ISSN 0140-3729

WIGHT STUDIES

PROCEEDINGS OF THE ISLE OF WIGHT NATURAL HISTORY AND ARCHAEOLOGICAL SOCIETY




Volume 30 Issued 2016

PROCEEDINGS

OF THE

ISLE OF WIGHT
NATURAL HISTORY AND
ARCHAEOLOGICAL SOCIETY

VOLUME 30 2016

Proceedings of the Isle of Wight Natural History and Archaeological Society

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Notes for contributors are printed at the end of this volume.

Printed in Great Britain by Biltmore Printers Ltd., Newport, Isle of Wight

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EXCAVATIONS IN A BURGAGE PLOT WITHIN THE MEDIEVAL BOROUGH, SEAPORT AND LIBERTY OF NEWPORT, ISLE OF WIGHT

David Tomalin

Abstract

A field assessment examines the sites of two lost Tudor buildings within the northern boundary of the medieval borough and port of Newport. These properties were itemised in a royal survey of 1559 and in the borough's Terrar Book of 1563. They are also figured on John Speed's town plan, of 1611. House footings of Bembridge Limestone were examined as well as a cobbled floor composed of a variety of imported (ballast?) stones from Dorset, the West Country and possibly the Channel Islands or Armorica. An apparent lack of exotic medieval and Tudor pottery is attributed to the relatively low status of these particular buildings. The sizes of discarded oyster shells and cockleshells offer similar evidence.

Documentary records of the town's oyster fishery, its potting industry and its clay-pipe production are briefly discussed. Where archaeological evidence was sought for a putative late medieval town pale or palisade, this proved inconclusive. The study notes that during medieval and Tudor times, residential building, within the town, prudently avoided the margins of the Lukely Brook, where historic episodes of flash flooding have since been observed. After the mid-eighteenth century, this precaution was abandoned.

The nature and setting of burgage plot 294

This archaeological field evaluation examined some 1.3 hectares of urban land within a corner property sited within the northern boundary of the medieval town, at SZ 49739.8 89324.1. The east frontage of the site abutted the pavement of St James Street. Historically, this street had served the principal northern exit from the town, giving direct access from St James Square to Town Bridge, to Hunny Hill and hence to the old country highway via Parkhurst Forest to Cowes. The formal exit to the medieval borough lies at 'Town Gate' just 60m north of the junction with Crocker Street (fig. 1).

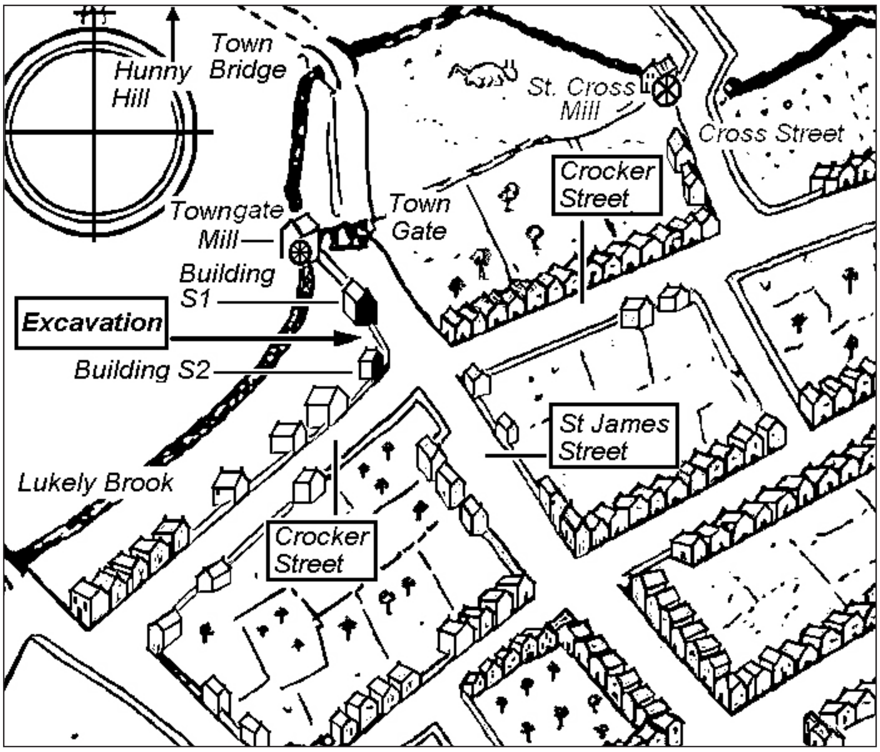

Fig.1: *A portion of John Speed's town map of 1611, annotated to show the position of principal features and streets cited in this text.*

At Town Gate or 'Forest Gate', we now find a stone bridge of three arches sufficiently robust as to resist periodic flushes of the river. A damaged date stone places the construction of this bridge in the 1840s. A watercolour, of early 19th century date, shows an earlier twin-arched stone bridge attended by a water-carrier and his horse-drawn cart (Jones & Jones 1987, 44).

Where the Lukely Brook approaches this spot, it passes within 30m of the Crocker Street plot. The flow of this stream once sustained a chain of mills along a 3km course leading downstream from the parish of Carisbrooke. At the Crocker Street site, the land surface stands some 4.7m above this watercourse. Here, on a minor bench, a thin and intermittent spread of Quaternary gravel, or 'gravelly head' has been identified (context 145; BGS 2013).

The southern frontage of the site opens directly on to the pavement of Crocker Street. This street shadows the course of the Lukely Brook where this watercourse forms the northern boundary of the medieval borough. Like Pyle Street, on the southern boundary of old Newport, it seems that Crocker Street might also shadow the course of a former defensive palisade or 'pale' around the medieval town. Arguably, this may have been contrived in the late 14th century, although no evidence can be seen on the map of the town drawn by John Speed in 1611. The case for such a putative defence rests solely upon the etymology of the name 'Pyle Street'. Cited as *Pilstrete* in the mid 14th century, the name also offers an alternative interpretation as being a road leading towards a town *pill* or landing place on the bank of the Medina River.

The development site in Crocker Street embraced a medieval burgage plot otherwise identified in the Newport *Terrar Book* of 1563. This property is situated in the northwest angle of the junction between Crocker Street and Lower St James Street. The modern curtilage includes an ancient plot or 'half place' numbered 294 in the *Royal Survey of Newport* in 1559 [IWCRO, 7 NEWP 5]. In the town's terrier of 1563 [IWCRO, Webster MS], the same is identified as property 31, a 'corner house' occupied by *Jamys Bowler* on the north side of Crocker Street.

The excavation method and strategy

Within a proposed development footprint of 620 sq. metres, three linked trenches were machine stripped to expose an area of 139 sq. metres for archaeological evaluation (fig. 2). Trench 1 was cut parallel to Crocker Street, where it revealed the stone footings of a Tudor tenement house otherwise reorganised on John Speed's town map of 1611 (figs. 1, 3 & 5, building S2).

Trench 2 was cut parallel to St James Street. Its southern end touched bedrock clay at the shallow depth of 0.55m. At its northern end, the trench cut through deep compacted brick rubble (context 120) where the bedrock clay descended steeply towards the Lukely Brook. Here, at a depth of 1.4m, the clay was overlain by the brick floor of a rear room or annex of the former *Trooper* tavern (figs. 1, 2, 3 & 8; Tudor building S1). In the former rear yard or garden of the inn, trench 3 was cut through a layer of urban 'dark earth'. This deposit was found to have been extensively disturbed and dug-over by past gardening activities.

Principal investigation was focussed on the stone ground course and cobble-floor of Tudor building S2. To its east, an annexed brick-built room with a rammed chalk floor was also examined. A full investigation of building S2 was impeded where its southern frontage was lost somewhere beneath the present public pavement of Crocker Street (figs. 3, 5 & plate 3).

The excavated evidence

General stratigraphy and features

Throughout the site, bedrock was observed to be an impermeable surface of Hamstead Clay, its colour being a light yellowish brown (context 200; figs. 4 & 5; plates 1–4). In one area, in trench 1, this surface was found to be thinly masked by a weak spread of similarly coloured gravel (context 145; fig. 4; plates 1 & 2). This was tentatively attributed to a localised Quaternary riverine deposit, perhaps marking an older and higher base-level of the Lukely Brook. Elsewhere, where it had apparently escaped later disturbance, an occasional horizon of thin light greyish brown clay was observed. This was considered to be an early and incomplete soil horizon, now heavily truncated (fig. 4, contexts 140 & 145).

The former position of Tudor building S1 was identified by no more than a brick-built rear annex, with fireplace (fig. 5, contexts 220–224). This structure was attributed to the use of these premises as a public alehouse, one time known as '*The Trooper*'. A deep overburden of brick rubble (context 120) and potential drainage problems concerning adjacent properties prevented further investigation of this building.

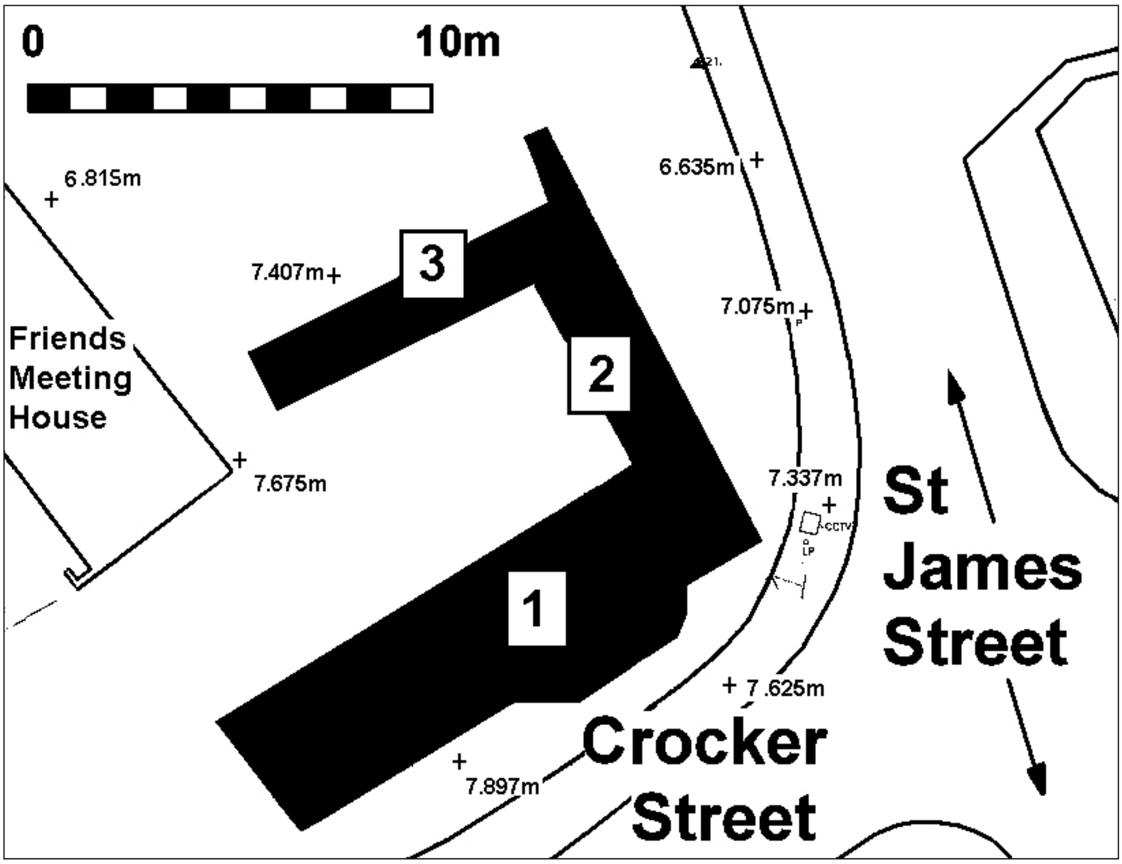

Fig. 2: *The location of the archaeological evaluation trenches at Crocker Street. This site approximates to plot 294 in the Newport Borough Terrar Book of 1563.*

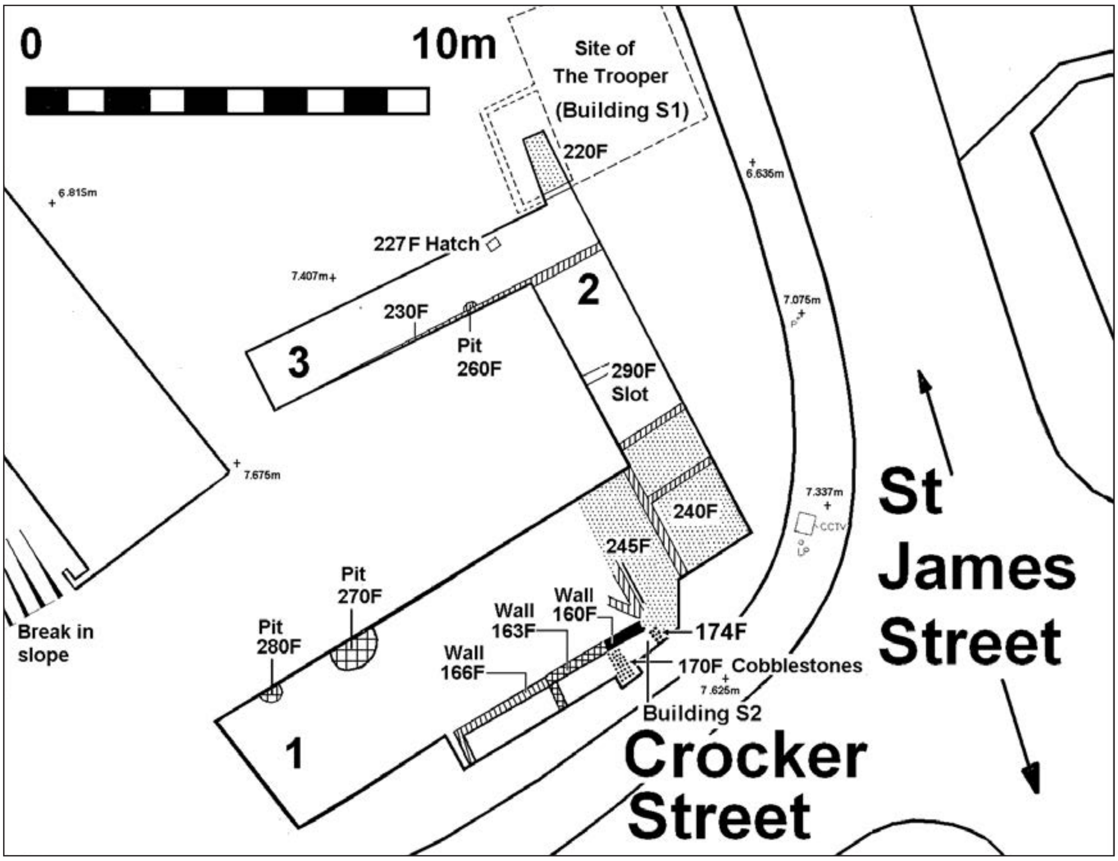

Fig. 3: *Plan showing evaluation trenches 1–3 and the location of principal features and contexts, including Tudor buildings S1 and S2, near the junction of Crocker Street and St James Street.*

Building S2 was represented by a stone foundation wall (160F; fig. 3 & plate 3). On the evidence offered by Bellarmine sherd SF 215 and John Speed's town plan, a construction date between *circa* 1550 and 1611 is proposed. Cartographic evidence suggests this building was still standing in 1759 yet destroyed before 1792.

Westwards, in Crocker Street, a short terrace of brick houses had been levelled to produce the present car park. One of these properties had once abutted building S2 (fig. 3). At the junction of these premises, the rear wall was composed of a stone ground course topped by brick construction (context 163F). This displayed a marked contrast with the surviving all-stone composition of building S2. Further west the entire wall changed to brick construction (context 166F; fig. 3).

Where two pits were investigated in section 1 (fig. 3) the smaller (280F) proved to be a chalk-filled cavity, containing a large shattered ceramic bowl, a post-medieval product of the Verwood potting industry. This vessel had been carefully set into the ground and may have been used as a capped cold-store before the pit was utilised to dissipate excess water (fig. 6, plan and section).

In a larger pit (context F270) a succession of four fills was identified (figs. 3 & 7). The first was a deliberate lining of clean crushed chalk (context 275). This was followed by an earthy fill containing fine flecks of chalk, perhaps marking a time when the pit was left open (context 274). It was evident that this pit was eventually filled to the top with a dark clay loam (273). The final episode saw the centre of the pit re-cut by a central scoop that removed much of the clay loam and replaced it with a sandy silt loam containing a fragment of transfer-printed blue and white tableware (no earlier than 1770). Clay pipe fragments from this final fill also included a fragment with an acorn spur that is unlikely to be earlier than mid 19th century (SF 83).

From the lower fill of the pit, in context 274, came four bowl fragments of early tobacco pipes with a date-range AD 1620–1670. These offer a mid seventeenth century date for the use of the chalk-lined pit, its rammed chalk floor and chalky sides perhaps serving as a small and well insulated cold storage chamber in much the same way as has been suggested for the buried Verwood vessel in pit 280F.

Interpreting the site by period

Pre-urban stratigraphy

Minor evidence of prehistoric activity was offered by a few struck flint flakes of Neolithic or Bronze Age character. Unfortunately, these were all recovered from the disturbed Victorian garden soil (context 130) where they could no longer offer helpful stratigraphic information. A notable artefact from this context was sherd SF 99. This was a fragment of a shoulder-rilled cooking pot of Saxo-Norman character. The horizontal rills on this vessel follow the style of Late Saxon or 'pre-Conquest' Portchester Ware (plate 6).

Evidence for activity on the site, before the establishment of the borough in *circa* AD 1180, was generally poor. In trench 1, weak traces of an older sedimentary deposit and a possible early land surface were perceived in contexts 145 and 146. Both proved to be archaeologically sterile. Moreover, the latter horizon lay too close to later ground disturbance to secure a reliable source of palynological information.

Medieval activity on burgage plot 294

Evidence of medieval activity was confined to a minor scatter of disturbed sherds re-distributed throughout the Victorian garden soil. These comprised fragments of Saxo-Norman cooking pots and jars with a date-range somewhere between the ninth and twelfth centuries. Although the typological dating of this ware is certainly subjective, the rim–neck profiles of these vessels seem to favour a relatively late date in the development of these wares. In this case there was no reason to suspect that any of these vessels pre-dated the 12th century.

No proven trace of medieval structures was found during this investigation. This seems to accord with evidence offered on John Speed's map, where few buildings are shown in this quarter of the town in AD 1611 (fig. 14). The proximity of the Lukely Brook and its propensity to flood may be an explanation, although the frontages on Crocker Street are safely above flood level, at a height of some 13.6m OD.

Where Speed's map shows a building on each of the two frontages of the corner plot in the early 17th century, there remains the possibility that both may have occupied the positions of earlier structures.

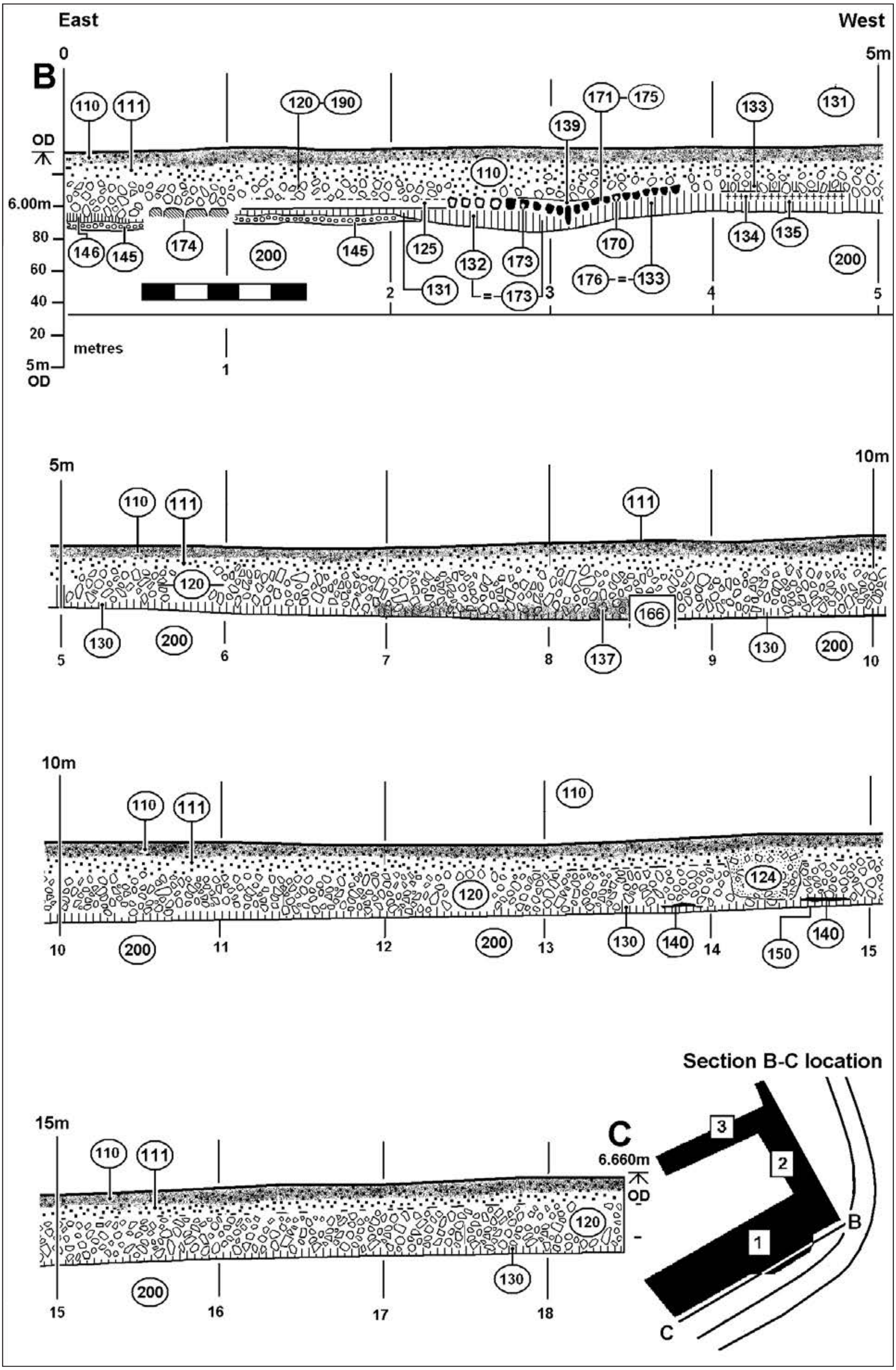

Fig. 4: *East-west cross section B-C on the south face of trench 1 at Crocker Street*.

