence hollows up to 1500 m across and tens of metres deep (Rees and Wilson, 1998).

With the possible exception of the occurrence of saline water in two boreholes in Somerset, no surface indication of the possible outcrop of thick beds of halite has been recorded in south-west England despite a search during the present study of the whole of the Dunscombe Mudstone Formation outcrop. The formation can be traced northwards from the coastal exposures at Dunscombe Cliff [NGR ST 152 877] via exposures in stream beds between there and Honiton to the Blackdown Hills (Figure 1). It emerges from beneath an extensive unconformable cover of Cretaceous Upper Greensand on the north side of the Blackdown Hills to crop out south and east of Taunton. Part of the formation is exposed on a low but prominent escarpment capped by thin beds of fine-grained calcareous sandstone between Lipe Hill [NGR ST 186 215] and Rumwell [NGR ST 187 235] (Ruffell, 1991). The upper part of the

formation, a total of about 30 m of predominantly green and purple mudstones, is well exposed where sunken lanes cut through the steepest part of the escarpment. Ruffell and Warrington (1988) described the sedimentology and palaeontology of the more arenaceous beds, which they interpreted as channel fills.

The formation is also exposed in part on the face and crest of a similar escarpment that runs from Knapp [NGR ST 300 253] to Stathe [NGR ST 375 290], east of Taunton. There, two to three beds of calcareously cemented siltstone and fine-grained sandstone within the predominantly mudstone succession cap low features and were mapped out during the survey of the 1:50,000-scale Taunton Geological Sheet (Edmonds and Williams, 1985). The harder beds have been worked for building stone, and were named the North Curry Sandstone Member by Warrington *et al*. (1980). No field evidence has been recorded in the Taunton area to suggest that the Dunscombe Mudstone Formation contains, or formerly contained, thick beds of halite. A well dug in 1820 at Capland [NGR ST 303 187], c. 9 km south east of Taunton, proved saline water at a depth of c 9 m in the Lias and achieved temporary fame as a medicinal spa (Richardson, 1928). The site is within the Watchet-Cothelstone-Hatch fault system (Miliorizos and Ruffell, 1998), and may derive its salinity from the underlying Mercia Mudstone Group.

Northwards from Stathe the outcrop of the Dunscombe Mudstone Formation is broken by faults, and much of it is concealed by the Holocene deposits of the Somerset Levels. Green and purple mudstones on the face of a low escarpment at Othery [NGR ST 385 315] are probably within the formation. Northwards from there, between Moorlinch [NGR ST 398 368] and Sutton Mallet [NGR ST 374 364], sandstones in the Dunscombe Mudstone Formation give rise to a prominent escarpment which marks the northern margin of the levels. Exposures on this escarpment were described by Ruffell (1990, 1991) who was the first to recognise that the sandstones were the correlative of the North Curry Sandstone of the Taunton area. The full thickness of the formation has not been determined in the Moorlinch area where it is brought into contact the Blue Anchor Formation by an east-west trending fault that runs from Bridgwater to near Langport (Figure 1). No evidence of halite has been recorded south of this fault, but the former salt workings at Puriton lie only 3 km to the north of it. Whittaker (1972) suggested that a well at Bridgwater that proved saline water beneath drift deposits might be indicative of the crop of the halite beds proved in the Puriton Borehole. He also (1972) suggested that the locality known as

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Salt Moor [NGR ST 350 300] near Burrow Bridge might indicate the presence of Trias-derived brines, but this is unlikely to be correct. Salt Moor is a reclaimed Holocene salt marsh that overlies the lowest part of the Mercia Mudstone Group, an estimated 100 m stratigraphically below the Dunscombe Mudstone Formation.