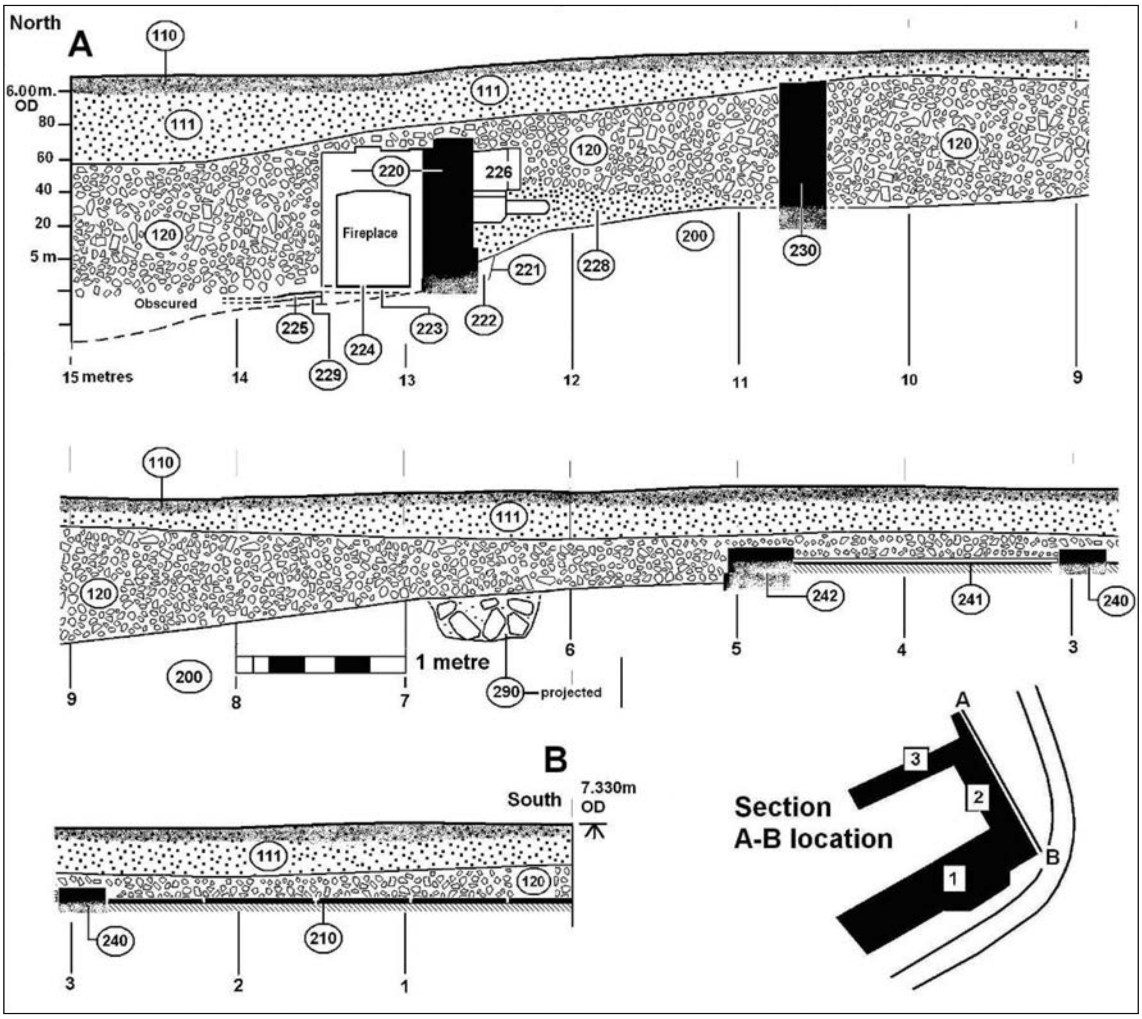

Fig. 5: *North-south section A-B along the east face of trench 2 of St James Street frontage showing the surviving brick walls of 19th century buildings and bedrock profile across the suspected line of the town pale (context 280) and the brick rear annex of The Trooper.*

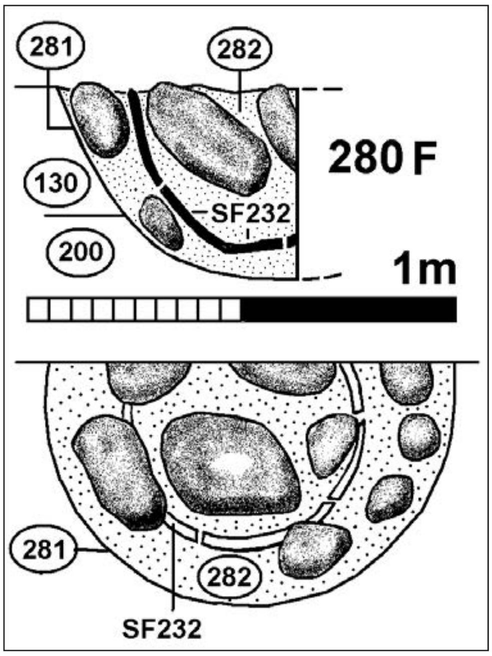

Fig.6: *Pit 280F in plan and quarter-section showing chalk blocks and Verwood bowl SF 232.*

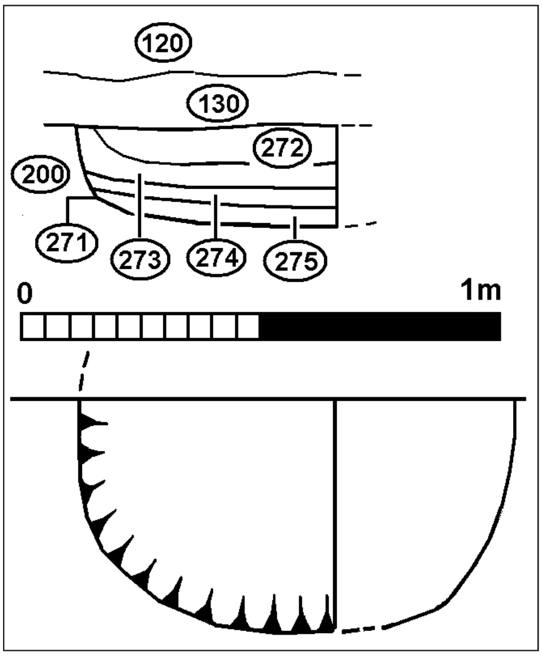

Fig. 7: *Pit 270 shown in quarter section with a succession of three fills and re-cut deposit 272.*

Tudor activity on burgage plot 294

John Speed's map shows a single building on the St James Street frontage of the corner plot. Where a brick-lined floor was revealed in this position, this was considered to be the rear parlour the former 'listed building' known as '*The Trooper'* (building S1). This ancient alehouse was demolished in 1973.

Where the second of Speed's buildings was examined, the results were more informative. Building S2 is sited on the Crocker Street frontage where it can be equated with '*a corner house occupied by Jamys Bowler* [a glover] *on the north side of Crocker Street and the west side of St James Street, between a half a place of John Harvey of Alvington being the garden of the Town Gate Mill in occupation of William Hancock on the north, and eight parcels of land containing four places of Thomas Siggens, in occupation of Jamys Bowler*'. This description is entered as property 294 in the *Royal Survey of the Borough & Liberty of Newport* 1559 (IWCRO, 7 NEWP 5).The owner, in 1559, was Richard Worsley. Four years later, in 1563, this property is simply recorded in the *Newport Terrar Book* as a '*half place, a corner house*' in the possession of the Priory of Carisbrooke (IWCRO, NBC/45/99, p. 22). The occupant is again given as *Jamys Bowler*. It appears that sometime after 1536, Richard Worsley had acquired property that was still traditionally associated with the extinguished estate of Carisbrooke Priory.

The excavation examined the stone footings of the north wall of building S2. Regrettably the full ground plan of this house could not be ascertained because its eastern portion had been destroyed by a large brick building (context 240F) later known as Self's corner shop or bakery (fig. 9 and plates 3 & 12).

At its west end, building S2 had been further damaged by the addition of another brick building, abutting the intervening cobbled floor (plate 13). Due to past street widening, the position of the original frontage of building S2 was also beyond reach. This now lies somewhere under the modern pavement of Crocker Street. According to the OS 252 map of 1862, the front to rear measurement of this building appears to have been approximately 4m (fig. 8).

The archaeological dating of the earliest phase of building S2 rests on a small number of Tudor sherds found beneath its cobbled floor. These include two fragments of a Bellarmine jug bearing a distinctive medallion attributable to the latter half of the 16th century. The stone floor or gully in this building contained a number of notable cobblestones that were foreign to the geology of the Isle of Wight. These generally indicate the use of West Country ballast stones while a further source in the Channel Islands and possibly Armorica are also suggested.

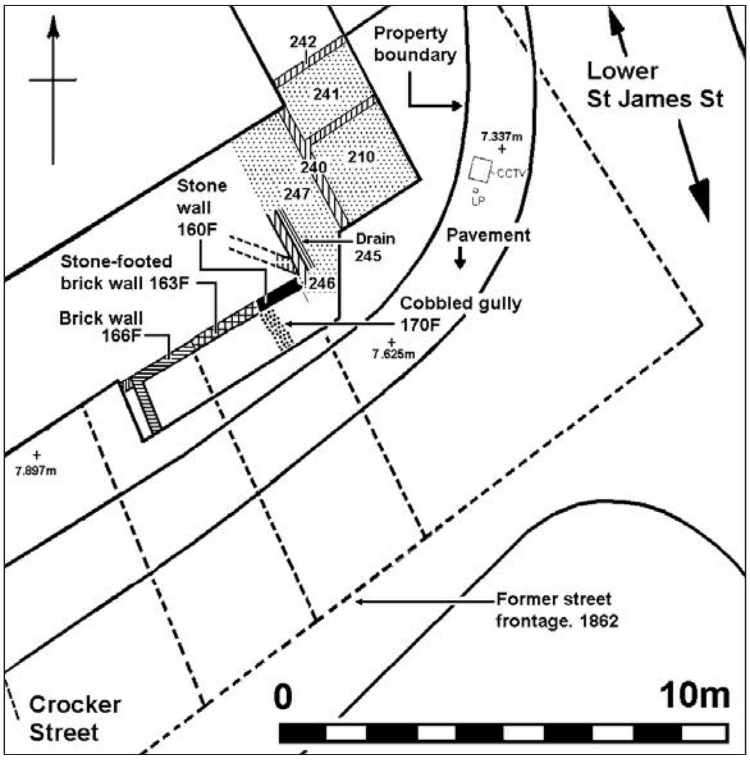

Fig. 8: *Plan showing excavated Tudor and later footings on the site of building S2 and the former street frontage based on the 1862 O. S. plan of Crocker Street.*

Later post-medieval activities on burgage plot 294

In post-Tudor times there is little trace human activity until or after the close of the 18th century. This accords with the cartographic evidence gathered in the desktop assessment of this site (in archive). Clay pipes recovered from the site of 'The Trooper' alehouse (building S1) include those of Stuart/Cromwellian date. These pre-date the first documentary record of a public house here in the year 1694. (In the 1559 and 1563 written surveys of the town, the evidence for a building on this site is somewhat ambiguous).

By 1769 there appears to be a continuous train of buildings or tenements running up the west side of St James Street. These can be traced from Towngate Mill to the junction with Crocker Street (Andrews 1769, Newport town plan, inset). These include the whole eastern frontage of burgage plots 293 and 294, including 'The Trooper' alehouse. A view provided by Charles Tomkins in 1794 reveals at least four individual episodes of construction in this line of buildings. These are betrayed by differing roof gables on houses that otherwise stand shoulder-to-shoulder (plate 5).

Despite the intensity of 18th century buildings, the archaeological record of human habitation was generally weak until the opening of the 19th century. There then followed a spate of ceramic discards, mostly strewn throughout soil context 130 and its sub-contexts. By 1862, it is evident from the Ordnance Survey map that there has been a substantial increase in the tenements (fig. 9). Photographic evidence gathered in a desk-top assessment of this site suggests that much of this building activity may have concerned brick casing rather than outright rebuilding because the roof gables appear to be much the same as those sketched by Tomkins in 1794 (plate 5). The footprints of these buildings, as shown on the 1862 Ordnance map, similarly suggest that individual ownerships had controlled these remodellings. This work included the replacement of Tudor building S2 in Crocker Street where a terrace of four dwellings has now abutted the corner property.

In the archaeological record we find that the northern wall of building S2 was now extended to the west. Here, stone was still employed in its lower courses but this was now mixed with brick (fig. 3 & plate 13). It is tempting to speculate that stone for these foundations was derived from the demolition or replacement of some of the superstructure of building S2. At the rear of the new buildings, brick was used to construct yard walls and piped soak-away drains. A long brick wall also defined the rear garden or yard of the Trooper alehouse (fig. 9).

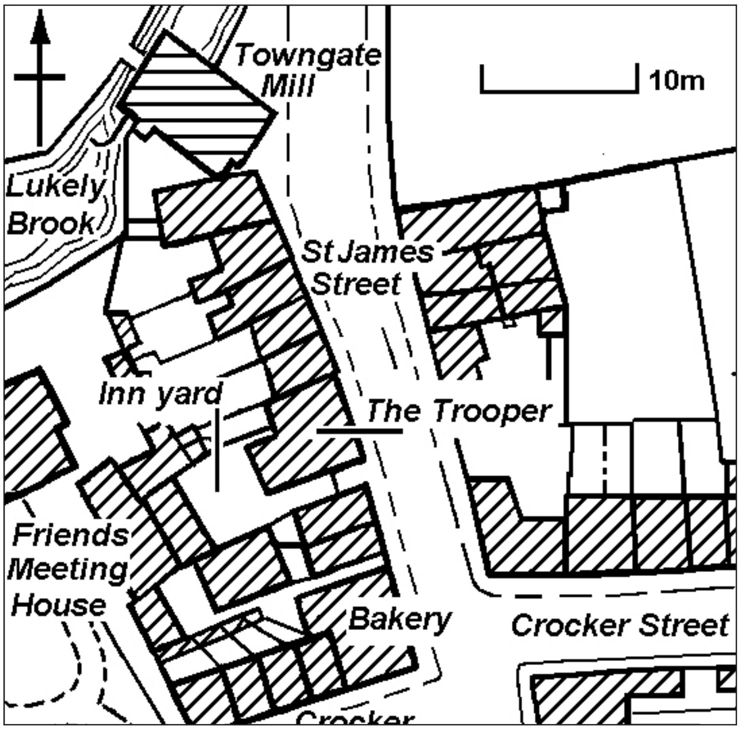

Fig. 9: *Victorian development of the Crocker Street corner site retains old narrow property boundaries. After the Ordnance Survey map of 1862.*

Twentieth century events at burgage plot 294

Archaeologically, 20th century events were represented by a massive destruction horizon of red brick rubble and mortar. This deposit also contained wooden furniture fragments and house-fittings (context 120). This is seemingly attributable to the demolition of most of the tenement buildings *circa* 1940.

In the corner-shop, formerly attributed to the bakery of Messrs. Tee and Self, some minor portions of burnt structural timbers were found in the demolition rubble. These drew speculation concerning a bakery fire or enemy action in WWII, but this could not be confirmed. A further spread of brick rubble covered the site of the Trooper alehouse (S1). This demolition has been dated to 1973 (Mitchell 1999, 134; fig. 15).

Spot samples and dating

Spot dates were specifically sought in eight key contexts. Where the survival of a residual prehistoric ground surface was perceived in context 140, a single fragment of prehistoric flint debitage was recovered (SF 85). Unfortunately, found in the same horizon was item SF 39. This was a post-medieval sherd demonstrating that this context had, nevertheless, been disturbed.

Where the stone ground course (160F) had been laid for Tudor building S2, the land surface beneath this wall (context 167) yielded no more than some minor fragments of oyster shell; but where the same deposit was traced under the chalk floor of this building, as context 135, the contents were more rewarding. Here 76 medieval sherds of similar fabric could be generally attributed to Norman or early post-Norman cooking pots of the sagging-base type (SF 100–121, 130–165).

Where the cobblestones were laid in a firm secure layer, the black soil beneath was denominated context 176. In this well-sealed context, two fragments of a sixteenth century German Bellarmine bottle (SF 215 & 216) offered a *terminus post quem* for the laying of this floor (fig. 10 & plate 11). This event is assumed to be coeval with the construction of building S2.

From the surface of the cobblestones, in context 171, came post-medieval white ware sherd SF 60. This bore a thin green/brown internal vitreous glaze. Judged by its position on the open cobbles, this item probably dates from the very late use of this floor. Both Holling (1971, 64) and Pearce (1992, 102) recognised the demise of the production of 'White ware' or 'Border Ware' in the early years of the 18th century. After this event we can only guess the survival time of an individual vessel in a building such as S2.

In feature 280F, helpful dating evidence was provided by a large Verwood bowl that is unlikely to pre-date the mid 17th century (figs. 3 & 6). This was an internally glazed wide-mouthed vessel sometime termed a 'milk pan' (Draper 2002, 137–8). It seems that all or most of this vessel had been crammed into a pit that was eventually covered with soak-away boulders (fig. 6). These were hard sub-rectangular blocks that may well have been robbed from a nearby building.

Artefacts

Despite Victorian and later ground disturbances, the excavation succeeded in recovering evidence attributable to high medieval occupation on or near this burgage plot. Traces of prehistoric and putative Saxo-Norman activity were also detected. The site also yielded an array of foreign building stones. These items could be attributed to past maritime activities conducted from the quay and port of the medieval borough.

Prehistoric flintwork

Where the garden soil had been impacted by brick rubble, three significant flint tools of Neolithic or Bronze Age character were recovered (contexts 120/130). Item SF 1 was a composite piercing tool with a unifacially worked point at the bulbar end of a prismatic flake. Flint SF 35 was a further composite tool, with bulbar end retouch and utilised side notch and spur. Flint SF 46 was a heavy core-rejuvenation flake showing occasional punch marks and some discernable edge battering. All three items accord well with the presence of a Bronze Age roundhouse found during modern development on plot 288 on Crocker Street. This was situated some 130m east of burgage plot 294 (Trott, in archive and forthcoming).

The ceramics

In total, 179 fragments of pre-Victorian pottery were recovered from the site. Fragments of Victorian and early 20th century pottery were also noted.

General quantification of the pottery

Medieval	*132*
Early post-medieval	*84 SBCP (full total is 139)*
Post 17th century and Victorian	*151*
Unclassified	*11*

Medieval pottery

Vessels of the Saxo-Norman cooking pot tradition

Medieval cooking pots were mostly represented by small fragments of body or base rather than rim. A few fragments offer undeniable evidence of the sagging base form that is commonly attributable to the Saxo-Norman period. At Southampton, however, the sagging base persists in vessels with sandy fabric well into the 15th century. This means that the Crocker Street sherds need not be particularly early.

At Crocker Street, the principal incidence of these sherds occurs in the black loamy garden soil (context 130) and its localised subdivisions, contexts 131, 133 and 135. This accounts for a total of 66 pieces. Of these sherds, 85% were found in context 135 under the chalk floor of building S2. A further sherd was found under the north wall of this structure (context 161). All can be seen to pre-date the construction of this building, perhaps by a considerable length of time.

Other contexts containing this ware include the residual land-surface (context 140) and the thin gravel deposit (context 145). Where occasional sherds were found in other contexts it seems, from their small size and eroded condition, that these were residual items. None of these fragments were suitable for drawn reconstruction.

From context 135 came a single sherd of a cooking pot bearing shoulder rills of Portchester style (Cunliffe 1975, 189–92). Potentially, this was the earliest medieval vessel on the site, its style being characteristic of Portchester pottery used during the 10th and 11th centuries. Unless the fabric can be exactly matched, there remains the possibility that this is a later example of shoulder rilling (plate 6).

Ware comparable to the products of the Knighton kiln

Seven sherds can be favourably compared with the late medieval products of the 15th century kiln at Knighton, in the parish of Newchurch (Fennelly 1969). These comprise a fragment of a dark grey bunghole pitcher (SF 28) and body sherds of indeterminate vessels (SF 68, 69 180, 181, 200, 212, & 218).

The Knighton kiln is an isolated archaeological discovery on an outcrop of the Gault Clay in the East Wight parish of Newchurch. Where other kilns have been sought but not found in its immediate vicinity it might be conjectured that this was an example of a scattered industry exploiting the linear scarp-foot outcrop of clay at a convenient place where a ready supply of wood fuel might also be obtained. It seems equally possible that similar products may have been produced at other opportune locations on the Island and these might include the Tertiary clays in the vicinity of Newport and the specific locality of Hunny Hill.

Local medieval imports

Few sherds provided evidence of local importation to the Island. Fragment SF 213 is a green glazed pitcher probably originating from Southampton where green glazed pitchers of local white fabric were commonly used within the city (Brown 2002, 13–14). Sherds SF 168 and 196 may be compared with Southampton sandy ware products of the High Medieval period. A general date of AD 1250–1350 is suspected (Brown 2002, 14).

Imported medieval pottery from Aquitaine

A single eroded sherd of French white ware offers the only evidence of Saintonge pottery on this site (SF 170).

Tudor/ Stuart ceramics

A handle and a lower body fragment of a Rhenish stoneware Bellarmine jug recovered from context 176 are attributable to those manufactured in Frechen around AD1550 (SF 214 & 215; fig. 10 & plate 11). The reconstruction in fig. 10 is based on a similar jug found in Pit B3 at the All Saints, Chichester, where the pottery assemblage was sealed before AD1600 (Down 1974, 95–6 fig. 7.14 no. 55) The body fragment bears the lower portion of a portrait medallion of a moustachioed figure. These particular Frechen products commonly display the same girth decoration and acanthus leaves but the medallion portraits appear to vary and may have embodied contemporary political connotations.

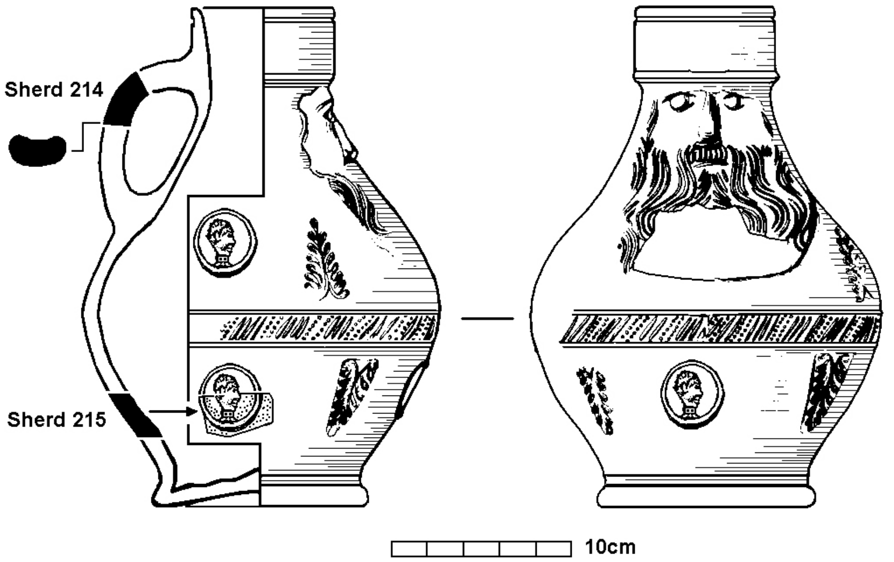

Fig. 10: *Crocker Street Bellarmine jug with portrait roundels reconstructed from a similar vessel from a context pre-dating AD 1600 at Chichester (after Down 1974, 96, fig. 7.14, no 55).*

Delft

Two fragments bearing a blue and white glaze on the soft white fabric of generic delft pottery were recovered from unstratified up-cast from JCB cut 3. These sherds were attributable to a plate or charger.

Later post-medieval and Victorian wares

Verwood

Products of the Verwood coarseware industry were represented by 21 fragments attributable to 'classic' jugs, breadbins, egg jars and open bowls. Some sherds were too small and featureless to give any indication of vessel form. Verwood sherds were recorded in contexts 120, 130, 135, 169 and 180. In pit 280 it seems that a whole or better part of a bread bin (counted as 1 piece) may have been buried intact before succumbing to pressure and fracturing during and after the construction of the car park (fig. 6). Most Verwood sherds were contained in contexts 130 and were recovered where this horizon was examined in the rear yard of the Trooper alehouse.

London-Hampshire red ware

Body sherds attributable to the London and Hampshire red ware ceramic industries were recovered from contexts 120 and 130. Most of these sherds carried a pale green internal glaze with characteristic manganese flecks. The paste was typically red. None of these 23 sherds permitted helpful reconstruction of vessel form.

Basalte ware

A single sherd was noted in context of 130.

Creamware

Four featureless fragments noted in generic context 130.

Stoneware flagons and inkbottles

Eight fragments were noted from contexts 120, 122, 130.

Transfer-printed tableware

Fifty-three fragments of transfer-printed plates and dishes were recovered from contexts 120, 130 and 280 (table 1). The majority were contained within context 120. Many of the fragments were of substantial size. This suggests that plates and dishes have been intact or semi-intact within the 19th century brick buildings at the time of demolition. The designs included popular copies of blue and white Chinoiserie scenes or 'willow pattern' while other blue and white fragments bore non-oriental geometric border decoration or floral designs. Five fragments bore designs printed in flow blue. Transfer printed designs in pale green and pale brown were also present, these later fragments perhaps dating from Edwardian times.

Table 1. Late post-medieval domestic wares of late 18th - early 20th century date noted at Crocker Street

Ware	*Context*	*Quantity*
Transfer- printed table ware	*130, 280*	*34*
Undifferentiated white porcelain	*130*	*22*
London-Hampshire red ware	*130*	*23*
Verwood	*130*	*21*
Basalte	*130*	*1*
Creamware	*130*	*5*
Stoneware flagons & ink bottles	*120, 130, 132, 214*	*8*
Unclassified	*130, 131, 172, 176*	*37*
	TOTAL	***151***

Clay tobacco pipes

A total of 85 fragments of clay tobacco pipes were recovered from the site (table 2). Fragments of bowls or feet amounted to just ten. Most bowls were relatively early in date, their forward-leaning profile according with Atkinson's types 1 and 2 (plate 7). With their size closer to Ayto's bowl forms 5 and 6, their date is best set in the period 1660–1680 (Atkinson 1975, 344–5 fig. 276: Ayto 1979/1994). Two of these excavated examples exhibited no more than a simple flat unstamped heel while four more bore the modest plain spur of this period. Later pipes at Crocker Street were represented by a leaf-seamed bowl, a ribbed bowl (plate 8) and an acorn bowl (plate 9). All of these are of 19th century style. Only the ribbed bowl produced a spur with a maker's stamp. This bore the letters *EB*.

At the time when pipe bowls of acorn, leaf-seamed and ribbed forms were in use in Crocker Street, an active pipe-making industry was flourishing just a few streets away in Orchard Street. A further Newport pipe works, that of *Thomas Edgar*, was operating in the Lower High Street in the early 20th century. The first of these local industries, carrying the stamp of *Robert Cole* of *Newport*, was producing pipes of all three of the above types. A broken section of stem marked on opposed sides reads ◌>> *R COL*[E < ◌<] and [>> NE]*WPORT* < ◌<. This is the only demonstrable evidence for the use of local pipes on this site (plate 10).

It seems that the discard of tobacco pipes at the Crocker Street site may have been associated with convivial gatherings in and around *The Trooper* alehouse. Although the number of recovered pipes is disappointingly small, it is certainly interesting to see that so few of the town's own Victorian clay pipes seem to been used here. This may reflect the popularity of a public house that may have drawn its principal clientele from visiting military personnel. Soldiers were billeted just 1.6km beyond Towngate, at the Albany Barracks.

Table 2. Quantification of clay tobacco pipe fragments found at Crocker Street

SF	*Context*	*Bowls*	*heel/spur*	*Stems*	*date*	*Qty*
48	*120*	*2*	-	*7*	*Late*	*9*
38	*120a*	-	-	*5*	–	*5*
21	*130*	-	*3*	*16*	*Late*	*19*
97	*130*	*1*	-	-	*Late*	*1*
98	*130*	*1*	-	-	–	*1*
5	*230*	*2*	-	*2*	*Late*	*3*
67	*246*	*1*	-	-	*Early*	*1*
–	*270*	-	-	*42*	*Indet.*	*42*
83	*270*	-	*1*	-	*Late*	*1*
93	*270*	*1*	-	-	–	*1*
94	*270*	*1*	-	-	*Early*	*1*
95	*270*	*1*	-	-	*Early*	*1*

Metal artefacts

With the exception of Late Victorian and 20th century furniture fittings and door fittings, metal items were surprisingly sparse from Crocker Street. These late items are excluded from this study.

Bone artefacts

A turned bone/ivory cap or thimble (SF 15) was recovered from context 130 where its date was uncertain. This context was the black loam that contained some medieval and post-medieval artefacts all of which had been rendered virtually unstratified by Victorian gardening activities.

Local and imported stone and its use

The wall components of building S2

The principal components of Tudor building S2 were rough-hewn blocks cut from the 'Binstead Stone' stratum of the Bembridge Limestone Formation. A maximum size of some 0.64 x 0.22m was noted for one rectangular component. This seemed particularly large and could be an example of re-use. The possibility of this being a threshold stone for a door could not be discounted but it was observed that no tell-tale signs of wear were evident on its upper surface.

Binstead limestone accounted for some 90% of the wall in this building (context 160). The additional components were occasional large flint nodules that frequently retained some residual chalky cortex. Only a single ground course, representing the northern external wall of this building, was observed. A particular stone-laying technique was discernible in this course, the larger stones all being laid on the outer face of the building where less pointing could, presumably, reduce the effects of weathering and water absorption (plate 12). It seems that this design may have suited a dwarf wall designed to support the sleeper beams for a half-timbered superstructure; other examples can be found in both Newport and Carisbrooke where stone foundations are now footings for a superstructure of later brickwork.

Where wall 160 had been extended westward, Bembridge Limestone was still employed in the ground course but the components here were now notably smaller (fig. 3). This stone-footed extension was capped with a brick wall constructed with soft lime mortar (context 163F). An occasional brick set amongst the footing stones confirmed that the ground course was contemporary with its superstructure and not a re-used footing.

Inside this brick annex, a chalk floor (fig. 4, context 134 & plate 13) had been laid on top of the generic black soil context 160. (Where this earth was partially sealed by the overlying chalk floor it was defined as context 135 (fig. 4, section). Throughout much of this interior, the chalk floor had been destroyed by 20th century robbing.

West of annex 163F the north wall of the building continued on the same alignment but its footings now changed entirely to brick (context 166F). This structure was presumed to be an additional portion of the range of brick dwelling erected in this part of the town during the late 18th century. No further investigation was made here (figs. 8 & 9).

The cobblestone floor and its components (Mike Cotterill & David Tomalin)

The cobblestone floor was attributed to building S2 but due to the absence of a west wall from this building, it seems that the cobbles may have served a covered space that was open-ended. It is also feasible that both building S2 and its annex were erected together as a unified entity, the robust stone foundations being best suited to a higher or heavier upper storey at the eastern end of the building. The excavated room and its cobbled floor seem best suited to an annex to building S2, a configuration intimated by the property boundaries mapped in 1862 (figs. 8 & 9).

It was evident that the cobbles once lined a space that was 1.4m wide. It was uncertain whether the cobbles extended as far as the street frontage or whether they served a wide entrance on the west face of the building. The projected frontage of this lost building lay outside the development area, where it was assumed to be buried beneath the re-aligned pavement of Crocker Street. From earlier street plans, an approximate distance of some 4m could be calculated from the frontage to the rear of the building.

The surface of the cobbled surface formed a shallow V profile, the central axis or gully being lined with narrow blocks set edgeways-up in the black soil of context 132 (generic context 130; plate 14). Along the east and western margins of this cobbled area, similar stones were set upright in the same manner. Although some local flint had been included in the laying of this surface, it was surprising to find that notable use had been made of cobblestones that were foreign to the Island. These stones signify shipments from several distant sources.

A careful examination of all stones *in situ* found no convincing evidence for particular selection by rock-type or colour when the cobblestones were laid. Nevertheless, most of the axial stones in the central gully were generally of similar size. These were a mixture of imported sandstones and limestones. Beach-worn sandstone components included Devonian Old Red Sandstone. Their source seems best attributable to a coastal outcrop on the shores of Plymouth Sound and its creeks.

While other West Country sources of this stone are also known, these occur inland and could not be shaped by beach processes.

A further choice of stone for the gully was hard Jurassic limestone. This could be generally equated with the Portland and Swanage beds of South Dorset. A calcareous sandstone from an unidentified 'off-Island' source was also present amongst some of the gully and edging blocks.

For the cobble infill, the predominant choice was further well-rounded tabular pieces of south Dorset limestone. These stones were generally flat with an irregular outline. Their shape approximates to about 0.5 on Powers scale of roundness. These pieces do not normally exceed 0.3m when measured at maximum horizontal intercepts. All are beach stones that have presumably apparently arrived in Newport as ship ballast.

About 8% of the infill cobbles were further ballast stones from distant sources (table 3). These were mostly igneous rocks, comprising basalts and granodiorites as well as a few small gneiss boulders from a metamorphic source. Some of the green granodiorites may be compared with other diorite ballast boulders that can be seen in walls near Newport Quay and elsewhere in the medieval town. They also appear in the revetment wall of the medieval churchyard on the north side of Carisbrooke High Street. Other green diorite boulders have been found in the foundations of Key Cottage in the medieval borough and port of Newtown. The construction of this Newtown cottage is attributed to Late Tudor or early Stuart times (Tomalin, forthcoming).

For the origin of these well-rounded igneous beach boulders, potential sources in the West Country, the Channel Islands and Brittany must be considered. Given that the Old Red Sandstone of the Plymouth area has already been identified, it seems possible that the granophyres lying close to the southern coast of Devon and Cornwall are a likely source. In Mounts Bay, Penzance, the Lands End granite extends to the shore where the beach is littered with granite and diorite boulders. On the Lizard, a highly localise outcrop of gabbro has generated a supply of derived beach boulders on the shores of Coverack and Falmouth Bays.

Currently, a source in the Channel Islands cannot be discounted. The kerbstones of 19th century Newport are said to have been shipped from Guernsey. One delivery of granite and green diorite cobblestones from the Channel Islands was lost when the 'Anglo-Saxon' sank at the foot of the Needles in 1871. Barry Price of Newport recalls that this grandfather regularly operated a sailing barge between Newport Quay and the Channel Islands. These islands are well endowed with granite, diorite and gneiss, all of which are rock types that we now find represented in this small cobbled surface in Crocker Street.

Table 3. A general quantification of rock types in the cobbled floor of building S2 in Crocker Street

Jurassic Limestone	*60%*
Flint	*20%*
Calcareous sandstone	*10%*
Bembridge Limestone	*2%*
Old Red Sandstone & other sst.	*2%*
Gneiss	*1%*
Igneous (quartz & basalt)	*2%*

Faunal and environmental evidence

The animal remains (Jennifer Wood)

A total of 48 (412g) fragments of animal bone were recovered by hand excavation. These were recovered from a small number of deposits dated from the Tudor period or later.

The remains were generally of a moderate overall condition, averaging at grade 3 on the Lyman criteria (1996). No evidence of pathology or burning was noted on any of the remains. A single fragment of carnivore gnawing was noted on a fragment of sheep/goat radius recovered from deposit (131). Butchery marks were noted on a total of three fragments of bone recovered from deposits (130) and (146). The butchery mark evidence was consistent with jointing and meat removal of the carcase.

The assemblage consisted predominantly of sheep/goat remains, with a single fragment positively identified as sheep. Small numbers of cattle, *equid* (Horse Family) and rabbit were also identified. The skeletal elements in this small assemblage are consistent with those commonly associated with butchery discard.

Marine mollusca (David Tomalin)

Marine shell was randomly distributed throughout context 130 where there was clear evidence of repeated churning of soil during past episodes of gardening. This could mean that the deposition of individual shells might be separated by several hundred years. A further examination of these shells nevertheless suggests that this is unlikely.

In context 131 the same soil was examined where it had been sealed and protected from later disturbance by the wall of Tudor building S2. In context 132 the same soil was, again, similarly sealed and protected by the cobblestone floor of this building. A further protected area occurred beneath the chalk floor of this building where the same soil was denominated context 135. All of these contexts represented the same soil yet the material from 130 must be considered unreliable due to the evidence for later disturbance. Where sealed context 135 was notably rich in oysters, it seem possible that the remaining oysters from the other cited contexts were all contemporary with this one episode. It is argued, below, that this date is likely to be medieval or Tudor.

In the garden soil of The Trooper alehouse, a single dump of periwinkles was found on the upper surface of context 138. This lay close to an *in-situ* flagstone covering an operational domestic drain. In this position it was most unlikely that this shell deposit could be much older than the demolition date of 1973. These shells were simply noted before being discarded.

Table 4. Summary table of marine mollusca from principal contexts at Crocker Street.

Context	*Ostrea edulis* Dorsal	Ventral	*Cerastoderma edule*	*Littorina littorea*	*Buccinum undatum*
130	28	9	72	-	-
131	14	8	-	-	-
132	47	43	79	-	-
133	18	8	-	-	-
135	3	5	-	4	-
138	-		-	86	-
140	-		-	8	-

The oysters. Ostrea edulis

The oysters from context 130 and its associated contexts total 183 shells of which 110 were dorsal and 73 were ventral. The higher number of dorsal components could be consistent with food preparation while the ventral shells may represent oysters that were directly consumed nearby. The quantities, however, are hardly conclusive.

In table 4 the incidence of oysters in 'protected' contexts 131, 132, 133 and 135 are interesting. Compared with garden soil context 130, these are small areas of archaeological excavation yet the yield of oyster shells remains high. It seems that the 'protected' portions of this dark earth may have retained its oysters from earlier times while the gardened portion of the same deposit may have lost much of its oyster shells to regular diggings and weathering. This gives ground to the suspicion that all the oysters from the gardened area are remnants of one principal episode of oyster consumption that took place before the erection of Tudor building S2. Given that the sherds of the sagging based cooking pots are distributed in precisely the same manner, it seems that the Crocker Street oysters are probably representative of medieval mollusc consumption here.

The size range of oysters ranged from 30mm to 86mm. The size frequency, set out in class categories in fig. 11, shows a predominance of oysters in the 40–44mm class. This is a relatively small size given that in two rare instances oysters double this size were recorded in the same deposit.

The cockles. Ceratastoderma edule

Like the oyster shells, cockleshells were recovered from contexts 130 and 132, the latter deposit offering an assurance of a Tudor or pre-Tudor date. The total quantity of measurable shells in these two contexts amounted to 117. When quantified by class categories, in fig. 12, a predominant size of 35–39mm is evident. This a regular size for mature examples of this species. Where 14 shells occur in the 20–44mm class, these are surprisingly large. A single shell measuring 46mm appears exceptional.

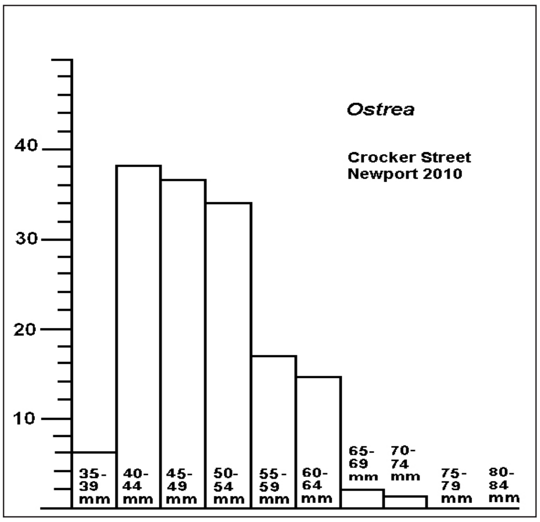

Fig. 11: *The frequency of oysters at Crocker Street expressed in size categories.*

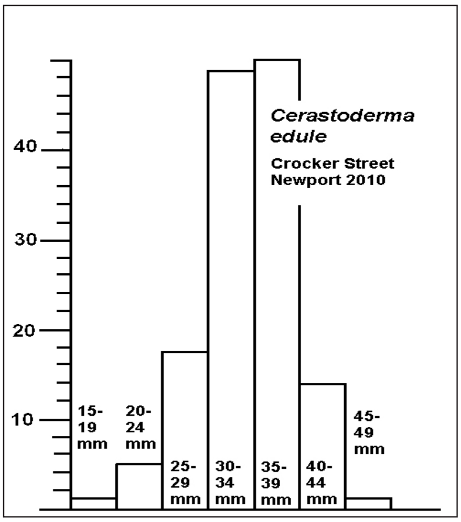

Fig. 12: *The frequency of cockles at Crocker Street expressed in size categories.*

The periwinkles. Littorina littorea

Apart from a relatively recent deposit of 20th century periwinkles abandoned in context 138, the incidence of these shells was minimal. A minor presence was noted in context 132 and 135 and a few more in context 140. With a total of just 14 shells from these earlier contexts no useful information can be gleaned.

Interpreting the marine mollusca

Where a size frequency centred on oysters of 35–39mm can be seen, it appears that supplies of larger oysters were very seldom obtained at Crocker Street. Just 2km upstream from the Newport's town quay, managed oyster beds of medieval and Tudor date were sited in an arm of the Medina estuary at Claybrookes (Hockey 1970, 50). Eldridge (1952, 21 & 26) explains that Newport's borough rights extended over the full length of the estuarine river and that this included a lucrative income from the licensing of the town's oyster fishery.

Where cockles have been sampled at Crocker Street, it seems that a healthy and mature population of these molluscs was readily available to the citizens of Newport. It also seems that the incidence of these shells accords with the oyster data in reflecting the modest social status of the S2 household, the cost of cockles being predictably less expensive than the oysters. It is also interesting to note that where consumption of large oysters was relatively common at Newtown, the incidence of cockleshells was low. This offers a further indication that the local cockles may have been a poor man's option.

The absence the whelk (*Buccinum undatum*) from all deposits at Crocker Street is something of a surprise given the close proximity of the town quay and the Medina estuary. This species was similarly absent from the marine mollusca sampled in excavations at Newport Roman villa. It would be interesting to know of the presence or absence of modern populations of whelks in the Medina estuary. Some seven kilometres to the west, in Tudor Newtown, both larger oysters and whelks were being consumed in some number. Here, again, there is perhaps a hint of better food in a more prosperous household.

Synthesis and conclusion

The phasing of the site

The archaeological features and horizons at this site can be assembled in eight broad phases. Of these, the two final phases distinguish no more than post-World War II destruction of the brick houses on this plot (phase 7) and the final levelling of the site to form a hard-standing for cars (phase 8).

In the Harris matrix in fig. 13, all of the principal horizons and features are displayed according to their attributed phase. (For clarity, minor associated or daughter contexts are omitted where their association is clearly identified in the text). The matrix reveals the key position held by the 'black garden soil' (context 130) and its generic sub-divisions 131, 132, 133 & 135. This seems to fulfil the role of an 'urban dark earth', its ancient garbage and faecal content having once represented much of the lifespan of the medieval and post-medieval town.

Unfortunately this deposit had never accrued to a substantial depth and, as a consequence, its entire profile had been repeatedly dug over. Total disturbance was made explicit by the incidence of 19th century ceramic fragments that could be traced from the top to the bottom of the soil profile.

A number of medieval sherds were recovered from this horizon but their occurrence in the top of the deposit was just as common as those at the bottom. In fig 13, the Harris matrix shows that the black garden soil (130) could, in some instances, be traced to the clay bedrock (context 200). Here, complete scrambling of archaeological evidence is explicit.

Phase 1

It is reasonable to assume that a complete prehistoric soil profile had once developed during phase 1. Due to severe truncation, this appears to have been removed by later reworking.

In trench 1 a few localised patches of ancient subsoil were observed but even here it was uncertain whether these had been previously disturbed. Nominally, the earliest was context 145. This was a stony variation of the clay bedrock, exhibiting a consistent scatter of well-rounded gravel flints. This was considered a Quaternary sedimentary deposit, probably associated with past fluvial activity along the course of the Lukely Brook. A photograph of Towngate Bridge in flood in 1960 shows how this modest stream can be transformed into a powerful river (plate 18).

Context 146 comprised some minor exposures of brown clay resting on the clay bedrock. It seems that these may have been the last remnants of an early Holocene soil profile, the remainder having been removed by later human activity. Context 150 was no more than an uncertain interface between the highly disturbed context 130 and its contact with the bedrock clay.

Phase 2

Where phase 2 should be represented by a long-accrued soil profile, it is now marked by no more than a heavily re-dug and archaeologically contaminated garden soil (context 130). Assuming that the contexts of phase 1 are no later than Earlier Holocene, the potential duration of phase 2 is enormous. Ostensibly, here is a time-span ranging from the Neolithic to the late 12th century AD.

A few dispersed artefacts in context 130 confirm human activity during this time. These include some struck and retouched flintwork of Neolithic or Bronze Age character and a single sherd of Roman Vectis ware.

Modest evidence of a similar character has been recovered elsewhere in the town. It is possible that the production of the flintwork here coincides with habitation of a Middle Bronze Age roundhouse situated some 130 metres away in the eastern leg of Crocker Street (Trott, pers. com.).

Phase 3

Phase 3 begins with the establishment of the borough, port and liberty of Newport around AD 1180–1184. Both Page (1912, 256) and Eldridge (1952, 9) have proposed a pre-borough settlement of some kind but have offered no documentary or archaeological evidence. Edwards (1999) acknowledges this possibility, remarking that the area seems suited to a small maritime community functioning in support of a centralised Saxon settlement and market some 3.5km to the southwest, at Bowcombe.

It is worth noting that the Crocker Street site has yielded a number of cooking potsherds of Saxo-Norman style. Unfortunately while the time trajectory of these pots can be generally traced between the 9th and 12th centuries (Coleman-Smith 1975, 53–69), there is little reason to suspect that any of the recovered sherds are any earlier than the 12th century.

An exception is the single sherd of a rilled pot of Portchester style (fig. P6, SF 99). Cunliffe (1975, 189–92) suggests that this pottery may have been produced at more than one location in the Solent region. He also suggests that its production had failed sometime around the close of the 11th century. If this suspicion holds, it seems that this sherd from Crocker Street represents the earliest phase of medieval activity at Newport, perhaps being employed or discarded several decades before Richard de Redvers acknowledges or confers borough status on this urban community in AD 1177–1184 (Stone 1912, 256; Beresford 1988, 444). Stone also acknowledges that Sir Richard's undated charter may be a confirmation of an earlier foundation that had been previously devoid of some of the privileges conveyed by this charter (*ibid*).

Due to the weakly defined stratigraphy on this site, phase 3 carries us to the commencement of building S2. This event is represented by the stone ground course of this structure (context 160F). A construction date between 1550 and 1611 seems evident.

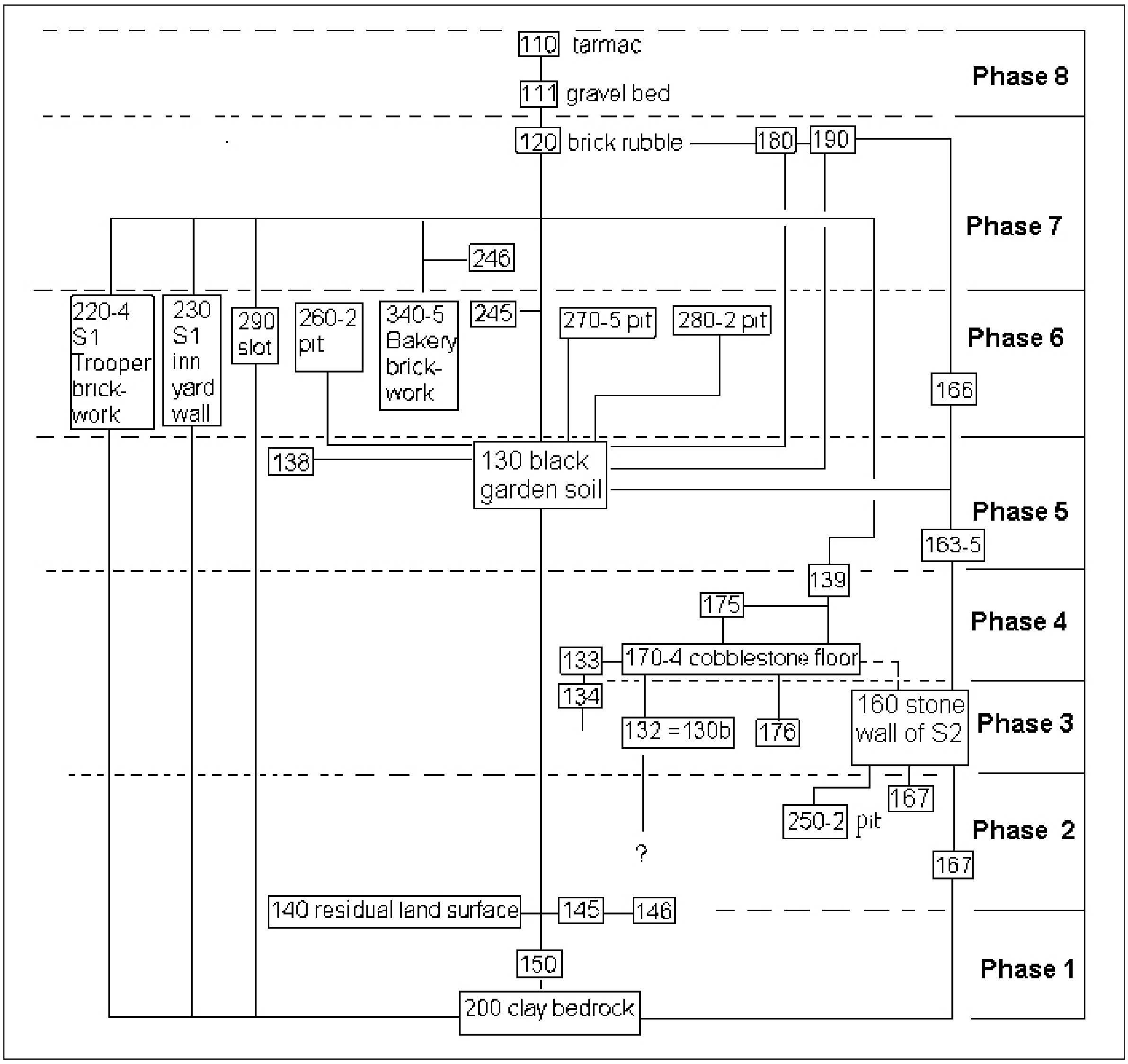

Fig. 13: *Harris matrix showing the phasing of archaeological contexts at Crocker Street.*

Phase 4

Phase 4 essentially concerns the habitation of building S2. If we accept the documentary evidence concerning *the corner house of John Worsley* on the boundary of plot 293 then the *Town Terrier* of 1563 indicates that this building was standing in mid-Elizabethan times.

The map evidence certainly shows Building S2 to be standing in 1611. The same appears to be the case 148 years later when the Parkhurst military map was drawn in 1759. On the map produced a decade later by John Andrews, in 1769, an unhelpful schematic representation of the town's buildings confirms neither the presence nor absence of this building. By the time Colonel Mudge produces his survey of the town, in 1791–2, the building is not shown but the reliability of some parts of this map can be questioned.

Although the primary dimensions of building S2 are unknown, it seems likely that from the position of wall 160F that its width from frontage to rear was approximately 6m. The only guide to its length along Crocker Street is the length of Self's corner shop along this axis. If we accept that ownership boundaries remained unchanged, this provides a proxy length of some 7m. On the ground, however, the northern stonewall 160F would correspond with a frontage in Crocker Street of some 8m. This could make this wall and the cobbled floor no more than an annex to Speed's building S2. Alternatively, an error of 1 metre may seem entirely acceptable given that all of our critical information is extrapolated from maps.

An examination of the primary section of the north wall shows an all-stone ground course laid directly on a disturbed old land surface. The components of the wall are predominantly sub-rectangular blocks of crudely dressed Binstead limestone, their average size on the outer face of the wall being some 0.45m measured at maximum horizontal intercepts. In the exposed top surface of this wall, a few loose fragments of brick were found lodged in the core interstices. Where none of these fragments were contained within the wall mortar, it seems possible that these may be derived from a later structure erected on the same stone foundation.

Outside the building a few fragments of thin Purbeck limestone slabs were found in context 130 where they seemingly represented fallen roofing. Unfortunately, common fragments of grey roof slate were also found in this same context, a recipe for archaeological ambiguity.

Phase 5

During phase 5 an extension or remodelling of building S2 is perceived. It seems that the north wall of the building was now extended eastwards to produce a total length of 4.7m. While still composed of stone, the ground course of this extended wall was of narrower gauge, its width measuring 0.50m. The stone components of this extension were different, being an average of 0.30m measured at maximum horizontal intercepts. They then change to a brick wall 0.40m wide to produce a total excavated length of 4.9m.

Above the stone ground course, the extended wall was capped by at least two courses of bricks (context 163F). An examination of the stone ground course shows that at least one brick was used in the basal construction of this wall. This tends to distance the date of this annex from the initial construction of building S2. The space provided by this extension had accommodated a chalk-floored room some 1.8m in width (context 134; fig. 8 & plate 13).

It appears that this room was probably still in use in the 18th century when a fragment of a large green glazed Verwood vessel and two fragments of glazed London/Hampshire Red Ware were deposited on top of its chalk floor, in context 133 (sherds SF 86 & 233). Unfortunately this same context also contained some derived medieval coarseware sherds that served to make the date of this horizon somewhat unreliable.

Phase 6

During phase 6 Georgian and Victorian cottages and a corner shop were constructed along the two street frontages of this site. Although we see no evidence of this on the Mudge map of 1791–2, the aquatint by Charles Tomkins shows the St James Street frontage fully lined with buildings in 1794. This view complements the evidence offered by the Parkhurst military map of 1759 as well as a plan provided by George Cole in 1805 (IWCRO).