CORRELATION OF THE SW ENGLAND HALITES WITH THOSE OF OTHER AREAS

The ages of the halites in the Mercia Mudstone Group in south-west England are poorly constrained. The standard stages of the Trias are based on ammonoid zones with supplementary definitions in non-marine successions based on tetrapods and other locally available faunal/floral assemblages (Ogg, 2002). The most diverse faunal assemblages recorded to date in the Mercia Mudstone Group in south-west England have come from sandy channel infills in the Dunscombe Mudstone Formation (Jeans, 1978). These include vertebrate and invertebrate remains, but the assemblages are rarely more age diagnostic than at the stage level. In Britain, palynomorphs (mostly miospores) are geographically widely distributed in a range of Triassic environments and have proved to be the most useful indicator of biostratigraphical age (Warrington *et al*., 1980). However, because of the oxidising environments in which most of the Mercia Mudstone Group 'red-beds' were deposited, specifically determinable palynomorphs are confined to a few thin (commonly < 50 mm thick) beds that are stratigraphically widely spaced. Most of those recorded to date have been preserved in grey mudstones in the Dunscombe Mudstone and Blue Anchor formations that were deposited in aquatic environments. In favourable circumstances in the Mercia Mudstone Group, palynomorph assemblages have been shown to be indicative of a particular stage and, in exceptional circumstances, of a substage. Despite the excellent exposures, the Mercia Mudstone Group of the Devon and Somerset coasts has yielded little age-diagnostic biostratigraphical data.

Warrington *et al*. (1980) correlated the Somerset Halite Formation with the Droitwich Halite Formation of the Midlands and the Wilkesley Halite Formation of the Cheshire Basin on general lithostratigraphical grounds, and allocated all three to the early Carnian on the basis of the limited biostratigraphical data available at that time. This correlation has been confirmed by later research. Correlations between the principal halite-bearing successions in western England, based on more recent work, are shown in Figure 3.

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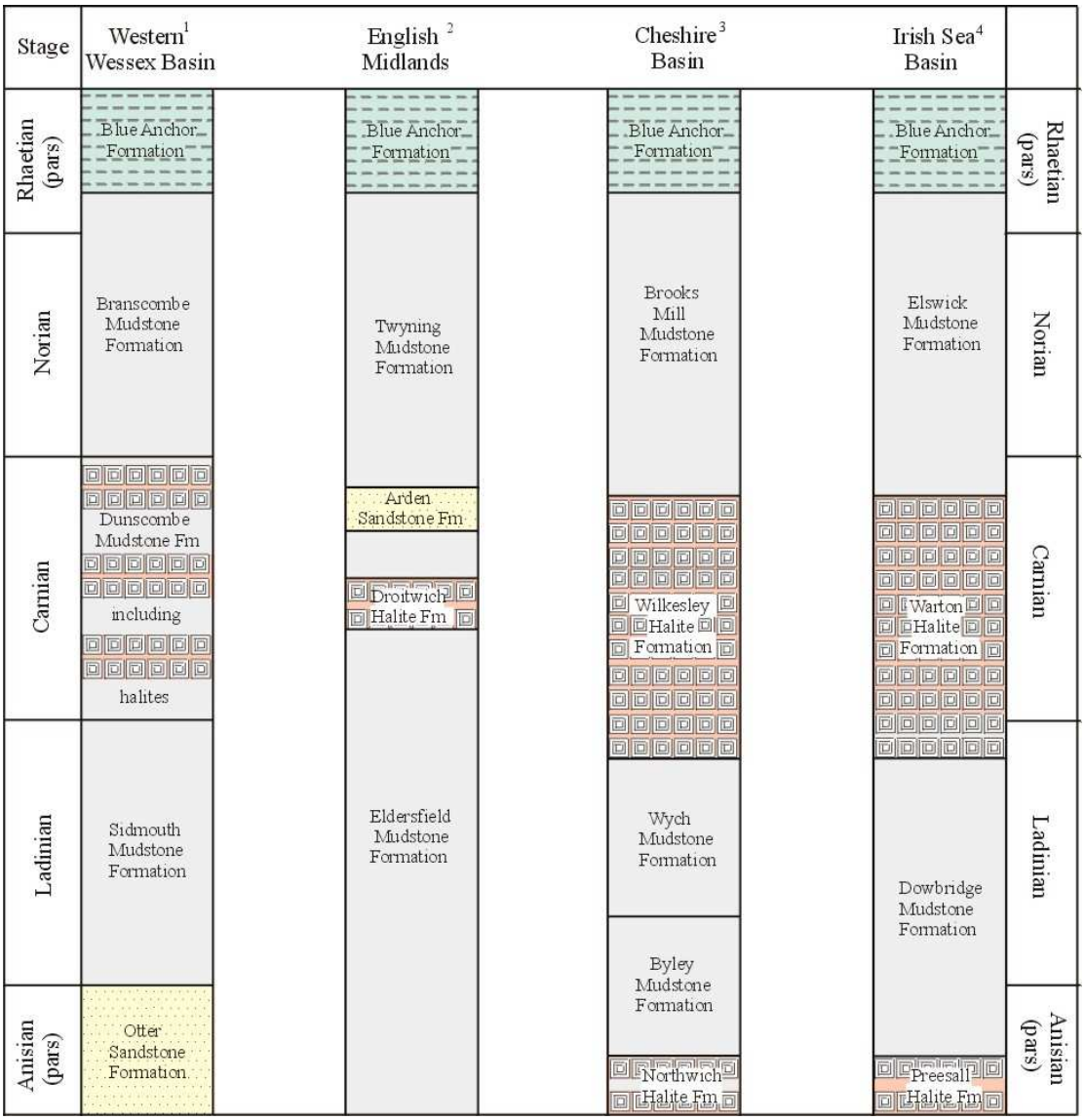