By 1862 further buildings had been erected along the Crocker Street frontage. The Ordnance map of this date indicates that the corner house was now a particularly substantial one. This is confirmed in a photograph taken in 1911, when the building was serving as Self's bakery (plate 17). This building is sited a little to the east of building S2. The same Ordnance map now shows a terrace building on Crocker Street that approaches or impinges on our excavated stone-based building. According to the OS map of 1892, this seems to occupy the same footprint, measuring approximately 7 x 4 metres, the long axis being parallel to the street.

Victorian and Edwardian artefacts recovered from black soil context 130 suggest that it was during this phase that the prehistoric and medieval soil horizons of phases 1–2 were dug-over and their stratigraphy finally obliterated.

Slot 290

Slot 290 was briefly observed during the infilling of trench 2 (figs. 3 & 5). A brief final bucket cut was made into the surface of the bedrock clay (context 200). This scrape revealed a flat-bottomed slot some 0.60m wide and 0.4m deep (context 290). Its fill comprised disturbed bedrock clay weakly contaminated with telltale earth smears and a strew of well-buried irregular Bembridge Limestone boulders. No other contents were found. The slot was traced in an east-west direction but could not be seen in the east baulk. A suspicion remains that this could yet be a stone-lined bedding trench for a town pale aligned on a notable break in slope on south side of the Friends meeting house (fig. 3 & plate 15).

Phases 7 & 8

Phase 7 concerns wholesale demolition of the Victorian brick building beginning around 1940. The process is completed in 1973 with the destruction of Tudor building S1 (the *Trooper* tavern).

In phase 8 there follows the bulldozing and re-working of phase 7 brick rubble to produce the hard standing for cars (figs. P1, P2, P4 & P16). Gravel bedding (context 111) and a tarmac surface (context 110) are the final archaeological horizons in the history of the site.

General conclusions

The ceramic evidence

This excavation has produced positive evidence concerning medieval and post-medieval activities in the northern sector of the county town, borough and port of Newport. Being dominated by local products, the earliest pottery shows little evidence of off-Island contact or maritime activity. Cross-Channel importation was represented by no more than a single sherd of Aquitainian white ware, attributable to the medieval potteries of Saintonge.

Just 2km west of the town, a 'general paucity' of imported pottery has been observed in medieval ceramics excavated at Carisbrooke Castle (Mepham 2000, 103). This is now repeated at Crocker Street. However, since John Speed has shown that this particular street was apparently bounded by undeveloped ground as late as the early 17th century, it seems that little everyday discard of urban waste might be expected in this area.

Newport's potters and crockers

Like many of the historic burgage plots within the medieval borough of Newport, the Crocker Street site is situated on the clays of the Hamstead Beds of the Tertiary basin of south Hampshire and northern Wight. Here, it seems, this outcrop offered a potential source of good potting clay. This is certainly evident in the fifteenth century when the records of the town cite the activities of working potters in this vicinity (Eldridge 1952, 31). From this it is reasonable to conclude that the presence of potters or 'crockers' was responsible for the naming of the street.

Where a disturbed scatter of medieval coarse ware sherds has been observed across plot 294, it seems that cooking pots of a common sagging base style and fabric had been broken and discarded on a number of occasions. The similarity of these randomly scattered sherds sustains the possibility that pottery of this type may have once been manufactured or traded in this eponymous medieval street. We must allow, however, that the quantity of fragments is still extremely small. Here is an indicator that any future planned development in this street should give due regard to the appellation and putative presence of former medieval 'crockers'. This case is reinforced by a statement of 1462, recorded in the borough ledger or 'ligger' book (Hillier 1860, II, 9):

> *iff any ffullor or potter, or any other, dygge ony cley yn the Co'en of the Towne, in honyhull, before he make agreement therfor with the Wardeyns or keepers of the Co'en boxe, he shall pay to the seid kep's off the boxe, vjs to the behofe of the Comunalty off the Towne…*
> 8 October, 2nd Edward IV [1462].

From this entry we gain confirmation that, during the 15th century, potting clay was dug on the neighbouring hill-slope at hill. This location lies within 200 metres of burgage plot 294 (fig. 1). In his perambulation of the borough records, Eldridge (1952, 31) observes that the firing of pottery was expressly forbidden within the town on account of it '*being dangerous in respect of fire, on pain of ten shillings for each offence*'.

Here, it seems, is an ancient municipal precaution that was perhaps taken with regard to some past calamity that may have stemmed from potting activities. Potters or 'crockers', it seems, were clearly active or resident within the town yet their day-to-day work was excluded from land within the town gates. The substantial fine of ten shillings 'for each offence' rather suggests that this was a regulation that had been commonly flouted.

People, places and documents

Documents concerning burgage properties in Newport begin in the 12th century but few give locations that can be recognised in the town today. Some of the earliest records come from entries in the cartulary of the Priory of St Mary at Carisbrooke (Hockey 1981).

Around the opening of the 13th century the monks of Carisbrooke agreed to the construction of a daughter chapel in the relatively new town of Newport. It was not long before they found themselves in receipt of a number of properties gifted by pious and dutiful residents. In circa 1240 '*Emma, daughter of Richard de Woburn*' gifts to the monks a certain '*messuage with a curtilage adjoining in Newport*' (*Caris. Cartulary,* entry 130).

In 1283 the monks received another urban plot. This was gifted by '*Robert son of Alurice*' (the miller). This property, with appurtenances, was reported to be '*at the southern end of the road leading to St Cross*' (*ibid*, entry 131). Although St James Street provides an effective route to the former site of the priory of St Cross, so too does Cross Street; moreover, both streets also lead to mills set in comparable positions on the Lukely Brook (fig. 14). Later, in Tudor times, we learn that on the corner of St James Street, plot 294 was still recognised as having been part of the old estate of the monks of Carisbrooke. Unfortunately, further east on Crocker Street, and in the west angle of the junction with Cross Street, we find that another corner house owned by the Heirs of Alvington may once have been a further former possession of the monks (Royal Survey, Crocker Street property 288; fig 14). Whether either of these ownerships derive from the 1283 bequest, we cannot say.

While neither of these early transactions specifically cites Crocker Street or Lower St James Street, they provide sufficient evidence to explain how the monks of Carisbrooke came to be property owners in the medieval town. This is an important consideration when we turn to some of the entries in Royal Survey of Newport (IWCRO, NBC/099, Webster mss). This document was prepared for the *Knollys Commission* in 1559. Within its pages, individual properties in each street are carefully described and numbered from east to west.

Where Lower St James Street meets the Lukely Brook at Town Gate Mill, the Royal Survey records '*a mill with a dwelling called the Wheat Mill, in occupation of William Hancock*' (Fig. 14, property 292A). To the south is a 'half place', '*owned by John Harvey of Alvington, being the garden of the Town Gate Mill*' (property 293). In 1559, the occupant of this property, too, is the miller, William Hancock. It is interesting to see in both the *Royal Survey* and the Newport *Terrar Book* that no building other than the miller's house is cited in relation to garden plot 293.

South of the miller's garden, the Royal Survey records a land *parcel of the Priory of Carisbrooke* then held by Richard Worsley (property 294). Within this parcel is a *half place* that comprises a *corner house* (IWCRO, NBC/099, p.22). The survey text makes clear that this building stood at the northwest corner of the junction of Crocker Street and Lower St James Street. This may be equated with building S2 in this current report (figs. 1, 3, 8 & 14).

In the text of the Royal Survey we are told that the occupant of the corner house was *Jamys* (James) *Bowler*. Elsewhere in Clifford Webster's annotated transcription of the survey, we learn that James was a Newport glover. Four years later, in 1563, the Newport *Terrar Book* provides some brief and helpful confirmation when identifying, on the north side of Crocker Street, a *half place, a corner house* owned by the Priory of Carisbrooke and occupied by *Jamys Bowler* (IWCRO, 7NEWP5, Crocker street property 31).

Through the Royal Survey and the 1563 terrier, we now have reference to two properties that seemingly accord with buildings S1 & S2 as shown in our annotated extract from John Speed's map (fig. 1). With the manor of Alvington situated within the nearby parish of Carisbrooke, it seems that the 'Heirs of Alvington' may have acquired former possessions of Carisbrooke Priory at or after the Dissolution of monastic properties in 1536. By this time, control of this previously 'alien' priory had passed to the priory of Sheen (Hockey 1981, xviii–xix). Through his ownership of the corner house, we can see that Richard Worsley was another to gain from this dispersal of monastic property.

Where land apportionments in Tudor Newport are described in the Royal Survey as 'places', it seems that these were allocations of urban land that might approximate to some of the rectilinear and paddock-like divisions engraved on John Speed's town map, in 1611. Owners of 'places' seem to have been at liberty to subdivide portions of these ownerships into 'half places'. These, in turn, might be further divided. In Crocker Street, the descending order of these divisions seems evident in a *Terrar Book* record for Thomas Sygines (Seggins). Where Thomas held eight parcels of land on the north side of the street, the document adds that these comprise four 'places' (IWCRO, NBC/099, Crocker Street entry, 32). These lay immediately west of our building S2 (fig. 14, property 295).

From this and other entries it appears that after places were divided into 'half places', these might be further parcelled and sold on to other occupants or landlords to become houses, tenements or gardens. By such means, the corner house occupied by James Bowler in Crocker Street (7NEWP5, entry 294) could easily become the property of a wealthy landlord such as Richard Worsley of Appuldurcombe, while, to the north, neighbouring half places (292A & 293) might be retained in the enduring possession of an earlier owner. In this case it seems that half place 293, comprising the Mill House garden, may have been retained by the 'heirs of Alvington' in anticipation of an eventual boom in the town's development. Even after corner house 294 had passed into the possession of Richard Worsley, and had become tenanted to James Bowler, the Royal Survey notes the earlier history of this property to be a detachment from Carisbrooke Priory's possessions in the town. This we see in entry 293 when describing the:

> *garden plot on the west side of St James Street, in occupation by William Hancoke, bounded on the north by the Wheatmill belonging to the town, also in occupation by William Hancock, and on the south side by a corner house of Richard Worsley Esq as a parcel of the Priory of Carisbrooke containing a half place in occupation by Jamys Bowler.*

Similarly, in entry 294, Richard Worsley's corner house is again identified by its earlier status as '*a parcel of the Priory of Carisbrooke'.*

The nature of Tudor building S1 and the history of The Trooper

We have already noted that, in 1559 and 1563, the area occupied by miller Hancock's rented garden shows no association with any other building other than his mill house. Nevertheless, it is this plot that seems to be associated with the site later occupied by *The Trooper* tavern (building S1 in this report). From evidence offered by the Royal Survey and the 1563 terrier, we might suppose that, in 1563, this alehouse had yet to be built. Alternatively, the miller's house (property 292A) may have been destined to become the tavern. When we see in the Royal Survey that miller Hancock also owned a corner property at the western extremity of Crocker Street (Fig. 14, property 297), it seems that he already had opportunity to transfer his residence elsewhere, if conversion to a tavern took place during his lifetime. (James died in January 1584/5; IWCRO, Royal Survey transcript, addendum. NBC/45/107).

It is particularly interesting to see that in the Royal Survey of 1559, no mention is made of a building between *William Hancock's* mill house (292A) and the corner residence occupied by James Bowler (294). This seems to exclude the building we have termed S1 on our extract of John Speed's map (figs. 1 & 14). Arguably, this may have been virgin land in both 1559 and 1563. Alternatively, at the time of the Royal Survey, building S1 may have been the house of miller Hancock before its subsequent conversion to an alehouse.

Where John Speed's map, of 1611 (fig. 1) and the later 'garden' version (fig. 14), show a building projecting into the roadway at Town Gate Mill, we are unable to tell whether this is a further part of the mill or whether it is the miller's house. In 1632, however, we are told that '*the mayor and burgesses of Newport let two water corn mills called Town gate mills in St James Street…*' (IWCRO, NBC/45/101/69 & 45/22). Where this apparently accords with the map evidence it seems that William Hancock's only available accommodation in this vicinity must have been the single free-standing (S1) building we see on the west side of St James Street in figs. 1 and 14. This, indeed, appears to be the only building that could serve the needs of the miller while also securing access to garden plot 293 and its documented border with James Bowler's corner premises.

The first reference to an alehouse in the vicinity of Town Gate Mill conveys the name 'Prince of Orange'. This tavern is cited in 1694, when sold to John Adam, a Newport dyer (IWCRO, JER/HBY/24/4). By 1740 the name has changed to *The Trooper,* when cited amongst boundary details for the sale of the old corner plot then acknowledged to be formerly part of the estate of Carisbrooke Priory. This sale is made to Thomas Shrimpton (IWCRO, BD AC/10/41; Royal Survey, Webster transcript, entry 294, footnote). The re-naming may well coincide with the gathering of troops, in 1739, for the Anglo-Spanish 'War of Jenkins Ear'. On this occasion large numbers or troops were assembled just 2km away, in Parkhurst Forest.

In 1766 the landlord or 'victualler' of The Trooper was Thomas Gregory (Newport Borough inventory of Alehouse Licenses, 1766 to 1819, IWCRO doc. NBC/6/1). This was a time when the taverns of Newport were clearly anxious to entice and exploit a military clientele. Within the borough, other local alehouse titles of this genre include 'The Bugle', 'The Valiant Man-of-War', 'The Vanguard' and 'The Valiant Soldier' (Edwards 1985).

When two Newport alehouses opt for the title of *The Trooper*, a simple distinction emerges. In 1772, the borough records these premises as the *Black Trooper* and the *White Trooper*. By 1782, the names have been adjusted again when we find the *Jolly Trooper* and the *Valiant Trooper*. Earlier, in 1740, Webster identifies the tavern near Towngate Mill to be 'The Valiant Trooper' (IWCRO, 7NEWP5). This suggests that by 1766 the name may have been shortened, before being recast when faced with competition from its 'Jolly' rival. After 1802 we find no further licences being issued to the *Jolly Trooper* and in the same year the simple title of '*The Trooper*' re-appears in place of its 'Valiant' version. It was with this simple shortened name that the building persisted well into the 20th century.

It was sometime in the 1950s that the fortunes of the Trooper finally waned. Downgraded to a wholesalers store, the building was still standing in March 1973 when it was designated a Grade II Listed building. One of its qualifying features was then noted to be its ancient half-timbering (fig. 15). Within eight months of its listing 'The Trooper' was demolished. A contemporary view shows a rendered or painted 18th century brick façade on the frontage with Lower St James Street (Mitchell 1984, 134; Shepard & Greening 2008, 99).

Like certain other buildings within the historic borough, the greater antiquity of 'The Trooper' seems to have been well concealed and poorly recognised. On John Speed's map we see a symmetrical gabled building with its roof-ridge aligned with the road frontage. This, it seems, was the same roof and gable that could still be seen immediately prior to demolition in 1973.

The nature of Tudor building S2

On Crocker Street, the archaeological evidence from building S2 accords with a modest street-front residence or tenement of Tudor date. This we now know to be a stone-footed building that included a small cobbled stone floor. A fragment of a Jurassic limestone roof slab found just outside the north wall of this structure suggests that this building was robustly constructed and capped by a substantial roof.

A helpful *terminus post quem* for the construction of this building is provided by the fragments of Rhenish stoneware sealed beneath the cobbled floor (SF 214 & 215; fig. 10 & plate 11). The pitch of this floor with its central gully suggests a small stone-lined passageway designed to fulfil a specialised purpose. The presence of a ground-floor stable with a tenement above seems a distinct possibility. This could explain the laying of the cobbles in a v-shaped profile suited to a central flushable channel.

If stabling was once a function of this building then the land to the rear could at least provide limited pasture. Ready access to grazing is seemingly confirmed on John Speed's street plan (fig. 1), where we see ample land enclosed in the manner of paddocks and cultivation plots within the boundaries of the town. In a later undated version of this map the same areas are somewhat artistically depicted as gardens (fig. 14).

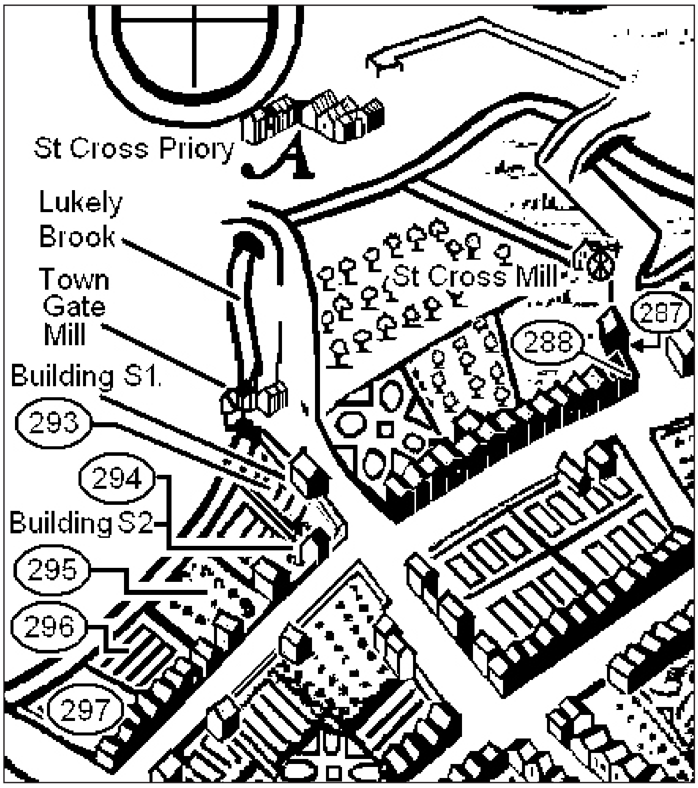

Fig. 14: *Portion of an undated map based on John Speed's survey of 1611. This version shows regular garden plots in and around buildings S1 and S2 in Crocker Street. The perceived position of 'half places' named in the Royal Survey of 1559 and cited in this report have been added as annotations. The gardens are probably mostly artistic embellishment. 'A' marks the Priory of St Cross.*

In his account of the municipal records of the borough, Eldridge (1952, 61) cites an on-going problem concerning the management of horses in the narrow streets. This was eventually resolved by a by-law in 1733. A small quantity of bone fragments, attributable to sheep, was gleaned from the surface and interstices of the cobbled gully (context 171). These proffer an alternative possibility that the cobbled floor was suited to James Bowler's need to process sheepskins and hides for his glove-making business. In this case the open land leading to the river at the rear of the property would be similarly suitable for temporary grazing.

The geological examination of the cobblestone reveals the presence of small diorite and granite boulders suited to ballast transported from an Armorican, Channel Island or West Country source. These boulders reinforce similar evidence offered by kindred stones observed in walls around the town, especially in the vicinity of Newport Quay. These boulders are also contained within the internal matrix of Coppins Old Bridge. Further diorite boulders occur in the street-side revetment wall of Carisbrooke churchyard.

The very low incidence of post-Tudor pottery of the 17th and 18th century date suggests that building S2 may have provided no more than modest accommodation until the erection of adjoining brick dwellings and shop premises during the 18th century. There then follows a floruit of ceramic consumption represented by a generous discard of Victorian and early 20th century tablewares and coarse wares. The nature of some of these brick buildings is helpfully recorded in photographs dated 1911 and 1939.

Beyond the pale

While it has been commonly assumed that medieval Newport has always been an undefended town, a case can be postulated for the possible construction of a defensive fence, palisade or town 'pale' sometime before the Tudor period. The name and configuration of Pyle Street hints at a town pale on the southern margin of the borough, perhaps assisting a natural line of defence drawn along the margins of the Lukely Brook and the Medina River. Lack of archaeological information concerning this question has been cited in the *Vectis Report* (Basford 1980, 43). A deposit of burnt roof slates and ash uncovered in Newport High Street has been equated with the sacking and burning of the town by a French force in 1377 (Tomalin & Scaife 1977, 76–7). When the town was then left uninhabitable for the next two years (Hillier 1860, II, 5–6), here, it seems, might be a significant prompt towards improvised defence. For the townsfolk, however, shelter within Carisbrooke Castle may have been a more practical resort, a stronghold where sufficient defence manpower would surely be required.

At the outset of this investigation, the siting of the evaluation trenches took the question of town defence into account, yet due to post-medieval disturbance, no credible evidence of post-holes for a wooden pale could be found. With the recognition of the undated slot feature 290, however, evidence of absence cannot be considered conclusive (figs. 3 & 5). The excavation has also shown the soil mantle over the Tertiary clay bedrock to be very thin and poorly suited to the recovery of archaeological information. This is an indication that extreme care will be needed when the need for archaeological intervention arises in other sectors of the medieval town.

Some social and maritime considerations

The maritime role of Newport is clearly emphasised by its name and by the documented history of its quay. It appears that the town's reliance on maritime trade is also evident in the medieval planning of Quay Street where the notable width and spaciousness of this thoroughfare is particularly well suited to a quay marketplace. By the mid-15th century, the town's maritime importance is certainly well recognised when an entry in the *Close Rolls* for 1449 tells us that:

> *Neuport in the Isle of Wight is situated on the sea where many masters and mariners of ships winter in their passage to Aquitaine and Bordeaux in quest of wines and other merchandise.* (Hockey 1982, 158).

Foreign perceptions of Newport and the Medina estuary as a welcome *haven* are conveyed in Pierre Mortier's *carte particuliere* where we are offered an exaggerated eighteenth century view of broad inlet and an overstated volume of water in the Lukely Brook (fig. 16). The term 'haven' is no longer employed in the Isle of Wight.

Despite the advantages of the town's coastal position, it is interesting to see that the early ceramics from the Crocker Street excavation offer virtually no confirmation of the statement we find in the Close Roll entry (*loc. cit.*). At this property at least, it seems that early occupants shared little in the town's contact with the vineyards, ports or markets of medieval France. It has been noted, however, that this sample of medieval pottery is extremely small. Moreover, building S2 was apparently one of the more modest households in the borough, where ownership of exotic items may have been virtually unknown.

In the discarded molluscs on this site we now glimpse the activities of local oyster and cockle fishermen and we can quantify a small sample of their stock. This makes a valuable comparison with some of town's ancient regulations, re-iterated in a document of 1462 (Hillier 1860 II, 9):

> *Noon shall fysh, nother dragge in the haven off the Toun with nettys and dragges, without lycensce of the Baylles under payne of fforfetture of their nettys and Dragges as often tymes as he so doth.*

In the same borough 'Ligger Book' [ledger book] we learn that there will:

> *…yerely be levied by the Wardens of the Co'on box yn susteynyng off the Key, off every bote off this Toun called a dragger, iiijd.*
>
> *Also – that no man shall dragge for oystres wtyn the haven off the toun without lycens off the bayllyfe, upon payne of ijs… And yff ony man lycencied off the baylifs, take oysters yn the haven off the Toune, that then he selle the seid oystres yn the market place, a hundred told by syx skore for ijd. And no derer – And grete oysters gadered with handys, a hundred told by syx skore, iiijd,, and no derer – And ostreys called salt oystreys, a hundred told for a ob, and no derer.*
>
> *And that every maister and mariner off every bote, yerely, shall gadre in the see at large, a bote ffull of oystryes calle ffrye, and shall put the seid ffrye in the haven off the Toun yn the sight off the bayllyfs or off their sergeauntes, everyth off the thaym, upon payne of iijs. Vjd to be payde to the keepers of the Co'en box…*

From these accounts, related by George Hillier, we learn of an annual seeding of the river with oyster fry in order to nurture fruitful and well-controlled stock (Hillier 1860, 9). We also find that a scale of optimum prices had been fixed for Medina oysters according to their size. Where the highest prices are applied to 'salt oysters', it seems that these, judged by their description, were caught offshore. If we accept that these were also the largest, it is interesting to note their virtual absence from the excavated sample in Crocker Street.

The relatively small sizes of oysters consumed at building S2 could well reflect the modest economic status of the occupants of these particular premises. This building, after all, is recorded in the town terrier as no more than a tenement. The size frequency of the oysters found at the rear of this building certainly presents a notable contrast with oyster consumption in a Tudor household at Key Close, in the neighbouring medieval port and borough of Newtown. At this latter site the dominant size of shell was 55–59mm with larger examples being not uncommonly consumed up a maximum of 84mm (Tomalin, forthcoming).

When reviewing the archaeology of the Hampshire ports of Lymington, Portchester, and Fareham, Hughes (1981, 66–70) emphasises that documentary evidence for the development of urban communities of this kind is generally weak prior to the 15th or 16th centuries. Similarly, the archaeological evidence for this period can be surprisingly elusive, a case well demonstrated by urban excavations at Fareham (*ibid*, 70).

The archaeology of burgage plot 294 in Crocker Street indicates highly restrained urban development in this sector of the medieval borough prior to the mid-eighteenth century. Yet the petrological evidence presented by the cobblestones hints at former maritime prosperity stemming from the town's Tudor waterfront where contact with the bays and quays of Devon, Cornwall or the Channel Islands were just a matter of fair wind and sail.