Figure 3. *Stratigraphical distribution of thick halites in the Mercia Mudstone Group in western Britain. 1..this account; 2..after Old et al., 1991 and Barclay et al., 1997; 3..after Rees and Wilson, 1998; 4..after Chadwick et al., 2001. Fm..Formation. No horizontal or vertical scale. In the Cheshire and Irish Sea basins the Mercia Mudstone Groups contains additional halites and mudstones (not shown here) that extend down to the base of the Anisian Stage.*

In Devon, the Otter Sandstone Formation, which conformably underlies the Mercia Mudstone Group (Figure 3), has yielded amphibians, fish and reptiles indicative of an Anisian age (Benton and Spencer, 1994). Fisher (1985) recorded palynomorph assemblages of "Ladinian-early Carnian" and "possible Norian" age from single samples from the Sidmouth Mudstone and Branscombe Mudstone formations

respectively, and rich floras from the lower and upper parts of the Dunscombe Mudstone Formation. These latter were indicative of early Carnian and late Carnian ages (Fisher, 1985), suggesting that the boundaries of the Carnian Stage might roughly equate with those of the Dunscombe Mudstone Formation.

The North Curry Sandstone Member at North Curry, where it consists of two or three lenticular sand bodies within the Dunscombe Mudstone Formation, has yielded bivalves of probable brackish-water affinity, the crustacean *Euestheria*, vertebrate remains including fish, amphibians and reptiles, and trace fossils (Ussher, 1906; Warrington and Williams, 1984). An associated palynomorph assemblage of spores, pollen and algae was indicative of a late Carnian (Julian or Tuvalian) age (Warrington and Williams, 1984). A similar fauna and flora has been recorded from the Arden Sandstone Formation at several localities in the south Midlands (Barclay *et al*., 1997), including Worcestershire where the Droitwich Halite Formation is locally present at 25 to 100 m below the Arden Sandstone (Old *et al*., 1991). Palynomorph assemblages from the Arden Sandstone there also indicate a late Carnian (Tuvalian) age (Old *et al*., 1991, Barclay *et al*., 1997). The similarity of the microfaunal and macrofaunal assemblages led Warrington and Williams (1984) to suggest that the North Curry Sandstone Member was the chronostratigraphical correlative of the Arden Sandstone Formation. The sedimentary evidence suggests that these thin (mostly <3 m thick), lenticular sand bodies were deposited in similar environments in shallow, brackish-water channels, but the palaeontological evidence is insufficiently precise to say that they are the same age.

In Cheshire, the Wilkesley Halite has yielded no age data, but the underlying Wych Mudstone Formation has yielded Ladinian palynomorphs and the lower part of the overlying Brooks Mill Mudstone Formation contains a Carnian assemblage (Rees and Wilson, 1998). In the East Irish Sea Basin, the Warton Halite Formation has been shown by seismic-reflection surveys to be in lateral continuity with the Wilkesley Halite: both are thought to have been deposited in a single brine pan that stretched from the Solway Firth to the Cheshire Basin (Chadwick *et al*., 2001). A miospore assemblage from the Elswick Mudstone Formation, which overlies the Warton Halite, is indicative of a Norian age (Chadwick *et al*., 2001).

Provisional magnetostratigraphic results (Hounslow *et al*., 2002) suggest that the age of the base of the Mercia Mudstone Group in east Devon is close to the Anisian-Ladinian boundary and that the Dunscombe Mudstone Formation is a condensed

deposit that spans all or most of the Carnian Stage. This interpretation is supported by the lithologies and sedimentology at the type section. There, the Dunscombe Mudstone Formation consists of 35 m of mudstones with laterally impersistent channel fills of calcareous fine-grained sandstone, and common erosion surfaces represented by thin (a few mm thick) pebble beds and hardgrounds. The Carnian Stage has an estimated radiometric duration of c 6.7 Ma (Gradstein *et al*., 1995) which would represent a speculative average rate of sedimentation of 1 m per 190,000 years for the Dunscombe Mudstone Formation at the type section. The comparable figures for the Sidmouth Mudstone and Branscombe Mudstone formations (assuming them to be roughly synchronous with the Ladinian and Norian stages respectively) exposed on the south Devon coast are 42,000 and 55,000 years per metre of sediment respectively.

DISTRIBUTION OF HALITE IN SOUTH-WEST ENGLAND

In an analysis of the deep structure of the Wessex Basin and adjacent areas based on seismic-reflection profiles and borehole data, Chadwick (1986) showed that the Permian to Cretaceous evolution of the region was controlled by the reactivation of faults in the Variscan basement. In particular, periods of crustal extension in the early Permian and early Triassic resulted in the development of fault-bounded basins and structural highs that had a marked effect on subsidence rates in the Permo-Triassic. Although the late Triassic (the time during which thick beds of halite were deposited) was a relatively quiescent period in the Wessex Basin, the distribution of the halite appears to be closely related to the reactivated Variscan faults identified by Chadwick (1986). In the Central Somerset Basin, thick beds of halite are restricted to the area between a fault belt that runs form Bridgwater to Langport and the Mendips structural high. In the Wessex Basin, thick halites are only present in areas of thick Mercia Mudstone Group deposition to the north and south of the Cranborne-Fordingbridge structural high (Figure 4).

Lott *et al*. (1982) suggested that there is a general westward thickening of the lower part of the Mercia Mudstone Group (their units A, B and C) in the Wessex Basin. Much of this variation is due to changes in the thickness of the halites and, therefore, of the Dunscombe Mudstone Formation. With the exception of the succession proved in the Cranborne No. 1 Borehole, which is condensed at all stratigraphical levels in comparison with those of the other boreholes shown in Figure 2, the thicknesses of

the members in the Sidmouth and Branscombe Mudstone formations vary little within the region (Table 1). Overall, the Sidmouth Mudstone Formation (mean thickness 209.3 m; standard deviation (SD) 15.7) and the Branscombe Mudstone Formation (mean 238.9 m; SD 37.7) show much less lateral variation in thickness than the Dunscombe Mudstone Formation (mean 120.3 m; SD 86.5). However, if the halite-rich beds are subtracted from the thickness of the Dunscombe Mudstone Formation, this too shows little lateral variation in sedimentary thickness (mean 42.1 m; SD 15.2) (Table 2).