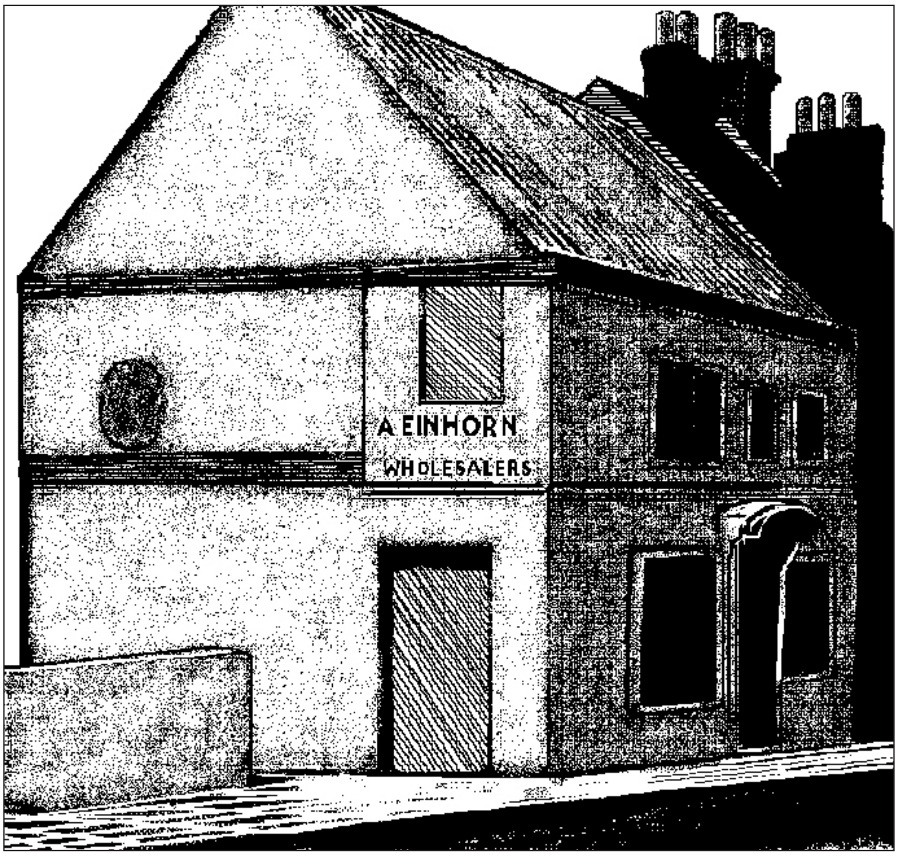

Fig. 15: *The Trooper alehouse, abandoned. From a photograph taken shortly before its demolition in 1973. The gable end shows the horizontal half-timbering attributed to 'Building S1' on Speed's map of 1611. Local residents recall a cased half-timbered building with notably low-beamed ceilings and an impressive wall plaster painting of an unspecified kind.*

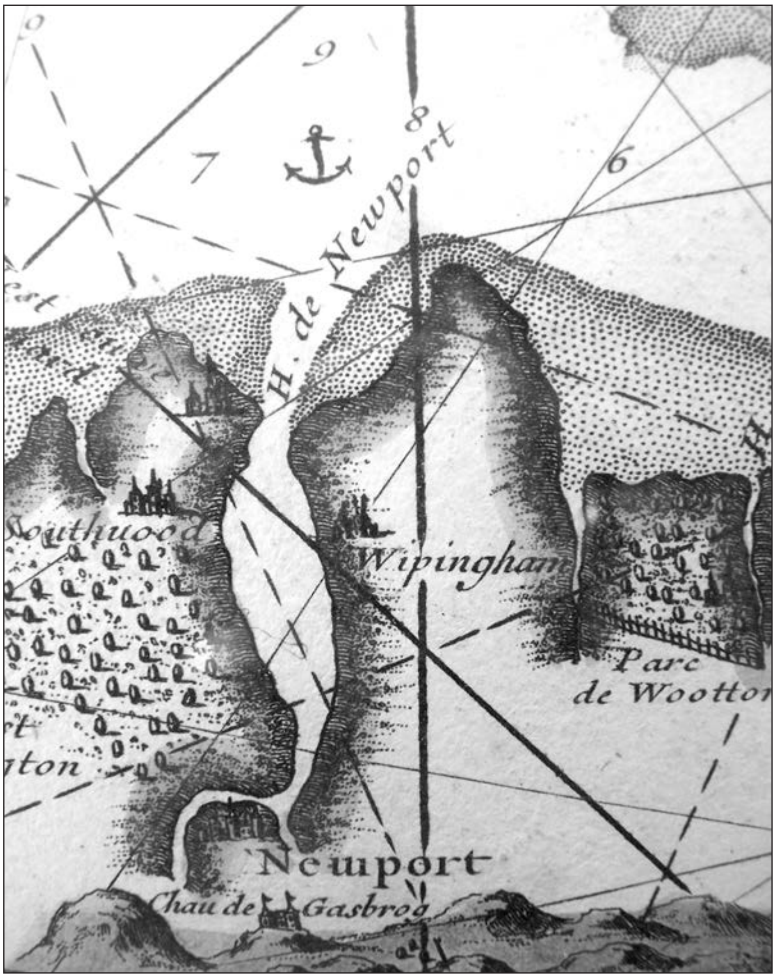

Fig. 16: *Pierre Mortier's undated 'carte particuliere' presents the Haven de Newport as a broad accommodating seaway. Skirting the north of the town, the Lukely Brook is also exaggerated.*

Archival note & abbreviations

The physical, and written archive of this excavation is deposited in the collections of the Heritage Service of the Isle of Wight Council. Site records and drawings were entered directly on to laptop. A digital version and paper print out has also been lodged with the Historic Environment Record maintained by the Council.

'F' suffixes on context numbers (e.g. 160F) identify substantial excavated features. In this text this may also embrace subsidiary contexts like a fill or a mortar matrix that does not always require specific or repeated citation.

In this text the term 'generic' is used to describe a 'mother context' that generally includes similar 'daughter' contexts that had been awarded other numbers during excavation. While use of the generic number allows ease of reading in the text, the reader should be aware that daughter contexts may gain their distinction because they were sealed in a slightly different, and sometimes more secure, manner (e.g. 130 generic and daughter contexts 131, 132, 135 & 161).

The abbreviation 'mhi' denotes 'maximum horizontal intercepts' – being a measurement taken across the furthest extremities of an object. This measurement is commonly used in the description of stone fragments.

The prefix 'SF' identifies a 'small find' number that may otherwise be regarded as an 'artefact number' or 'archaeological object record number' (AOR) as logged on-site. The extracted maps presented in figs. 1 and 14 have been graphically enhanced for clarity; for fine architectural detail the reader is advised to examine the original engravings.

Acknowledgements

This field evaluation was carried out as a condition of Planning Application TCP/4990/J, concerning proposed new development at Crocker Street. The project was assisted by members of the Isle of Wight Natural History and Archaeological Society and professionally aided, on-site, by Delian Backhouse-Fry Don Bryan, and Katie Bell. On-site facilities were kindly provided by the site owners and by BTC Carpets of Crocker Street.

Advice on the urban history of the area was provided by Bill Shepard. Supportive site survey and mapping was provided by Paul Macaire. The scheme of archaeological investigation and its implementation was overseen by the County Planning Archaeologist, Owen Cambridge. The writer thanks colleagues in the University of Southampton, Dept of Archaeology for advice and discussion on the artefacts and outcome of this excavation.

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Author: David. J. Tomalin, 4 East Appleford Cottages, Bleak Down, Rookley, Isle of Wight, PO38 3LA.

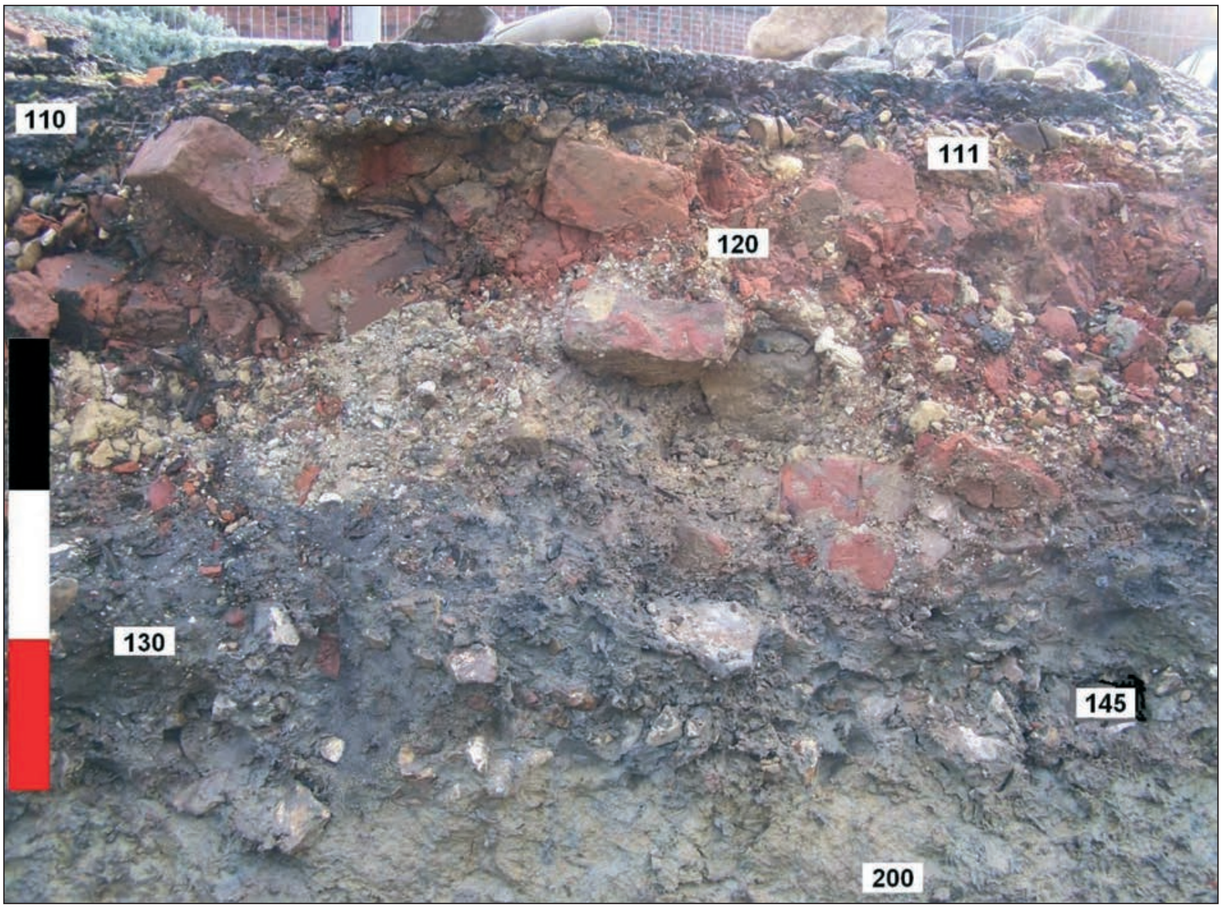

Plate 1: Contexts 110, 111, 130 & 145 resting on bedrock clay 200. (Scale in 10cm).

Plate 2: Crocker Street, contexts 110, 111 and 130 overlying disturbed land-surface 140 resting on Tertiary clay bedrock 200. The infill of pipe trench 124 is also visible.

Plate 3: The rear or northern stonewall of building S2 showing limestone ground course resting on land surface context 161 and lying parallel to Crocker Street. The cobbled floor or gully at top centre divides this building from a brick-built annex.

Plate 4: Evaluation trench 3 showing black urban soil 138 beneath rubble 120 in the former yard/garden of the Trooper alehouse. (GE).

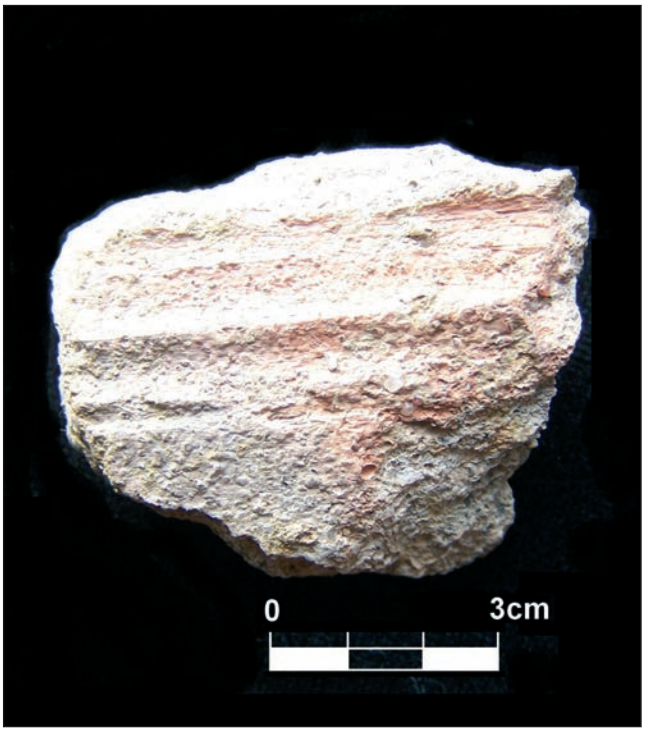

Plate 5: Lower St James Street viewed from Town Gate in 1794. An aquatint published by Charles Tomkins in 1796.

Plate 6: Early medieval cooking pot displaying a rilled shoulder of Portchester style. SF. 99.

Plate 7: Pipe SF67. Context 246. The style is dated 1630–1670.

Plate 8: Pipe SF5. Late ribbed pipe bowl with B and (?) E on spur. Context 230. Trooper yard/garden.

Plate 9: Pipe SF97. A late pipe with acorn bowl. Context 130.

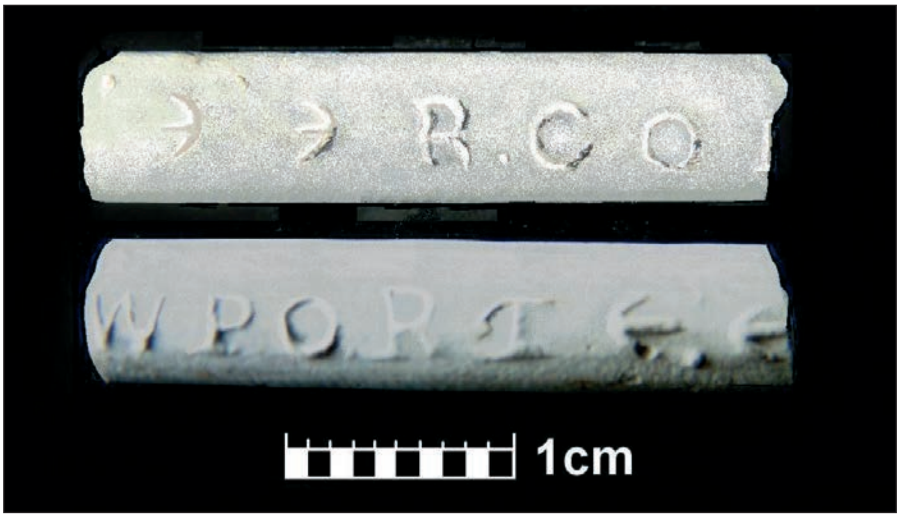

Plate 10: The embossed mark of pipe-maker R. COLE of NEWPORT.

Plate 11: Girth fragment of a Rhenish salt-glazed stoneware ale jug of Frechen style with a production date of c. 1550 –1600. The medallion contains a moustachioed figure that probably carries contemporary political connotations. SF 215.

Plate 12: Building S2. Wall matrix 160 showing in situ rough-hewn 'Binstead' blocks from the Bembridge Limestone Formation. Larger stones have been reserved for the outer face.

Plate 13: Brick annex to building S2 (structural context 163F) resting on a ground course of small Bembridge Limestone blocks. Inside this room, the chalk floor (context 133) was partially robbed by 20th century scoops that are here flooded by rainwater. The cobblestone floor divides this structure from the building S2.

Plate 14: The V-shaped profile of cobbled gully 170 looking south. The eastern robbed portion (left) and chalk floor 134 (right) were temporarily flooded with rainwater.

Plate 15: The break in slope at the old Friends Meeting House, looking due east towards St. James Street. A perceived indicator of the line of a potential town pale or palisade. See also plan fig. 2.

Plate 16: Aerial view showing cars on burgage plot 294 after the demolition of The Trooper public house in 1973. Towngate Mill and the Lukely Brook in foreground. Photograph attributed to Frank Taylor.

Plate 17: The bakery in the northeast angle of the junction between Lower St. James Street and Crocker Street. The date is 1910. The span of the gable is probably equivalent to the width of the lost Tudor building S2. At extreme left, the ground courses on the Crocker Street frontage may be the stone remnants of the earlier building.

Plate 18: The Lukely Brook floods Towngate Mill and Bridge in October of 1960. John Speed's town plan of 1611 (fig. 1) shows Crocker Street to be the limit of medieval and Tudor residential building in this quarter of the town. This long-founded wisdom of holding to higher ground was disregarded during the expansion of the town during and after the mid-eighteenth century.

AN ANGLO-SAXON ROAD NETWORK?

John Margham

Abstract

The hypothesis that the rural road system of Britain was substantially complete by the eleventh century is tested in a case study of the Isle of Wight. The evidence from Anglo-Saxon charter bounds, place-names and Medieval documents largely supports this assertion. Documented Medieval changes to local routes are also considered. The topology of the Island's road network as mapped in 1810 is examined through case studies. The plotting of significant locations in the eleventh century onto this network provides further support for the hypothesis. The use of the road network in the eleventh century is examined through a review of the evidence for the functions of the road system in the later Anglo-Saxon period of defence, 'seasonal use of pasture', the 'farm of one night', and trade.

Introduction

Christopher Taylor concluded his chapter on Saxon and Dark Age roads and trackways in *Roads and Tracks of Britain*:

> Whatever its origin, whether prehistoric, Roman or Dark Age, our present road system was virtually complete by this time [the eleventh century] and apart from the modern motorways and a few roads in particular areas, our pattern of roads is the same as it was 900 years ago (Taylor 1979, 110).

Was the road network of the Isle of Wight substantially complete by the Norman Conquest? This can be investigated through the following strands of evidence: the bounds of Anglo-Saxon land charters, place-names, medieval documents, and the road network itself as depicted in the earliest detailed and accurate maps of the Isle of Wight. In addition, modifications to the rural road network will be examined in the post-Conquest medieval period. The uses of the Anglo-Saxon road system will also be examined. Other uses of the Anglo-Saxon road system of the Isle of Wight can be inferred from various sources, including the importance of Island roads in the defence of Wessex in the Viking Age, the movement of stock to summer pastures, and trade.

Anglo-Saxon Charters

The only contemporary evidence which can be ascribed to specific dates for the existence of roads in the landscape of the Isle of Wight in the Anglo-Saxon period is to be found in land charters. These Latin documents, which recorded the grant or the confirmation of a grant of land by the king, were frequently accompanied by a description of the bounds of the estate in Old English. The Isle of Wight is well documented in this respect, there being more sets of bounds extant for its relatively small area than the whole of Yorkshire. The charters which provide information about route-ways on the peripheries of estates date from between 949 and 982, appended to grants by Eadred, Eadwig and Æthelred II (Appendix 1). Four different charters record this information, with one charter describing the bounds of four different estates on the Island.

The bounds of the estate of *Linlande* include a *herpað*, a highway. *Linlande* was probably located on the Isle of Wight and was quite possibly in the Bathingbourne area. Other instances of *herepað* can however be located in the modern landscape with confidence (Map 1). *þone sandihtan hærepoþ* 'the sandy highway' is the road through Sandford from Godshill towards Whiteley Bank. The *herpaeðs* in the bounds of Bathingbourne is the road south from the former ford to Green Acres Farm. The *herpaeðs* in the bounds of *Heantune* (Branstone) is Bathingbourne Lane, north-eastwards from 'the stony ford' which was referred to in three sets of charter bounds (Appendix 1), and its continuation the other side of the modern main road towards Newchurch. These instances of *herepaðs* can be contrasted with the one instance of *weg*, *þes grenan weges* 'the green way' on the bounds of Bathingbourne. In the modern landscape a green way continues the line of the *herpaeðs* south from Bathingbourne, with the more significant route deviating at Green Acres Farm around the hill and past Summersbury where it is known as Lessland Lane (Fig. 1). This difference in status would seem to have been the case in the tenth century. The two instances of *lanan* in the bounds of Ningwood would also appear to name route-ways of lesser significance than *herpaeðs*. One of these is the road westwards from Newbridge to Wellow. The other no longer exists as a right of way, being a former lane from Warlands (Shalfleet) to Newbridge.

The last category of boundary locations which provide information about route-ways is the five instances of gates. Two of these are gates on or adjoining significant modern roads. *ðæt hlidgeat* 'the swing gate' in the bounds of Ashey is a location to the south-east of Ashey Down (to the south of Eaglehead Copse) on the ridgeway road towards Brading. *þan stane æt þan geate* 'the stone at the gate' in the bounds of *Staðe* (Fishbourne) would appear to be a location to the south of Quarr Abbey on the modern main road to Ryde from Wootton at Elenor's Grove. The remaining three instances would seem to be of more local significance. *wynnangeate* 'the meadow/pasture gate' at Winford seems to have been a location where there was access to grazing on an area of heathland. *þan fulan geate* 'the dirty gate' on the bounds of Ashey appears to have had a similar function, providing access to the Upton area adjoining Ashey Common as mapped in the late nineteenth century. *þæt geat* 'the gate' in the bounds of *Staðe* was probably located within modern Firestone Copse, an area of ancient woodland, its specific function unknown.

Although the evidence from Anglo-Saxon charters for a road network is limited, a picture is beginning to emerge of a hierarchy of route-ways. *Herpaeðs* were of more than local significance, being part of longer distance routes, whilst the single instance of *weg* and the two 'lanes' were not so. Gates were located on or adjoining either of these two types of road.

Place-Names

The second category of evidence which can be cited for the existence of components of a road network is that of place-names. All relevant entries from the two standard publications on Isle of Wight place-names (Kőkeritz 1940 and Mills 1996) are itemised in Appendix 2, citing the first record of each particular name in extant documentary sources. The latter provides a *terminus ante quem* (date before which) for each place-name's formulation. In many instances it is appropriate to assume that place-names were not recorded for a significant period of time after entering the vernacular naming vocabulary. Some of the names listed in Appendix 2 would appear to have been of considerable antiquity when first recorded, for example Huffingford (Blackwater) and Farringford, due to their containing the place-name element *-ing* (Dodgson 1966). There are however exceptions to this, for example the recording of *Bynnebrigg* (Bembridge) in 1316, with the *brycg* suffix of the name originating at about the time of the construction of Yarbridge *c.*1300 (Mills 1996, 27).

Fords There are twenty-one different locations with *ford* names in the Island place-name literature (Map 2). The *ford* names can be broadly categorised into two types. The first, of which there are fourteen instances, are locations which were associated with through routes on the 1810 Ordnance Survey map. The second, six instances, are those which were on spurs from these routes, i.e. roads of local significance which ran for a relatively short distance and were minor through routes or *cul-de-sacs.* Whilst it is acknowledged that the road network in 1810 was not necessarily the same as in the more distant past (see below), this analysis does give an indication of the importance of fords in the medieval landscape. The *ford* names can also be categorised as to their occurrence in Domesday Book. Nine of these names were first recorded in 1086. Of these, six would appear to have been located on significant through routes. These were Appleford (Great Appleford) between Chale Green and Godshill; Horringford between Arreton and Sandown Bay; Huffingford (Blackwater) on the route south from the Newport area towards Rookley; *Melevsford,* a lost name in a location approaching Bouldnor from Shalfleet; Sandford on the line of *þone sandihtan hærepoþ* (above); and *Scaldeford*, crossing Scotchell's Brook between Apse Heath and Lake. The remaining three instances, Fulford, Briddlesford and Yafford, were on routes of more local significance. The single instance of Old English *wath* 'ford' can be added to this list of place-names representing fords. This was in The Undercliff area and would appear to have named a crossing of a minor watercourse in the St Lawrence area. The *ford* place-names of the Isle of Wight do tell us something about the nature of individual fords when first named. *Scaldeford* was shallow, whereas Briddlesford as a 'bridle ford' was considerably deeper. Sandford was sandy which can be compared with the dirty ford at Fulford. Clatterford had a bed of loose stones or pebbles and *Rydeford* was to be found amongst the reeds (Appendix 2).

Bridges The vast majority of waterway crossings in Anglo-Saxon England would have been fords. There is however one instance of a bridge on the Isle of Wight recorded in a Domesday place-name. The name Shide was recorded as *Side* and *Sida* in 1086. Old English *scīd* means '(Place at) the plank or foot-bridge': "The first bridge here over the Medina may well have been no more than a plank or beam of wood" (Mills 1996, 95). The sixteen references to *brycg* names in the Island's place-name literature are all from sources from the thirteenth century onwards (Map 2). It is possible that some bridges other than that at Shide existed in the landscape of Anglo-Saxon England, and there is some additional evidence to suggest that this was the case (below). However, with no *brycg* place-names in Domesday Book, it is a reasonable assumption to make that most originated after the later eleventh century. Apart from the instance of the origin of Yarbridge c.1300 (above) there is evidence in the corpus of place-names for the replacement of fords with bridges in the place-name corpus. *Durneford* of c.1258 would appear to have been the crossing of the Medina known as Coppins Bridge from 1769, which was named as *Godsbridge* in the sixteenth century (Fig. 2). *La Rydeford* in 1331 may be identified with the *Redebrigge* of 1471 in the Budbridge area. *Newbryge* (Newbridge) in 1328 may have been of relatively recent origin then. The rather rudimentary bridge at Shide, almost certainly a significant former ford site, had been upgraded by or in the thirteenth century when recorded as *Schidhambrigge*.

Street Names A few medieval place-names record roads rather than stream crossings. *Weg* 'way' and *straet* 'street' names can be considered together, with two instances of the former and three of the latter in the place-name literature, with a further instance documented by Beresford (1967). Four of these names represent route-ways of more than immediate local significance. *Holeweye* provided access to the Undercliff area from Wroxall, and can probably be identified with Old Shute (Margham 2013, Fig. 4). *Thenestrate* (Havenstreet) is on a route from the Island's north-east coast inland. *Rewestret* (Rewstreet) may possibly have been associated with the Romano-British 'villa' site adjoining Gurnard Marsh, but now lost due to coastal erosion, proving a road southwards from Gurnard Bay. The *Terra de Strete* of the twelfth century records the road eastwards from Newbridge, now known as Quarry Lane. There is evidence for a pre-existing settlement known as Stretley at the site of the thirteenth century planned town of Newtown. In the bishop of Winchester's account roll for 1254-5 there is a reference to the missing rent of *Stretleya* (Beresford 1967, 445). The remaining name is that of *atteridweie* (Redway), the *weg* here giving access to a location alongside the River Yar from Merstone.

Topographical Names Apart from explicit references to place-names associated with communications such as *ford, brycg* and *straet*, some inferences can be made about pre-Conquest roads from names describing natural topographical features. Rowborough in the upper Bowcombe valley contains the place-name element *beorg* 'barrow-shaped hill'. A previous study has drawn attention to the half-rounded profile of the spur to the north of Rowborough Farm when seen approaching from further up the valley (Margham 2011; 2012). However, the profile of the spur to the south-west of the farm when viewed from the road approaching from further down the valley is that of a barrow-shaped hill. This observation strongly implies that there was a road up the valley routinely used when the name was formed (Fig. 3). The place-name was first recorded in 1277 as *Rowebere* (Mills 1996, 88) but it is very likely that the name was coined many hundreds of years before this date. A similar inference can be made from the name of the hill associated with Bigbury Farm (Newchurch). This was *Bikeberge c.*1222, the name being a combination of two apparently contradictory topographical place-name elements, i.e. **bica* 'pointed ridge' and *beorg* 'barrow-shaped hill' (Margham 2012, 10). This contradiction can be explained by the angle from which the hill is viewed, which in turn implies that the road eastwards and the road from Apse Heath were both of significance to provide two different views of the same hill. A study by Ann Cole has drawn attention to the probable significance of *cumb tūn*, i.e. Compton place-names, as reference points on longer distance routes in the Anglo-Saxon period (Cole 2013, 66). Whilst the Isle of Wight does not provide opportunities for travel on land lasting for more than one day, the single instance of Compton on the Island may be significant in this respect. Compton Farm, first recorded as *Cantune* in 1086 (Williams and Erskine 1989, 52), would have been a significant landmark in its landscape setting for travellers to the West Wight when viewed from the lateral chalk ridge (Fig. 4).

Post-Conquest Documents

There is much information to be gleaned from post-Conquest documentary sources. Unlike locations in Anglo-Saxon charter bounds and items in the published place-name literature, the evidence cited below from medieval sources has not been collected systematically. Examples have been selected to provide evidence of the existence of roads and the modification and construction of roads.

Through Routes The information about the existence of roads and their status as perceived by contemporaries has been somewhat arbitrarily divided here into roads which were through routes and more than of immediate local significance, and shorter routes between two adjoining locations. References to the former category, which can be seen as broadly equivalent to the *herpaeðs* documented in the tenth century, are abundant in the documentary sources. One of the earliest references is to 'a certain croft on the way to *Claterford*, lying between *Vorstewell* and the great road' (Hockey 1981b, 82) in the mid twelfth century. 'The great road' would appear to have been the road south from Carisbrooke towards Whitcombe. Another 'great road' left Carisbrooke towards the Northwood area, 'the great road coming from *Karesbroc* and leading to *Cicely's gat* [Scuts Gate]' documented between 1200 and 1206 (Bearman 1994, 97). Part of this route is today followed by footpaths and one section is no longer a right of way.

'The public road from Newport to Brading' in the Heasley area in the thirteenth century (Hockey 1991, 133) was the road along the top of Arreton and Mersley Downs. After the foundation of Newport in the twelfth century there are references to roads to and from Newport. It is very likely that, as *Durneford* was the lowest crossing point of the River Medina before becoming a tidal estuary, these routes were of significance well before this date. The road from Shide to Newport,*'vie tendit de Side versus Novum Burgum'* (Hockey 1981a, 125) was mentioned c.1260. The road up from *Durneford* to the east was the 'main road to Newport' in the vicinity of *Cotebare Poyly* in 1334 (Hockey 1991, 404), now known as Staplers Road. Further out from Newport was 'the road from Newport to St Helens' at Havenstreet in the mid thirteenth century (Hockey 1991, 100). There were two crofts in the fields of Rookley and Sibdown 'lying on the east side of the road from Niton to Newport' in 1328, thus documenting a road from the centre to the south of the Island (Trin.

Coll. Cambridge, Budbridge Cert. 1.0.25). Also in the South Wight was the 'road from *Apeldreford* to Chale Church', c.1290 (IWRO JER/ misc.). Again providing a routeway from the centre of the Island to the south was the road coming from Wydcombe *'vie qua ventor de Widecomba ad Caresbroc',* c. 1230 (Hockey 1981a, 165).

Although several roads would have radiated out from the Carisbrooke/Newport area, significant routes are documented in other areas of the Island. The 'road from *Cotesford* [Scotchells Brook Bridge] as far as *Brandestone* [Branstone]' in 1240 (Hockey 1981a, 487) was a continuation of the well-documented road from Arreton to Horringford (below), out towards Sandown Bay. The reference of c. 1275 to 'the road called Portway' was to the road running north from Newchurch to Quarr, bypassing Havenstreet on the east side (Hockey 1991, 101). The central section of this route is now known as Rowlands Lane, which crosses Blackbridge Brook at *Blakbrigge*. Another significant north-south route was the 'ridgeway'. In 1487 a reference was made to the 'manor of Claybrook with its fishponds and warren and the pasture on the west side of the *Ryggeway*, between *Alewarston* [Alverstone] Common' and the '*Ryggeway,* which leads from *Schoweflete* [King's Quay] towards the eastern end of *Poyleys* lane.' (PRO E 315/33/134).

Local Routes Routes of more local significance were sometimes documented in relation to through routes. In 1280 '*the main road from Horringford to Arreton church*' was described, followed by mention of '*the path from Fulford as far as the said main road*' (Hockey 1991, 152). Similarly in c.1240 a location was described '*between the road coming from Blackbridge, which marked the boundary between the grange of Combley and the land of Briddlesford and the road leading from it, near the chapel of Briddlesford*' (Hockey 1991, 111). The '*33 acres of land at Le Parc of which two lie on the southern side of the road leading to Watchingwell*' c. 1220 (Hockey 1981a, 32) documents a track, part of which is no longer in existence, between Great Park and Upper Watchingwell. Within the 'Freshwater Isle' the 'road from Sutton to Freshwater Gate' and the 'road from Longbridge to Weston' were mentioned in about 1278 (IWCRO 95/32/13). Some minor roads gave access to local resources, for example the 'southern part of *Greneweye* descending as far as *Ranecumbe* [Rancombe]', a droveway giving access to downland pasture in 1241 (Hockey 1991, 332), and the 'land of *Bikeberge* (Bigbury) as far as the road leading to the moor at Borthwood' in 1222 (Hockey 1981a, 337). In the early seventeenth century an inquiry was made regarding the boundary between the King's tenants at Wroxall, and Mr Denys's tenants at Littletown, Holloway and Ventnor. The matter was settled through reference to two old persons who testified that about fifty-five years previously the boundary was the Greenway (IWCRO 134/15 Jas.1/Mich. 5). This is the trackway along the crest of Luccombe Down which continues northwards following the parish boundary between Newchurch and Shanklin. At the end of the medieval period such matters were of significance, with the manorial boundary being a routeway along a long-established boundary, and the Greenway providing access to downland sheep pasture.

Route Changes Although many, if not all, of the routeways itemised above would have been of considerable antiquity when first mentioned in the post-Conquest documents cited, changes to roadways are also described in these sources. In c.1216 Quarr Abbey granted permission for the '*freedom to construct a bridge over the water at Blakbrigge* [Blackbridge near Havenstreet], *where it suited them*' (Hockey 1991, 97). This would appear to be a realignment of the road at Blackbridge, as the above statement was prefaced by a comment that the recipient of the grant had '*free transit across his land, choosing the way clear of clay*'. In 1304 Quarr Abbey arranged for an '*exchange of land for making a roadway from the main road to Arreton beyond the abbey land to the west of the brook, as far as the hill of Berdone* [Arreton Down] (Hockey 1991, 163). A little before this date (c.1280) plans had been made for a new road at Beaper. This was to be:

> a broad road for carts 20ft wide, over her [Joan de Tracy's] land at *Beaurepeyr*, to begin at the road at *Stokbrugge* [Stockbridge between Nettlestone and Westbrook] and then to go south, next to the brook crossing it where it seems best, and then go up the great road towards the *Widgate* and *Beaurepeyr*, thus by the same road, as long as her lands last towards Brading (IWCRO JER/P/19).

At the end of the medieval period, many records were made regarding problems with the road system. An example of this was documented in 1558 when the jurors of Appuldurcombe reported that the highway between *Puckford Cross* and *Redhill Style* was in decay (IWCRO JER/WA/32/7).

The medieval documentary evidence for through routes and local roads builds on the evidence from Anglo-Saxon charter bounds and complements the information from place-names. All three strands of evidence are necessarily selective. Analysis of the entire pattern of roads on the Isle of Wight can only be made from post-medieval sources, i.e. maps produced from the eighteenth century onwards.

Topology

Topology is the study of networks. The road network of the Isle of Wight was not depicted in any comprehensive form on maps until the mid eighteenth century. The first properly accurate mapping of Island roads was the six-inch to the mile survey made under the supervision of Colonel Mudge of the Ordnance Survey which was completed in 1793. This formed the basis of the first edition of the one-inch survey of the Isle of Wight published in 1810. The analyses below are based upon these two resources. These are studies of the relationship between the road network and Domesday manorial centres in the East Wight, the relationship between the road network, Domesday manorial centres and local churches within the former extensive *parochia* of Carisbrooke, and of north-south/east-west routeways throughout the Island.

The East Wight

The evidence from documentary sources suggests that the hypothesis that the road network of the Isle of Wight was substantially complete by the eleventh century is largely correct. The plotting of Domesday manorial centres against the Island's road network may serve to substantiate this. The network of roads in the east Wight depicted on Map 3 is derived from the first edition Ordnance Survey map of 1810. The locations of Domesday manorial centres have been indicated. The area of the estates of Yaverland and Brading, purported to have been granted by King Ine of Wessex to the church of Winchester around the year 700, has been used in this study. This consisted of the later medieval parishes of Brading, St Helens, Yaverland and Shanklin and was the former minster parish (*parochia*) of Brading (Margham 2000, 119-20), with a sunken way defining its southern boundary (Fig. 5). No attempt has been made to differentiate between routeways of differing status in the early nineteenth century. Domesday manorial centres have been plotted at the site of farms and settlements depicted on the 1810 map. The exceptions to this are that the former site of Nunwell is depicted (Roy Brinton, personal communication), along with two other sites that were deserted by 1810, Selbournes and Hardley. With the exception of the three locations which were named as *Scaldeford* in the Domesday survey (i.e. Ninham, Upper Hide and Selbournes) only a single symbol has been used on the map to depict Domesday manorial centres sharing the same place-name in 1086.

The overall impression of the relationship between the road network in 1810 and the location of Domesday manorial centres is that the latter were well-served by roads. Several centres were located at nodal points on the road system, for example Nettlestone, Barnsley and Sandown (formerly known as Sandham), with most of the remainder on through-routes. The only sites not served by the road network as depicted on the 1810 map were Lea Farm, the former site of Nunwell and the lost settlement of Hardley. All three of these locations were however served by local paths depicted on the unpublished 1793 six-inch survey. The correspondence between the road network of 1810 and the Domesday manorial centres within this former estate suggests that a network of roads existed in the eleventh century which was substantially similar to that mapped in the later eighteenth century.

One observation that can be made from Map 3 is that there was one through-route within the reconstructed former estate running from the northern coast, southwards passing Rowborough, through the Yar gap in the lateral chalk ridge at Brading, past Sandham, on to Shanklin and beyond. Analysis of the road network in 1810 can provide further examples of both north-south and east-west routes. These will be examined below.

The Carisbrooke Parochia

'Extensive Lordship' was a feature of early medieval Britain, with large 'multiple estates' being dependent upon estate centres, of which the Yaverland and Brading estate is an example. This relationship between core and periphery of such estates would have been facilitated by the road network, for instance Calbourne being an estate centre for an extensive block of land, before the establishment of nearby Swainston as the bishop of Winchester's *caput* which probably occurred after the Norman Conquest. The break-up of extensive estates was a phenomenon of the later Anglo-Saxon period, as was the beginning of the fragmentation of extensive minster *parochiae* (mother parishes). Both of these can be seen as part of the process of the 'localisation' of society. The evidence for relationships between estate centres and outlying components of estates does exist from the Isle of Wight, but the religious counterpart, that of minster churches and their extensive *parochiae* is better documented. When this pattern was in the process of decay with the development of local churches, links between the former minsters and their daughter churches were recorded. In some instances later references were made to roads between the former minsters and the outlying communities that they served.

Several *parochiae* can be identified from documented relationships between churches, which in turn imply that people from outlying communities travelled to minsters before and during the process of local churches attaining parochial independence. This process of decay of the minster's authority and the development of local churches can broadly be dated from the tenth to the twelfth centuries, although attaining of full parochial independence by local churches could be a protracted affair as some instances on the Isle of Wight testify.

One of the best documented links between churches was the foundation of St Andrew's, Chale, in 1114. An agreement was made '*between the church of St. Mary of Carisbrooke in the Isle of Wight and Almetus the priest of that church, and the church of St. Andrew of Chale and Hugh Gernun who had founded that church*' (Hase 1988, 61). As part of this agreement Chale was to have a cemetery (*ibid.*). Before 1114 the dead would have had to be carried all the way to Carisbrooke for burial. An agreement was also drawn up in 1205 regarding the status of the chapel at Shorwell and its relationship with St Mary's, Carisbrooke. This included that Shorwell's dependent status was to be marked by the whole 'parish' having to go in solemn procession to Carisbrooke church every year:

> Also the Chaplain of Shorwell and all the parishioners of the chapel who are not excluded by some reasonable cause are in duty bound to assemble once a year and go solemnly in procession to the church of Carisbrooke, on the greater festival of that church, i.e. at the Assumption of B. Mary (Aug 15). And if on account of unfavourable weather or manifest storm they cannot come on that festival, then they must make their procession at the Nativity of B. Mary (Sept 8) and so honour their mother-church. And if still, on account of stormy weather, even if they have not been able to come, then they must visit the said church during the eight days following the Nativity (Hockey 1981b, 175).

Carisbrooke retained its right to bury the dead of Shorwell after this date. Worsley records that the chapel of Shorwell belonged to Carisbrooke parish until the time of Edward III [1327-1377], when the inconvenience of burying the dead at Carisbrooke, especially in winter, occasioned its separation (Worsley 1781, 251). In the words of the eminently quotable Sir John Oglander: '*One reason amongst others that they urged* [to obtain a burial ground] *was ye greate inconvenience they suffered in carryinge of corses* [corpses] *to burial to Caresbroke through ye waltorish lane at winter, whereby many caught theyre deaths. So that ye death in winter tyme of one cawsed many moore*' (Long 1888, 108-9; Fig. 6).

Documentary evidence when combined with examining the configuration of parish boundaries allows the reconstruction of minster *parochiae.* The *parochia* of the minster at Carisbrooke has been reconstructed by Patrick Hase (1988; 1994). The analysis of Map 4 is based on this reconstruction.

The pattern of later medieval parish boundaries within the former Carisbrooke *parochia* is complex, so these are not depicted on Map 4. The *parochia* consisted of a large block of land, extending from the Solent in the north to the English Channel in the south. It encompassed the parishes of Northwood, Carisbrooke, Gatcombe, Shorwell, Kingston and Chale. It also included detached portions of the parishes of Shalfleet, Wootton, Brighstone, and St Nicholas, the chapel of Carisbrooke Castle, as well as the extra-parochial area of Parkhurst Forest. Domesday manorial centres have been plotted in an attempt to relate something of the eleventh century settlement pattern to the road network of 1810. Most of these can be located with reasonable accuracy in the modern landscape, the exceptions being the second reference to Luton in Northwood and the second and third Shide place-names. In addition to these Domesday Book locations, the *tūn* names of Chawton, Cockleton, *Quidhampton* (now Marvel) and Somerton have been added. These place-names and associated settlements were probably in existence by the eleventh century (Cole 2013, 101). They have been included as they provide a more accurate picture of the settlement pattern in the Northwood area than the sparse record of Domesday, and provide evidence for 'functional *tūns*'.

As in Map 3, no attempt has been made to differentiate between roads of varying status in 1810. The plotting of Domesday manorial centres on to the later road network indicates that all are alongside roads and that in some cases, for example Chale, Carisbrooke and Shorwell, are at or adjoining nodal points. The distribution of Domesday manorial centres to the north of Carisbrooke is almost non-existent. This reflects the extensive land-use of wet heathland and wood-pasture of much of this area in the early medieval period, and much of this area formed parts of the manors of Watchingwell, Alvington and Bowcombe (Carisbrooke). That Watchingwell extended to the northern coast in 1086 is demonstrated by the reference to salt pans in its Domesday Book entry (Williams & Erskine 1989, 52v). The *tūn* settlements of Chawton, Cockleton and Somerton, along with Domesday Luton, are all located on or adjoining the margins of the plateau gravel in the Northwood area. None of these are on the road northwards towards the Cowes area, but all are within less than half a mile of this road and are connected to it by local roads. Somerton and Chawton can be identified as 'functional *tūns*'. Somerton records the former seasonal settlement of this area for pasturing stock in the summer months and Chawton can best be interpreted as 'calves farm' (Margham 2015b). Both of these names record the use of the wet heathland and wood-pasture surrounding the dry heathland on the plateau gravel in the early medieval period.

For much of the former *parochia* the road network would seem little altered between the later eleventh century and 1810. The exception to this was the area within the bounds of medieval Alvington Forest. Changes and additions to the road network would have been stimulated by the enclosure of the areas to the west, south and east of modern Parkhurst Forest, for example the establishment of Forest Road, along its modern southern boundary, and Betty Haunt Lane/Whitehouse Road to the west. Forest enclosure would appear to have been responsible for the extinction of part of the line of the road which went from Carisbrooke to *Scuts Gate* in the early thirteenth century (above). A further addition to the road pattern came with the foundation of Newport in the twelfth century. Newport's street pattern can be seen on Map 4.

A wide variety of functions of the road network within Carisbrooke *parochia* can be suggested, ranging from access from the estate centre and minster church site at Carisbrooke to outlying communities, through to local access to agricultural resources. Examples of the latter would be to the wet heathland and wood-pasture in the Alvington Forest area and to rough grazing alongside the River Medina estuary and further upstream at locations such as Cridmore. Unlike the East Wight estate, there was more than one north-south route. One route was along the ridge from the Cowes area southwards into the Medina valley, then up the chalk valley at Chillerton, and onwards to the south coast. The other route that can be identified was southwards from the Thorness area, over the chalk downland to Shorwell, and on to the Atherfield area adjoining the south coast. A substantial portion of this route, from Whitehouse Farm southwards to New Park, was depicted as a track through the unenclosed Parkhurst Forest on the 1793 map. This had been straightened to a road through an enclosed landscape in 1810, but was fundamentally the same route.

An Island Road Network

Although local changes in the Island's road network from the eleventh to the early nineteenth centuries can be identified, the general pattern can be shown to have been in existence by the former date. Roads can be somewhat arbitrarily divided into roads of local importance, and roads for longer distance communication. A consideration of the road network of the whole of the Isle of Wight using the map of 1810 will demonstrate the significance of these longer distance routes.

Map 5 is derived from a tracing of all the roads and tracks depicted on the 1810 map. As in the discussions above, no attempt has been made to differentiate between roads of varying status. This approach to examining the road system aids objectivity, in that analysis should not be prejudiced by knowledge of topography, modern road classifications or by the relative insignificance of un-metalled lanes in the modern landscape. The following sites have been superimposed on the road network to aid analysis:

- High status medieval churches (i.e. minsters and probable minsters) based on Hall's identification of minsters in Dorset (see Appendix 3 below);
- Other Anglo-Saxon estate centres for landholdings of five hides or more which are not coincident with high status churches; and
- Probable meeting place locations associated with local governance in the tenth and eleventh centuries (moot sites) and sites that may have been in use by the later eleventh century identified by Margham (2013).

The longer distance routes depicted in 1810 can be broadly classified into north-south, east-west, and roads radiating out from the Carisbrooke and Newport area, with some inevitable overlap between these categories.

North-South Roads

The north-south roads which can be identified are as follows:

- Shalfleet to Brook
- From the area to the north of Calbourne though to Brighstone
- Thorness to the Atherfield area
- Cowes though Newport to the Atherfield area
- Newport to Niton
- East Cowes to Ventnor
- From the Ryde area to Shanklin

West-East Roads

The west-east routes which can be identified are as follows:

- Yarmouth to the top of Hunnyhill, north of Newport
- Thorley to Carisbrooke via Newbridge, Upper Watchingwell and Alvington
- Freshwater to Carisbrooke
- Brook to Shorwell
- Chale Green to Shanklin
- Newport to Brading
- Godshill to Shanklin with a spur north-eastwards to Newchurch
- Through 'The Undercliff'

Roads from Carisbrooke and Newport
Roads which radiate from Carisbrooke and Newport are one and the same beyond about a two mile radius from these two nodal points, due to their proximity. In addition to some of the roads itemised above, these are:

- Newport to Ryde
- Newport through Blackwater to Sandown

It can be noted from Map 5 that there is a gap in this route as it was depicted on the 1810 map in the Branstone area. This is however depicted as a road in the 1793 six-inch survey which was unenclosed on its northern side.

Two observations can be made about this pattern of longer distance roads on the Isle of Wight. Firstly, the influence of the plantation of Newport in the twelfth century can be detected in the early nineteenth century road map. Carisbrooke can still be seen as a major nodal point for roads in 1810 but only part of the former great road to Scuts Gate is depicted, with the road here shown as curving round towards Newport (Petticoat Lane). Also, the former importance of the road from the ford at Blackwater to Carisbrooke can be identified. Secondly, although there is only limited evidence for the existence of roads in the Anglo-Saxon charter bounds of the Island, the two instances of *herpaeðs* 'highway' (Appendix 1) which can be identified with through roads are itemised above. These are the road from the Newport area through Blackwater to Sandown, and the road from Godshill to Newchurch.

Minster Churches, Estate Centres and Moot Sites
Minster church sites as defined by the criteria developed by Hall (2000) have been plotted onto the road network of 1810 as these were significant places in their own right in the eleventh century and reflect the pattern of early estate centres. Two further sites have been added to this distribution, both of which are estate centres comprising landholdings of five hides or more. Wroxall was an estate of five hides in 1066 whilst Yaverland is purported to have been an estate of 30 hides documented in the lost charter of King Ine (688-726) of Wessex (Williams & Erskine 1989, 39v; Margham 2000, 119-20).

The high status churches of Freshwater, Shalfleet, Calbourne, Carisbrooke, Arreton, Godshill and Brading were all located at nodal points on the road network. Whippingham and Newchurch are on through routes but are not at nodal points. These high status church sites stand proxy for mid-Saxon estate centres. Shalfleet, Calbourne and Brading are all high status churches associated with Anglo-Saxon charters itemising estates with relatively large hidages (Sawyer 1968 S 281 & S 274; Finberg 1964 ECW 1), as is Whippingham (Finberg 1964 ECW 4). Arreton was a royal estate which was itemised in King Alfred's will of the later ninth century (Keynes & Lapidge 1983, 175). Wroxall and Yaverland have been added to this list of probable estate centres. Wroxall was the centre of a five hide estate mainly within the Island's southern chalk massif at the time of Domesday. Its topographical place-name and isolation from the estate centres further to the north does suggest that it was a centre of some antiquity in 1086 although it never acquired a church. The location of Wroxall Manor Farm in a blind valley within the chalk downs does not lend itself to being at a nodal point of longer distance roads, but the 1810 map shows it to have been at a *local* nodal point and connected with the wider network of Island roads.

A similar observation can be made regarding Yaverland in its connection to the road network of the 'Bembridge Isle' which before the construction of Yar Bridge was only connected to the wider Island road system via the track along the coast to Sandown. Yaverland did acquire a small parish church, probably in the twelfth century, adjoining the manorial centre. It can be inferred from the lost charter of Ine (Finberg 1964, ECW 1) that it was an estate centre for the whole of the 'Bembridge Isle'. The fact that it was one of the very few Domesday manors held directly by the king owing no geld taxation (i.e. not assessed in hides) in 1066 supports this identification as an estate centre of long-standing by the eleventh century.

Significant aspects of the landscape of the later Anglo-Saxon period were meeting places for local administration, often associated with the local administrative unit of the Hundred. The Isle of Wight can be shown to have consisted of two Hundreds at the time of Domesday Book divided by the Medina estuary and river. Bowcombe Hundred later became known as the West Medine and the other, unnamed hundred, was later known as the East Medine (Margham 2012). The meeting places of the Longstone, Bunts Hill, Bowcombe Down and The Hatt all adjoin nodal points on the 1810 road network (Fig. 7). Shide Bridge is also at a nodal point. It is however uncertain whether this location was a hundredal meeting place in the eleventh century or whether this was a later development, possibly replacing Bowcombe Down (*ibid.*). Many other nodal points can of course be identified on the 1810 map, but minster churches/estate centres and meeting places had contemporary relevance to the inhabitants of the mid and late Anglo-Saxon landscape.

Anglo-Saxon roads and their use

The functions of the roads making up the Island's routeway network were multifarious. That of communications between minsters and outlying communities has been mentioned above. There is evidence from mid and later Anglo-Saxon England and in Domesday Book for four other functions of the road system, i.e. defence, transferring stock, the collection of the 'farm of one night', and trade. These will be examined in turn.