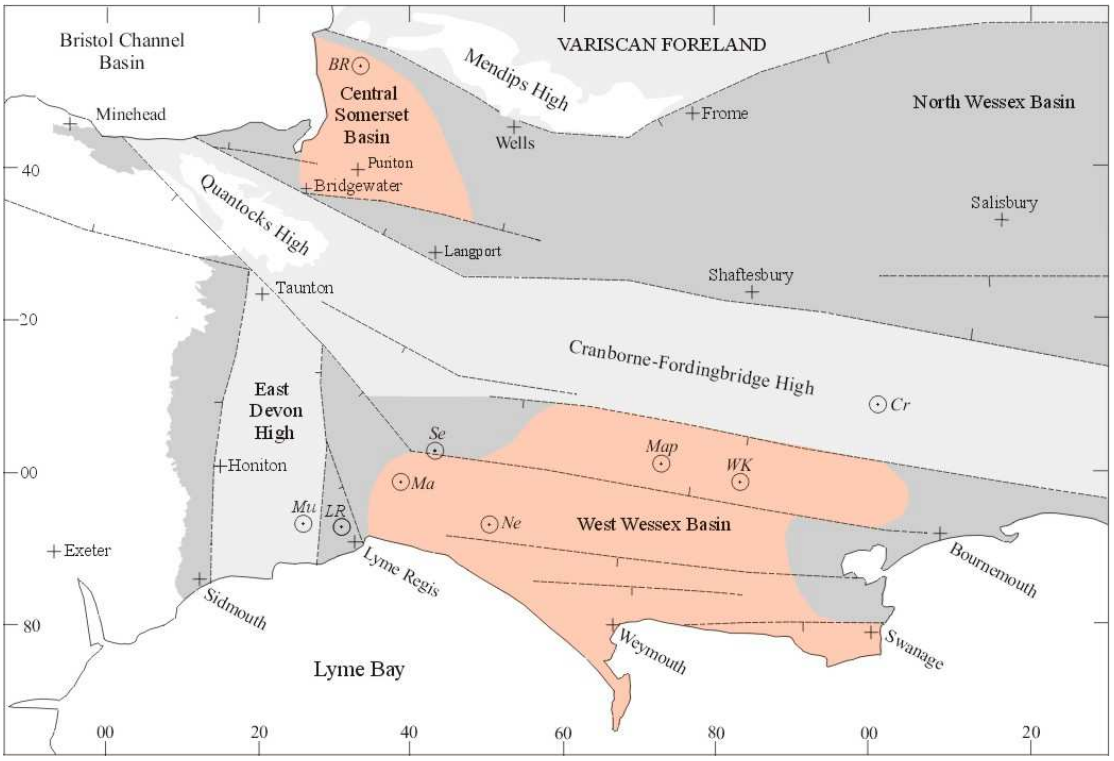

Figure 4. *Relationship of the distribution of thick halite deposits in the Mercia Mudstone Group in south-west England to major faults in the Variscan basement. Eastern area after Harvey and Stewart (1998).*

This suggests that the differential movements on the reactivated faults identified by Chadwick (1986) had little effect on the topography of the Mercia Mudstone Group depositional area. In those areas where halite accumulated, deposition and subsidence rates appear to have been delicately balanced. As with the halites proved in the Burton Row and Puriton boreholes, the thick (locally >1000 m) deposits in the Mercia Mudstone Group in the Irish Sea Basin, are characterised by displacive halite and haselgebirge, features that Jackson *et al*. (1995) interpreted as indicative of deposition in intertidal and supratidal coastal-marine sabkhas.

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Member/Formation	Coast	BR	Se	Mar	Ne	Map	WK	Cr
10. Haven Cliff Mst. Mbr.	10	20	18	18	17	27	25	11
8-9. Seaton Mst. Mbr.	125	140	122	145	156	175	203	92
7. Littlecombe Shoot Mst. Mbr.	75	50	52	65	78	70	72	32
6. Dunscombe Mst. Fm.	35	40	35	135	165	175	180	38
5. Little Weston Mst. Mbr.	40	40	42	45	48	25	30	37
4. Hook Ebb Mst. Mbr.	40	42	40	60	72	95	69	c 28
3. Salcombe Mouth Mbr.	11	12	16	16	23	21	19	c 10
2. Salcombe Hill Mst. Mbr.	59	65	90	72	59	36	48	c 25
1. Sid Mst. Mbr.	15	30	16	25	20	33	30	16

Table 1. *Variations in the thicknesses (in metres) of the Mercia Mudstone Group members and the Dunscombe Mudstone Formation proved in the boreholes shown in Figure 2. Borehole abbreviations as Figure 1. Coast=east Devon coastal sections. Member/Formation numbers as Figure 2.* ***8-9.*** *includes Red Rock Gypsum Member*
Mst. ..Mudstone Mbr. ..Member Fm. ..Formation

The Irish Sea halites are thought to have been deposited in a series of interlinked brine flats or salt pans that were separated by mudflats, the thickness of the halite accumulation in any one basin being governed by the fault-controlled rate of subsidence of that basin (Jackson *et al*., 1995). This interpretation appears, from the available stratigraphical and structural data, to be equally applicable to the Mercia Mudstone Group halites of south-west England where the Central Somerset and the Wessex basins probably had connections to saline waters via the Bristol Channel and English Channel basins respectively. There may also, from time to time, have been connections between the Somerset and Wessex basins as evidenced by the presence of brackish-water faunas at some stratigraphical levels in the Dunscombe Mudstone Formation.

Differential subsidence seems to have ceased in the Wessex Basin in Branscombe Mudstone Formation times when the Red Rock Gypsum Member, a laterally persistent marker bed 5 to 20 m thick (**8** in Figure 2), was deposited throughout the region.

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Formation	Coast	BR	Se	Mar	Ne	Map	WK	Cr
Branscombe Mst.	219	210	192	228	251	272	300	135
Dunscombe Mst.	35	40	35	135	165	175	257	33
Dunscombe Mst. less halite	35	15	35	55	45	60	50	33
Sidmouth Mst.	165	189	204	218	222	195	228	107

Table 2. *Comparison of the thicknesses (in metres) proved in the boreholes shown in Figure 2 of the Sidmouth Mudstone and Branscombe Mudstone formations with those of the Dunscombe Mudstone with and without halite.*

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