Defence

The Isle of Wight was of fundamental importance to the defence of southern England in the later Anglo-Saxon period (Margham 2015a). Along with the *burh* at Carisbrooke and a system of beacons, the road system of the Island would have been an important component of defence against the Vikings. As we have seen, the charter bounds include references to two *herepađ*s, one at Sandford and the other *herepađes* crossing the ford at Bathingbourne. This Old English place-name, literally meaning 'army path' 'is commonly taken to signify a road made for military purposes, when identified on the map, however, *herepađes* usually turn out to be ordinary roads without military importance...' (Rackham 1986, 259). Grants or confirmations of land grants by the king were frequently subject to the three 'common burdens' in later Anglo-Saxon England. These were obligations by the land holder to contribute to military service (*fyrdfæreld*), bridge-work (*brycggeweorc*) and fortress-work (*burhbot*). Whilst it would appear that the three 'common burdens' were not used in the construction of roads for military use, the road network would however had been of great significance in the defence of the Isle of Wight, for access for the *fyrd* (militia) to the coast, and other locations where they needed to be deployed. The road system, whilst essentially complete, had to be maintained for military use. This may not have been on an *ad hoc* basis. Alex Langlands has observed regarding *herepađes* that:

> Overall, their ubiquity in Wessex and distribution in the landscape, and their uniformity in terms of the terminology used to describe them, go some way to suggest that in the herepath system, some kind of national policy and strategy has been implemented in response to the Viking threat. Is it possible we have here a scheme of national defence over which the documentary sources are entirely silent? Accepting the view that herepaths are a product of a planned system of road maintenance for the defence of the realm, we should consider them in relation to another more famous scheme of national defence – the *Burghal Hidage* (Langlands 2013, 219).

The 'Lower Enclosure' at Carisbrooke Castle would appear to have been a *burh* at the time of King Alfred which was excluded in extant texts of the *Burghal Hidage* document probably due to scribal error (Margham 2015a, 22-24). The tenth century charters of the Isle of Wight itemise six locations in which the three 'common burdens' were incumbent on landholders.

The one element of the three 'common burdens' which was directly relevant to the road system was *brycggeweorc*, bridge work. As we have seen, there is little direct evidence for the existence of bridges on the Island by the later eleventh century, but the single instance of Shide Bridge does alert us to their presence. It is a reasonable assumption to make that Shide was not an isolated example even though most crossings of water courses would have been fords. Although the clause in charter proems referring to the three 'common burdens' is formulaic, the imposition of the three 'common burdens' from at least the mid tenth century implies that there were bridges to be repaired on the Island. This common burden was inescapable as the law codes of II Cnut specify that the fine for neglect of the 'common burdens' was 120 shillings under English law and slightly later as the *Rectitudines* of c.1050 state: '*the law of theigns is, that if he is to be worthy of bookright, he should do three things for his land: army service, borough-work and bridge-work*' (Cooper 2006, 63). The construction of bridges would have facilitated the deployment of the *fyrd* to various parts of the Isle of Wight.

The movement of livestock

There is evidence for the seasonal movement of stock to summer pastures in the Anglo-Saxon period. The bounds in the Anglo-Saxon charter of King Eadred (951-955) granting *Beaddingaburnan* (Bathingbourne) and *Linlande* are unique amongst Island charters due to their mention of outlying pastures (Sawyer 1968, S 1662). The bounds of Bathingbourne conclude with the phrase: '*And the outlying pasture common with other men*', whilst *Linlande*'s concludes with: '*And the outlying pasture and the woodland pasture common with other men*' (Margham 2007, 117-23). Whilst *Linlande* is yet to be identified, it would appear to have been on the Isle of Wight, and documents a link between a discrete estate and distant open pasture, probably chalk downland, and wood-pasture. The bounds of Bathingbourne can be identified and were situated in the valley of the eastern Yar river. The Domesday Book entry for Bathingbourne is titled 'The Down [*La Done*] and Bathingbourne' (Williams & Erskine 1989, 39v). It would thus seem that Domesday *La Done* was the location of the outlying pasture belonging to Bathingbourne in the mid tenth century. The Domesday place-name evidence suggests that the outlying pasture of Bathingbourne was chalk grassland. The minimum distance from Bathingbourne to chalk downland, beyond its southern bounds, is 1½ miles. It has however been suggested that *La Done* can be identified with Down Court, high up in the Island's southern chalk downland (Kőkeritz 1940, 252-3). If this identification is correct, then Bathingbourne's outlying pasture was some 4 miles beyond the bounds of the estate. There is further evidence in the Domesday folios for outlying pasture in the reference to Knighton and the Down (Williams & Erskine 1989, 54). Whilst 'the down' in this instance may very well have been the downland immediately to the north of Knighton, a more distant location several miles to the south is quite possible. Kőkeritz points out that:

> DB records two manors called respectively *Done* and *Ladone*, which have so far been left unidentified. In 1066 the former was held by the King together with Knighton, and and the entry in question is immediately followed by *La Done* and Bathingbourne, also held by the King. The most plausible explanation of this simultaneous mention of *Done* and *Ladone* is that they represented two distinct portions of the same manor, which I do not hesitate to identify with modern Down Court (Kőkeritz 1940, 252-3).

Assuming that Kőkeritz's identification is correct, we have evidence for the movement of stock over significant distances away from the estate centre. Down Court is 6½ miles from Knighton. The seasonal movement of stock over considerable distances in the Anglo-Saxon period is now attested in the research literature, for example up onto Dartmoor and into the Kentish Weald (Fox 2012; Everitt 1986). Whilst the distances involved on the Isle of Wight were not so great, they were far enough to suggest movement of stock to summer pastures (Fig. 8). The evidence cited above raises the possibility that other routes were used for the seasonal movement of livestock. In addition to downland pasture, seasonal movement to riverside marsh, for example along the upper course of the Medina and the lower course of the eastern Yar, can be suggested. The dominance of Heathfield in the Swainston estate in 1630 alongside the evidence that the bishop of Winchester's estate formerly included the Brighstone area, and the reference to wood-pasture in the bounds of *Linlande,* all suggest the seasonal movement of stock to the wet heathlands and wood-pastures of the Island's 'Northern Lowlands'.

The 'farm of one night'

An important institution in Anglo-Saxon England was the 'farm of one night'. '*Although the farm of one night was sometimes expressed in financial terms, it appears to have originally been intended as a render in kind, which may have provided for a king while travelling on circuit*' (Lavelle 2007, 13). The evidence for this provision from the Isle of Wight is to be found in the Domesday folios for Bowcombe and for Amesbury in Wiltshire (Williams & Erskine 1989, 52; Williams & Martin 2002, 162). Bowcombe is the only manor on the Isle of Wight which contributed to the 'farm of one night' and although a royal manor in 1066 it did this through the extensive royal manor of Amesbury. Bowcombe therefore acted as a collection centre. We can envisage Æthelred II dining off this food render during his sojourn on the Isle of Wight during the Christmas season of 1013 on his way to exile in Normandy (Swanton 1996, 144).

We do not have any accounts of what was collected from the Island, but some idea may be gained from a clause in the law-code of king Ine of Wessex, dated to 688x694. The food render expected from an estate of ten hides was '*10 vats of honey, 300 loaves, 12 "ambers" of Welsh ale, 30 of clear ale, 2 full-grown cows, or 10 wethers, 10 geese, 20 hens, 10 cheeses, an "amber" full of butter, 5 salmon, 20 pounds in weight of fodder, and 100 eels*' (Whitelock 1979, Ine 70.1). Provisions such as these would have been collected on the Bowcombe estate from within the estate and perhaps beyond, necessitating the use of carts and in the case of livestock, transport on the hoof (or even on the foot in the case of geese).

With the exception of Æthelred's visit, there is little evidence for the visit of Anglo-Saxon kings to the Isle of Wight, so the food render would have been transported to mainland Wessex. This raises the issue of where were the stathes? A charter of Æthelred of 982, a confirmation of the grant of various estates to Winchester New Minster, included 1 hide at *Staðe.* This can be identified with Fishbourne (Margham 2012, 279-84). This is the only explicit mention of such a 'landing place' in the corpus of Island place-names until that of *Nettlestone Hythe* in 1583 (Kőkeritz 1940, 198). Other such locations must have existed in Anglo-Saxon Wight, with roads serving them. Domesday *Ermud* (Yarmouth), the Gurnard Marsh area at the northern end of Rew Street, King's Quay, and the later site of Newport Quay, can all be suggested.

Trade

The wealth of the Isle of Wight in the mid-Saxon period is demonstrated by the evidence recorded by metal detector users from a 'productive site' in the Bowcombe Valley. A 'productive site' is a broad term used to describe a location which has produced a range of metal artefacts. Whilst some 'productive' sites

> … are simply settlements discovered via metal-detected finds instead of the more traditional methods of fieldwalking and excavation. Another perspective is offered by Katharina Ulmschneider, who identifies 'productive' sites as having been the sites of seasonal fairs or more permanent trading posts largely on the basis of the number of coins discovered (Hoggett 2010, 77).

The number of middle Saxon coins recovered from the Bowcombe Valley site is exceptional. The coin sequence commences between 700 and 710, intensifying during the eighth century before seeming to decline from late in the century, ceasing by the early ninth century (Ulmschneider 2003, 75). Along with non-ferrous metalwork, the coin evidence '*points to a major market or 'productive' site in an area of very dense activity in the centre of the island, which clearly had close connections with both Hamwic and probably the continent*' (Ulmschneider 2003, 77). The large number of sceattas (coins) minted at *Hamwic* indicate this connection with mainland Wessex. The Bowcombe Valley 'productive site' did not last as long as the emporium of *Hamwic* which in turn would appear to have been replaced by Southampton from about 900 (Lilley 1999, 71). The 'productive site' in the Bowcombe Valley can be seen as a 'central place' for the Island for the century or so of its existence. This function would appear to have been taken over by Carisbrooke by 1086, for Domesday Bowcombe was recorded as having a toll worth 30 shillings (Williams & Erskine 1989, 52). The Bowcombe Valley site and Carisbrooke are near the centre of the Isle of Wight and would have been well-served by communications. These included the Island's lateral chalk ridge, the lower level roads radiating from the Carisbrooke area, the various fords and the one instance of a bridge at Shide. To this can be added water-borne communications along the Medina estuary and beyond to mainland England.

Domesday Book and other sources provide some information about what was being traded in the Bowcombe area along the road system and with the mainland from stathes. Grain and pigs, along with salt, can be inferred from Domesday Book, and although not mentioned, wool was almost certainly an important part of economic life. The use of Bembridge Limestone in more than 25 mainland Hampshire and Sussex churches dating from the later Anglo-Saxon period testifies to the stone trade. This corpus of church sites was supplemented by the evidence of Anglo-Saxon stone sculpture, with the likelihood of trading of stone from at least the ninth century onwards (Ulmschneider 1999, 33).

An Anglo-Saxon Road Network

The study of the development of the roads of the Isle of Wight is a vast subject which would benefit from a much more detailed analysis of the medieval and post-medieval evidence. However, in broad terms, Taylor's statement that '*… apart from the modern motorways and a few roads in particular areas, our pattern of roads is the same as it was 900 years ago*' (Taylor 1979, 110) can be supported by the evidence from the Isle of Wight reviewed above, with some qualifications. The Island has no motorways but does have a relatively recently constructed dual carriageway crossing the Medina between the top of Hunnyhill and Coppins Bridge in Newport. The Military Road was a significant addition to the Island's road network in the early nineteenth century, providing rapid access to 'The Back of the Wight'. These, and other more minor additions and alterations, can be cited as evidence of change since Domesday Book was compiled in the later eleventh century. Bridges were built, new towns were laid out, some roads went out of use and nearer to the present day the surface of roads was improved, but the network of roads which existed then was fundamentally similar to that of the present day.

Notes

[1] Anglo-Saxon charters are indexed according to their numbers ascribed to them in Sawyer (1968). Thus the four charters referred to in Appendix 1 are S 543 which included 1 hide at Ningwood, S 1662 which included 1 hide at *Linlande* as yet unidentified but quite possibly in the Bathingbourne area, S 1663 which included 5 hides at Bathingbourne, and S 842 which included 2 hides at Branstone, 2 hides at Bathingbourne, 2 hides at Ashey, and 1 hide at *Staðe* (Fishbourne). These and the other charter bounds of the Isle of Wight are discussed fully in Margham (2005) and Margham (2007).

[2] The place-name *Staðe* has been added to this corpus of names. Mills (1996) does not mention it and Kőkeritz (1940) thought that it referred to a location in the Titchfield area of mainland Hampshire.

[3] The final instance is really in a category of its own. *Yarneford* was a route across the mouth of Brading Haven, the vestiges of which are now known as Bembridge Harbour.

[4] Domesday *La More*, not Moor Farm but Fulford adjoining Horringford (Hockey 1991, 140).

[5] Although *brycg* could mean the same as modern 'bridge', it could also mean a causeway or bridge and causeway combined (Cole 2013, 37). Examples of the latter on the Isle of Wight include Yarbridge and Newtown Bridge.

[6] The author has only noticed this quite recently, whilst cycling up the Bowcombe valley in February 2015, having a view of this hill which would have been obscured by leaves on the trees adjoining the farm later in the year.

[7] Scuts Gate was a location on the road from Newport to Cowes in 1810, the site of the Stag Inn. The 'great road' from Carisbrooke in the early thirteenth century would have run northwards from Priory Farm, crossing the stream at Kitbridge Farm, then through the H.M. Prison site and up Horsebridge Hill to Scuts Gate. In 1250 it was described as '*the main road* (*magnam stratum*) *leading to the lazar-house*' and in 1270 as '*the road from the Priory* [of Carisbrooke] t*o Cutebrigge* [Kitbridge] *and Chimelorde* [West Cowes]' (Hockey 1981b, 99, 230).

[8] Due to the track bed of the former Newport to Freshwater railway line being used as a minor road, replacing its former alignment.

[9] Namely Nettlestone, Barnsley, Adgestone, Yaverland and Shanklin.

[10] Cole has made the observation that pre-existing road systems may have had a considerable influence on the choice of site for residences of the king (Cole 2013, 110-111). The same can be argued for the estate centres of the Isle of Wight in the mid-Saxon period. 'In this case the royal residences would not be determining which pre-existing Roman roads or ancient tracks were going to be used: the roads would be determining where residences would be' (*ibid.*).

[11] The collection of tithe would have been one of these functions. This was made obligatory in Athelstan's law regarding church dues (926xc.930) and after c. 960 was enforceable by the king's reeves (Morris 1989, 210).

[12] The 1810 map does not show this as a continuous route through the Swainston area. However, an examination of the unpublished six-inch scale survey completed in 1793 shows vestiges of the west-east route in this area as a path.

[13] Nunnery Lane receiving a metalled surface can be recalled by the author.

[14] One *herpaeðs* is mentioned in two different sets of bounds, i.e. Bathingbourne and Branstone (*Heantune*).

[15] The laws of Henry I (*Leges Henricii Primi*) which date from c. 1113-1118 have their origins in Anglo-Saxon law codes. These laws are concerned with the identification of highways that came under the king's jurisdiction and ensuring the safety of road users. '*Leges Henricii Primi* define the highway as "the *via rega* which leads to a city (*in civitatem*) or royal *portus* (*portum regium*)", it is uncertain whether the latter means a market town or a sea-port. An earlier document of c.1080 says that a highway is a road linking city to city, market to market, or one sea port to another' (Cole 2013, 10). A highway was to be wide enough for two ox-carts to pass, or of two goad-lengths (a goad being about 16 feet long), or to allow 16 knights to ride abreast (Cole 2013, 11).

[16] The place-name Kingston may derive its name from being a collection centre for the 'farm of one night' from this part of the Bowcombe estate to the south of the Island's lateral chalk ridge. This will be explored further in a study of the *tun* place-names of the Isle of Wight.

[17] For the implications of Ine 70.1 including estate management see Lavelle (2013).

[18] A further use of Island roads and stathes was documented in an account written in 971-973 by a monk of Winchester named Lantfredus. This concerns miracles recorded when the body of St Swithin was translated to the Old Minster in 971 by Bishop Ethelwold. Lantfredus gives details of individuals and their place of origin and includes three blind women from the Isle of Wight (Webb 2000, 19-20).

[19] Whilst Southampton would have been the major port for produce from the Isle of Wight, other trading locations can be identified. Ninth century coins from Eling Creek suggest a port in the Totton area. The mention in the *Vita Wynnebaldi* of Willibald setting out on his travels to the Continent in about 721 from Hamblemouth describe the location as a *mercimonium* (Ulmschneider 1999, 82). Lepe, the termination point of a Roman road from the north, which has been identified as the *Ad Lapidem* in Bede's *Ecclesiastical History* where two princes fleeing the Island were taken, is another possibility (Ulmschneider 1999, 35). To this list can be added *Twynham* (Christchurch), which had its origins as a town in the defensive arrangements by King Alfred documented in the Burghal Hidage.

[20] David Tomalin notes that the export of Quarr 'featherbed' limestone was well organised in the later Anglo-Saxon period. He envisages shipment of limestone directly from Quarr beach to locations accessed from Chichester and Pagham Harbours, and the mouths of the rivers Arun, Adur and Ouse (Tomalin 2012, 264).

[21] Post Medieval changes are largely beyond the scope of the present study, but some general observations can be made regarding changes to the Island's road network after c.1550. The most obvious addition to the rural road network was the construction of the 'Military Road' in the early nineteenth century, linking Freshwater Bay with Chale. The enclosure of Parkhurst Forest had an effect on the road network in the area to the north-west of Newport. The period saw the expansion of Newport, mainly from the nineteenth century onwards, and the development of West Cowes, East Cowes and Ryde as urban places. Modern alterations to the road network include the closure of the road into the Undercliff area from Chale following the massive cliff fall of 1928 and more recently the construction of the dual carriageway from Coppins Bridge to the top of Hunnyhill in Newport, and the southern extension of this route to Shide Bridge, known as St George's Way.

[22] The surfacing of roads with tarmac has served to define roads more clearly in the modern landscape. The quality of the roads on the Isle of Wight before the advent of modern surfacing would have left much to be desired from our perspective. A recent study has provided a definition of the local minor place-name of Shute as 'a through route negotiating a hillside via a sunken way in an enclosed landscape which could become a temporary watercourse during or after heavy rain' (Margham 2013, 59). The inter-changeability of *Brixton Whiteway* and *Brixton Shoot* in 1556 reminds us of this and the un-metalled nature of road surfaces. A good impression of an early medieval road can be gained by walking up the sunken way from Arreton Cross onto St George's Down (Fig. 7).

Acknowledgements

I am grateful to Alex Langlands for providing an electronic copy of his thesis. Maurice Turner, Johanna Jones, Ann Cole and Vicky Basford have all commented on a draft of this paper and I thank them for their comments and observations. I have had correspondence with Jilly Bourne about Kingston place-names and thank her for her suggestion about the meaning of Kingston within the former Bowcombe estate.

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Author: John Margham, 24 Woodpark Drive, Knaresborough, North Yorkshire, HG5 9DL.
johnmargham@yahoo.co.uk

Appendices

***Appendix 1*: Evidence for Isle of Wight roads in Anglo-Saxon charter bounds**

ford 'ford'
þam stanihtan forda 'the stony ford' *S* 1662 (Bathingbourne)
þone stænihtan ford 'the stony ford' S 842i (Branstone)
þæne stanihtan ford 'the stony ford' S 842ii (Bathingbourne)

geate 'gate'
wynnangeate 'the meadow/pasture gate' S 842i (Winford)
đæt hlidgeat 'the swing gate' S 842iii (Ashey Down)
þan fulan geate 'the dirty gate' S 842iii (Ashey)
þæt geat 'the gate' S 842iv (Firestone Copse)
þan stane æt þan geate 'the stone at the gate' S 842iv (Elenor's Gove)

lanan 'lane'
lanan S 543 (Warlands/Newbridge)
lanan S 543 (Newbridge/Wellow)

herepað 'highway'
herpað S 1662 (*Linlande-* unidentified)
herpaeðs S 842i (Branstone)
herpaeðs S 842ii (Bathingbourne)
þone sandihtan hærepoþ 'the sandy highway' S 1663 (Sandford)

weg 'way'
þes grenan weges 'the green way' S 1663 (Bathingbourne)

***Appendix 2:* Place-Name evidence for Isle of Wight roads**

OE *brycg* 'bridge', also 'causeway'
Bridge(court) *Bryggecourt* 1465, ME *court* (M 33)
Bembridge *Bynnebrygge* 1316, OE *binnan* 'inside, within', (M 27)
Blackbridge (Havenstreet) *Blakbrigge c*1216, OE *blæc* 'black, dark-coloured' (M 29)
Blackbridge (Freshwater) *ate Brigge* 1271, OE *blæc* 'black, dark-coloured' (K 125)
Bow Bridge (Freshwater) *Boudybrigge* 1417, ME *boued* 'bent, curved' (K 125)
Bridge Farm (Godshill) *La Brige* 1235 (M 33)
Budbridge *Butebrigge* 1235, either p.n. *Butta or OE **butt* 'tree-trunk, log' (M 35)
Coppin's Bridge 1769, *Godsbridge* 16th c (K 177)
Kitbridge *Cuttebrigge c*1220, probably OE *cyte, cete* 'cottage' (M 64)
Langbridge *Langhebrigge* 1228, OE *lang* 'long' (M 65)
Newbridge *Newbryge* 1328, OE *nīwe* 'new' (M 74)
Redebrigge (near Budbridge) 1471, OE *hrēod* 'reed' (K 20)
Shide Bridge *Schidhambrigge* 13th c, OE *scīd* 'plank, beam, foot-bridge' (M 95)
Stockbridge (Whitwell) *Stocbrig* 1759 (K 255)
Wootton Bridge 1608 (M 111)
Yarbridge *Yarnbrigge* 1462 (M 112)

OE *ford*, 'ford'
Appleford *Apleforde* 1086, OE *apuldor* 'apple tree' (M 22)
Briddlesford *Breilesforde* 1086, OE *brigdels* or *brīdels* 'bridle' (M 33)
Clatterford *Claterford* c.1150, OE **clater* 'loose stones or pebbles' (M 40)
Cottefford 1287x90 [south-west of Sheat?], ?OE *cot, cote* 'cottage, animal shelter' (K lxiii-lxiv)
*Durneford c*1258, OE *dierne* 'secret, hidden' (K 177)

Farringford *Feringeford* c.1250, p.n. *Fēra and OE *-inga-* (M 49)
Ford *Northeforde* 1586, *p.n. Atteford* 1271 (M 50)
Fordhulle/Ford Mill 13th c [=*Durneford* ?] (K 177)
Fulford *Fuleford* 13th c, OE *fulan* 'dirty, muddy' (M 52)
Horringford *Honingeforde* 1235, OE *horn* 'horn-shaped piece of land' and *-inga-* (M 61)
Huffingford *Ovingefort, Huncheford* 1086, OE *hūfe* 'hood-shaped hill' and *-inga-* (M 30)
Melevsford 1086, OE *mylen* 'mill' (K lx-lx1)
Pidford *Pideford* c.1290, OE **pide* 'marshy ground' (M 82)
Presford *Prestford* 1235, OE *prēoste* 'priests' (M 83)
La Rydeford 1331, OE *hrēod* 'reed' (K 20)
Sandford *Sandford* 1086, OE *sand* 'sand, sandy' (M 91)
Scaldeford 1086, OE *sceald* 'shallow' (M 93)
Shish Ford *Richeford* 1255, OE **scīete* 'corner of land' (K 84)
Southford *Southford* 1632 (M 96)
Winford *Winford* c.1246, OE **winn* 'pasture or meadow' (M 110)
Yafford *Heceford* 1086, OE *hæcc, hecc* 'hatch or grating' (M 112)
Yarneforde 1324, *de Arneford* 1248, ?OE **ærheford* 'ford fit for riding' or ?OE **ēaren* 'gravelly' (K 62)

OE *(ge)waed* 'ford'
Banewadam 740x756 (K lviii)
Underwa 1235, *Underwathe* 1250-60 (K 201)

OE *hyþ* 'landing-place'
Nettlestone Hythe 1583 (K 198)

OE *scīd* 'plank, beam, footbridge'
Shide *Sida, Side* 1086 (M 95)

OE *staðe* 'stathe'
Staðe 982 (S 842)

OE *stigel* 'style'
Stile House (Arreton) 1531, *p.n.* 1397 (K 22)

OE *straet* 'street'
Havenstreet *Thenestrete* 1248, OE *hæthen* 'heathen' (K 32)
Rewstreet *Rewestret* 14th c, OE *ræw* 'hedgerow' (K 189)
Street Place *terra de Strete* 12th c (K 84)
Stretley 1254-5 (Beresford 1967, 445)

OE *weg* 'way'
Holloway *Holeweye* 1287-90, OE *holh* 'hollow' (K 231-2)
Redway *atterideweie* 1302, OE *ryd(e)d* or OE **rēod* 'cleared' (K 20)

Abbreviations:
K Kőkeritz (1940)
M Mills (1996)
ME Middle English
OE Old English
p.n. personal name
S Sawyer (1968)

Appendix 3: **Identifying Minsters: a quantitative approach**

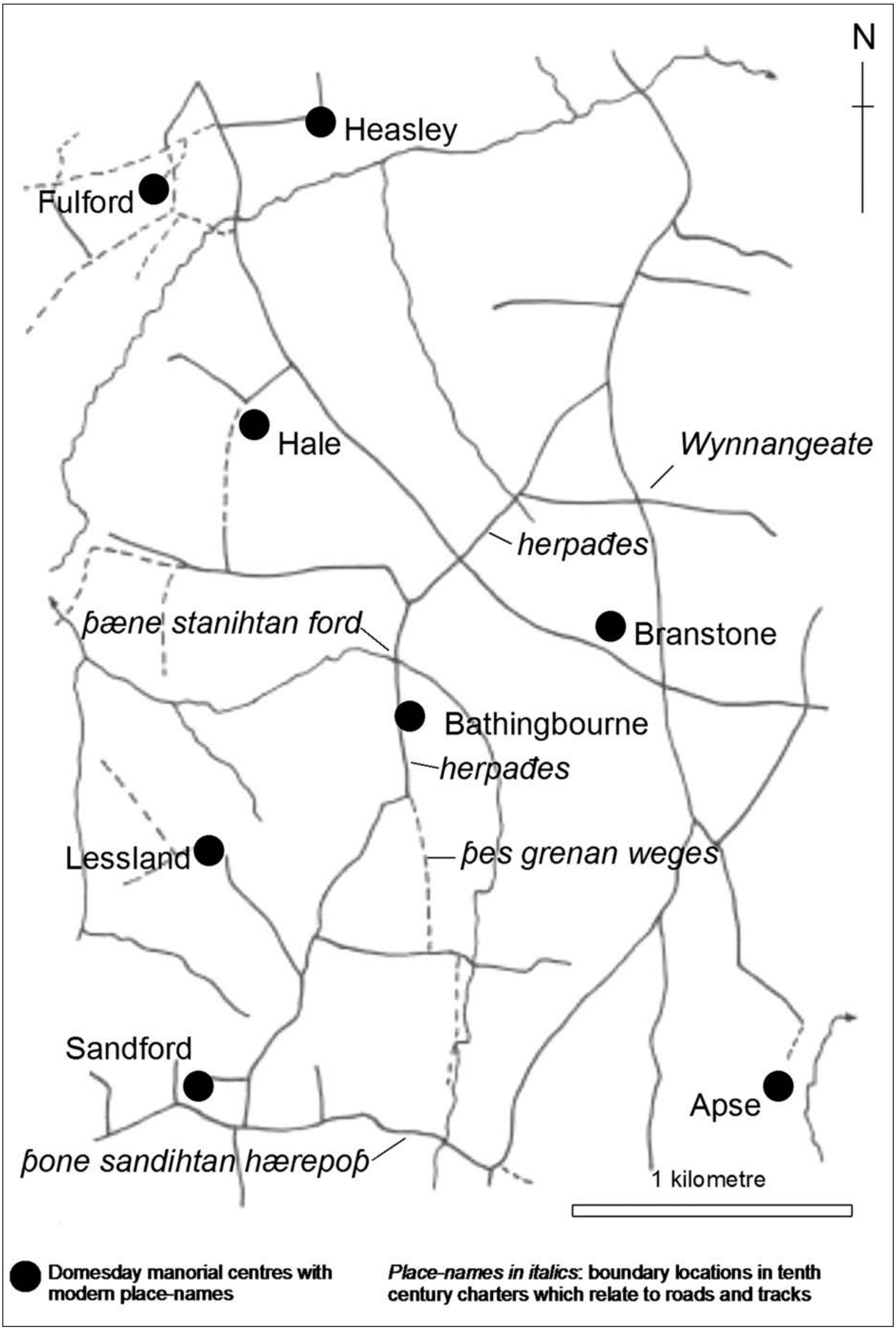
Hall in her work on Minster churches in Dorset used a statistical approach to identify high status churches, devising a scoring system with various indicators (Hall 2000, 4-7). This approach has been applied to all of the medieval churches and parochial chapels of the Isle of Wight to aid in the identification of minsters and enable direct comparison with the evidence from Dorset. The table here extracts this information, using Hall's criteria of scores of 10 or more to identify high-status churches. Hall divides her findings into two broad categories, those with totals of 20 or more which can be regarded as having been minsters (15 churches in Dorset compared to 3 on the Isle of Wight), and totals from 10 to 19 which Hall identifies as possible minsters (22 in Dorset, 6 on the Isle of Wight). The churches with the highest totals are Carisbrooke and Arreton, both of which can be identified from the evidence of Domesday as 'secular minsters'. Of the possible minsters on the Isle of Wight, Freshwater would appear to have been a 'secular minster'. The remaining five churches can certainly be regarded as high-status churches.

Table: *The high-status churches of the Isle of Wight*

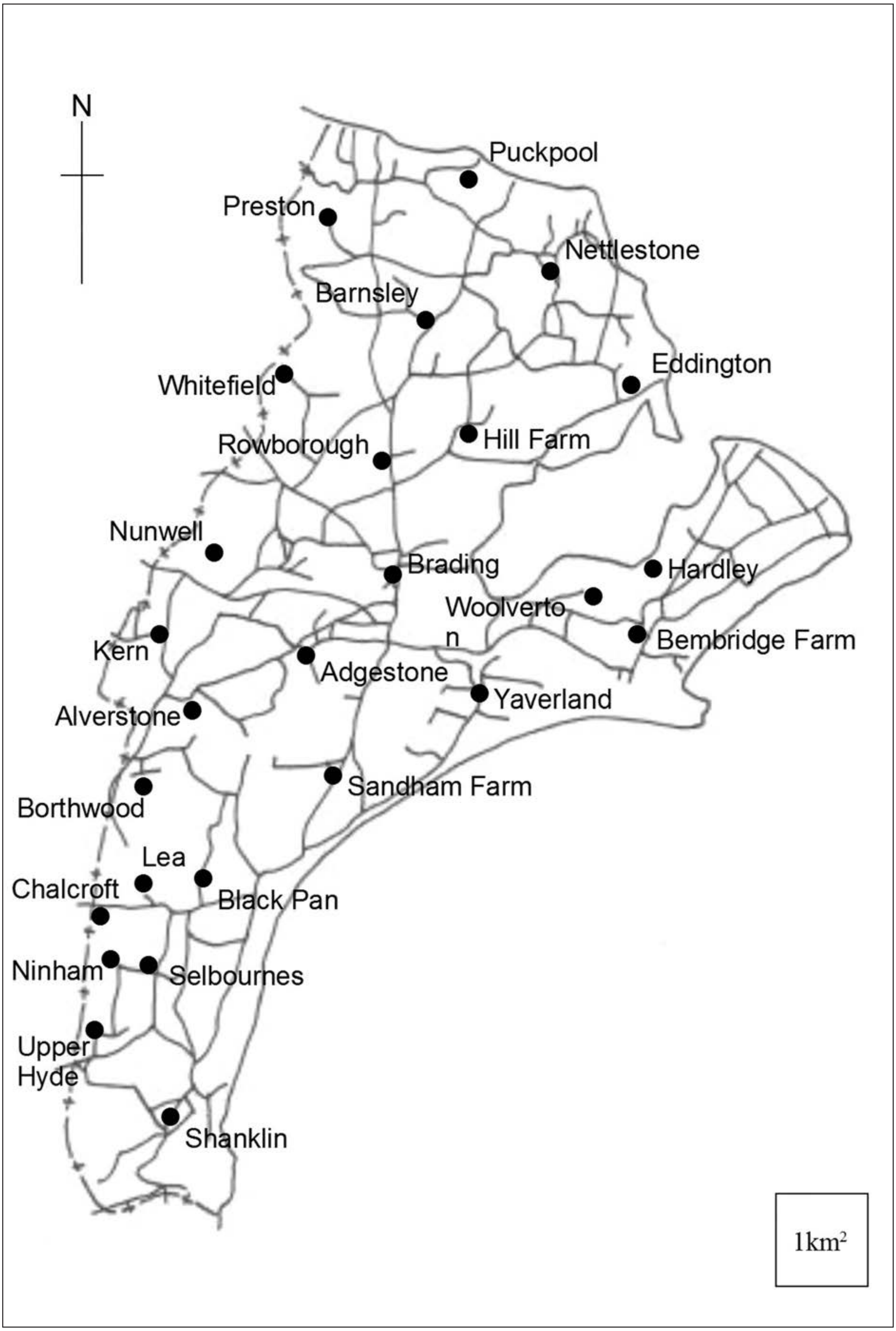
Church	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
Carisbrooke	-	7	-	3	-	-	5	3	5	4	-	-	5	-	-	1	1	34
Arreton	-	-	-	3	-	-	5	3	5	1	-	-	5	-	3	-	-	25
Freshwater	-	-	-	3	-	-	5	-	5	1	-	-	3	-	3	-	-	20
Newchurch	-	-	-	3	3	-	-	-	5	-	-	-	5	?	-	1	-	17
Brading	-	-	-	-	-	-	-	3	5	2	-	-	5	-	-	1	-	16
Calbourne	-	-	-	-	-	-	5	-	5	1	-	-	5	-	?	-	-	16
Whippingham	-	-	-	3	-	-	-	3	5	1	-	-	3	-	-	-	-	15
Shalfleet	-	-	-	-	-	-	-	-	5	-	-	-	5	-	-	1	-	11
Godshill	-	-	-	-	-	-	-	-	5	1	-	-	5	-	-	-	-	11

- Religious community before 950
- Non-regular community 950-1150
- Pre-conquest royal burial
- Church reference pre 1071
- Place-name in minster or church
- Saint's resting place
- Domesday secular minster (after Blair)
- Royal / ecclesiastical ownership TRE
- Church value 1291: £10-20; £20+
- Dependent chapels
- Pensions from other churches (not chapels)
- Receipt of churchscot
- Size of parish: 3-5000a; 5000a+ (1801)
- Cruciform church, pre12C evidence
- Saxon architectural remains
- Length of nave, 50ft+
- Roman remains or site

The approach used by Hall is relatively straightforward, the various criteria being outlined above. Some categories of information do not apply to any Isle of Wight churches, for example there are no documented religious communities pre-dating 950 and no pre-conquest royal burial sites or saint's resting places. One minor difference which has been adapted in quantifying evidence from the Isle of Wight is no. 4. Hall's table 3 quantifies 'pre-Conquest church reference' whereas table 1 (above) refers to 'church reference pre 1071'. The latter admittedly is based on documentation from the mid and late 12th century but reflects the grant of churches by William FitzOsbern to the abbey of Lyre made between 1067 and his death in 1071.

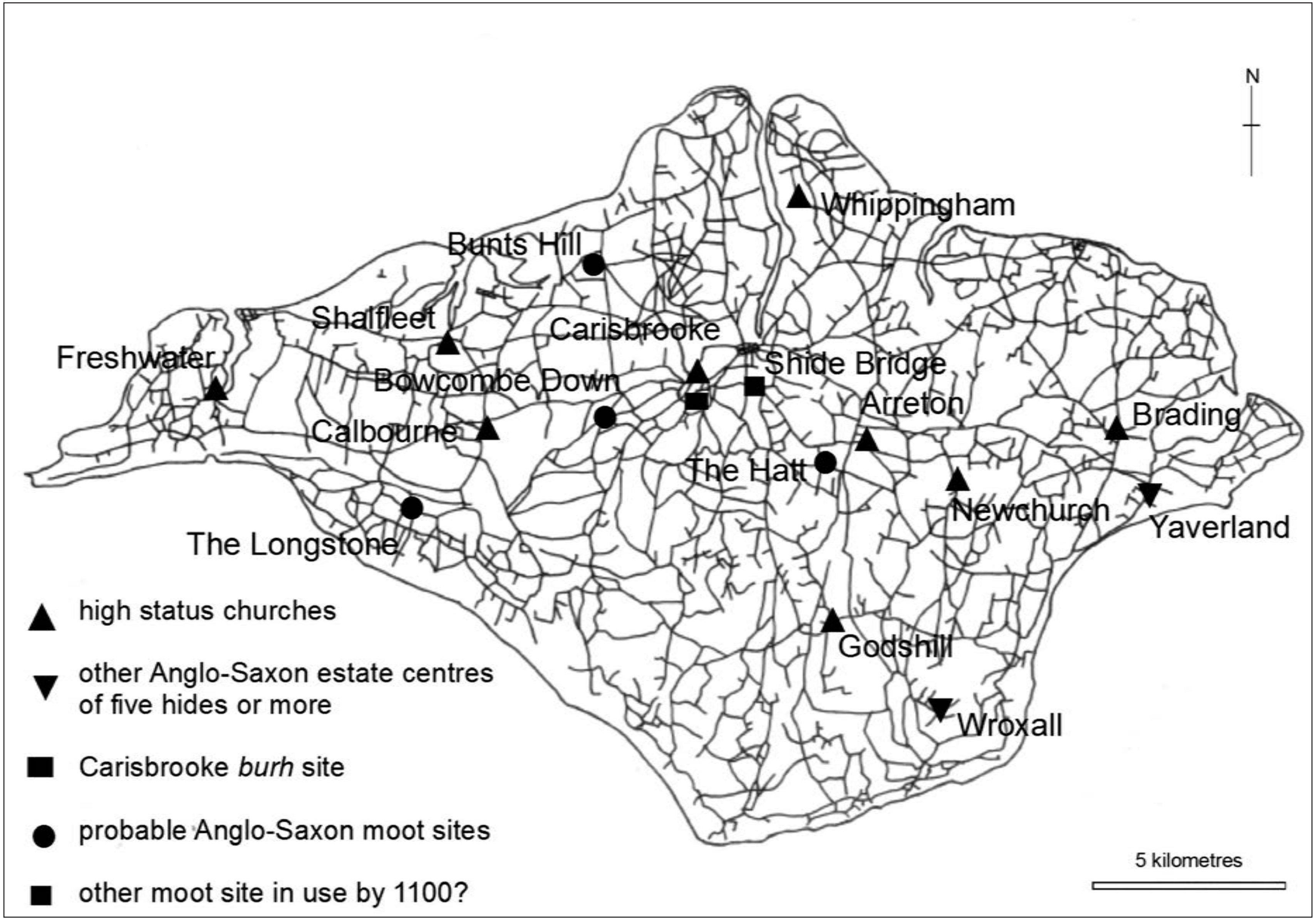


Map 1: Watercourse, roads and tracks in the Bathingbourne area as mapped in 1862-3; locations from tenth century Anglo -Saxon charters and Domesday manorial centres.

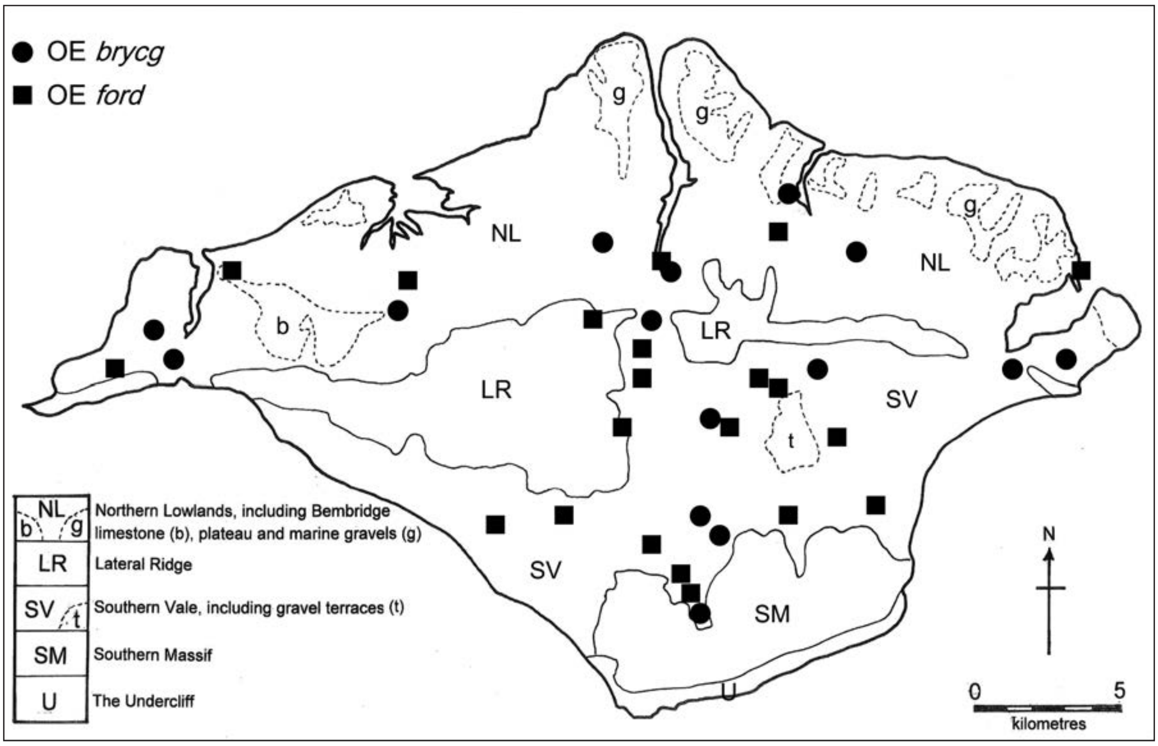


Map 3: Brading *parochia,* Domesday manorial centres and the road pattern in 1810.

Map 4: Carisbrooke *parochia,* Domesday manorial centres,
post Domesday *tūn* places-names and the 1810 road network.



Map 5: The Isle of Wight road network in 1810, high status churches and other Anglo-Saxon estate centres, the Carisbrooke *burh,* and Anglo-Saxon meeting places.



Map 2: The bridge and ford place-names of the Isle of Wight.

Fig. 1. The photograph shows Green Acres Farmhouse and looks northwards along Bathingbourne Lane towards the bridge which was the site of *þam stanihtan forda* 'the stony ford' (S 1662) in the tenth century. The lane was the *herpaeðs* 'highway' in the bounds of a charter of king Æthelred II (S 842). The photograph was taken at the point where the lane curves to the right when looking southwards but the line of the lane continues along a footpath towards Sandford. This footpath was *þes grenan weges* 'the green way', which continued southwards to *þone sandihtan hærepoþ* 'the sandy highway' at Sandford (S 1663).

Fig. 2. Coppins Bridge, Newport, looking southwards: This was the site of medieval *Durneford*. The photograph shows that the river is tidal at this location in the twenty-first century. This location would have been the lowest fording point, and later the lowest bridging point, of the Medina. Coppins Bridge is aligned with Newport High Street which almost certainly preserved a significant east-west route-way which pre-dated the laying out of the town's streets in the twelfth century and thereafter formed its principal thoroughfare. *Durneford* provided access from the site of Newport to roads in the East Medine.

Fig. 3. The view south-westwards from a location adjoining Rowborough Farm in the Bowcombe Valley: The road up the valley is behind the hedge. This view shows the spur of the hill with a rounded, barrow-shaped profile. The place-name was first recorded as *Rowebere* 'the rough barrow-shaped hill' in 1277. This place- name would have originated many centuries before the thirteenth century and provided travellers going up the valley with a reference point.

Fig. 4. Compton Farm from Brook Down: The *cumb tūn,* the settlement in the coombe in its distinctively shaped valley setting, may have formed a significant reference point for travellers going westwards along the chalk ridge, to the right of the photograph.

Fig. 5. The boundary of Shanklin on the south side of the parish follows this sunken way westwards up onto chalk downland. This route would have provided access to pasture on Luccombe Down and on Shanklin Down for the inhabitants of the two adjoining manors.

Fig. 6. The upper Bowcombe valley looking north-eastwards from a location adjoining the top of Cheverton Shute: The Domesday manorial centre of Cheverton Farm can be seen on the left with Rowborough Farm at the centre of the photograph. The road down the valley towards Carisbrooke was referred to by Sir John Oglander as *'ye waltorish lane at winter'.* This had to be negotiated by corpse bearers travelling from Shorwell to the mother church of Carisbrooke before Shorwell had its own burial ground. The site of the meeting place for Bowcombe (West Medine) Hundred at the Bowcombe Down pagan Anglo-Saxon cemetery can be seen at the top left of the photograph. This was situated on the ridgeway which followed the sky-line eastwards before descending to Carisbrooke.

Fig. 8. Cattle on chalk downland above Wroxall with St Martins Down in the background. The photograph is taken from 'The Greenway' which was mentioned in an inquiry into the location of a manorial boundary in 1617 and here formed the boundary between Wroxall and Shanklin manors. St Martins Down was recorded c.1240 as *Smerdone*. The first element of this name is Old English *smeoru* 'butter'. The down would appear to have been used for the seasonal pasturing of sheep which were milked there (Fox 2008, 356). The two instances of *wic* place-names on the Island (Sandford with Week and Week Farm) are also located in this landscape region of the Island's 'Southern Massif'. Fox (2012, 152) suggests 'a dairy settlement seasonally used by people engaged in the system of transhumance' for Old English *wic*. There is some evidence for the seasonal movement of stock to chalk downland over significant distances in Anglo-Saxon charters and Domesday Book. It is quite likely that the wood-pasture and wet heathland to the north of the Island's lateral chalk ridge was also used as summer pasture, suggested by the place-name Somerton. The Island's road network would have facilitated this transhumance from settlement sites to outlying pasture.

Fig. 7. The deeply-entrenched lane from Arreton Cross up on to St George's Down provides a good impression of the appearance of such roads in the Anglo-Saxon period. This lane provided access from Arreton to the Hatt meeting place for the hundred of East Medine and continued to Shide Bridge. To the east, beyond Arreton Cross, the route divided at the location of the school, eastwards following the base of the downland, now the 'Bembridge Trail', and south-eastwards along the line of the modern main road to Horringford and beyond to the coast.

A HISTORY OF THE MUSEUM OF ISLE OF WIGHT GEOLOGY

Alex Peaker and Paul Bingham

Abstract

Before the formation, just prior to the First World War, of a dedicated geology museum above the Free Library in Sandown, geology collections were established on the Island in museums in Newport, Ryde, and Ventnor. The Newport and Ryde museums closed before Sandown opened but some geological samples were transferred. Ventnor retained its geological collection until 1955 when again some specimens transferred to Sandown. This article details the history of these collections, and in particular the individuals who acted as curators. The task of writing a history of 'Dinosaur Isle', the Island's Museum of Geology opened to public in August 2001, remains.

Introduction

James Jackson, curator between 1924 and 1943 of the Museum of Isle of Wight Geology (MIWG), commenced an article 'An outline of the history of geological research in the Isle of Wight', in these Proceedings:

> Favoured as it is by singularly clear and extensive sections in remarkably varied and generally highly fossiliferous strata, it is no matter for surprise that during more than a century the Isle of Wight has been regarded by successive generations of geologists as classic ground, and that few British geologists of note have failed to visit it and work over its wonderful coast sections (Jackson 1932).

Jackson then gave an historical account of Isle of Wight geological discovery, concluding with some Geological Survey Memoirs, and a series of geological maps which he pointed out were then on display in the Sandown museum. Jackson would undoubtedly have been delighted by the recently published map and 'memoir' that details modern research into the geology of the Island (Price, 2016).

In view of the importance of the geology of the Isle of Wight and its attraction to visitors, a specialist museum was late in coming and by the time it opened there were collections from the Island located in national museums, including the Sedgwick Museum in Cambridge, Oxford University Natural History Museum that has the Buckland collection and the Natural History Museum in London. During the nineteenth and early twentieth centuries these institutions attracted donations of Island specimens from famous collectors and 'authorities' that were either self-collected or purchased. However, since its establishment over 100 years ago, the Museum of Isle of Wight Geology, as well as its replacement Dinosaur Isle, has placed high importance on full specimen documentation/security, and latterly museum accreditation; and is increasing favoured by local collectors with new finds.

The Early Societies

The collection which eventually became the Geology Museum at Sandown had its origin in the first Isle of Wight Natural History Society, based in Newport, which then 'morphed' into the Isle of Wight Philosophical Society. From 1818/19 the Society met and housed its geology collection at the Isle of Wight Institution (now the Isle of Wight County Club in St James Square, Newport) (Bingham 2015). Gideon Mantell, however, was scathing of this museum, and geological interest on the Island in general:

> Even the inhabitants, with but a few honourable exceptions, manifest an extraordinary degree of apathy in everything relating to the geology of the Island. In vain will the stranger seek for public collections illustrative of its physical structure and fossil remains. In one week it would be easy for a practical geologist to collect a more instructive series of specimens than is contained in the Museum of the Scientific Institution of the capital of the Island – Newport (Mantell 1847).

Unfortunately there are no records documenting the contents of the Philosophical Society Museum, which was in existence for some 33 years, although is known that latterly the Rev Edmund Kell acted as curator. The collection remained on display at St James Street until 1852, when the Isle of Wight Institution required the space for other purposes, and due largely to the efforts of Dr Ernest Wilkins, the collection was re-housed at the Newport Guildhall where it stayed for two brief years before moving into nearby rented premises (Bingham & Cooper 2015).

Newport Museum: Curatorship of Dr Ernest Wilkins

In the 1850s Wilkins published 'A Catalogue of the Isle of Wight Museum, in Newport'. More of a guide book than a catalogue in a strict sense, the publication gives a glimpse of specimens that must have been held by the Philosophical Society, and potentially allows at least one of the specimens from the oldest collection to be traced.

CASE 3, contains=a collection of bones of the gigantic Saurian reptiles of the *Wealden*, such as the Iguanodon, Hylæosaurus, etc.—some specimens belonged to young or small animals, but the greater part are of enormous size. They consist of—vertebræ, some flat, others concavo-convex, some with their processes perfect, others having them broken off, and some, as the inferior spinous processes of the tail or chevron-bones, being detached in a perfect condition—sacral and pelvic bones—thigh, leg, and foot bones—scapulæ and ribs—also scutes or skin-bones. Many of the above are perfect, some broken in excavation, others bearing unmistakable evidence of decay and attrition prior to their being imbedded. Several of these valuable specimens rival those in the British Museum.

Figure 1: Excerpt from 'A Catalogue of the Isle of Wight Museum, in Newport' written by Dr Wilkins

In this passage, the references to 'Hylaeosaurus' and 'scutes or skin-bones' may relate to a specimen now in the collection of Dinosaur Isle and recorded as 'scutes from the armoured dinosaur ?Polacanthus' (accession number MIWG : 37). At the time Wilkins' catalogue was published, Polacanthus had not yet been recognised as a new species (it was first described by Richard Owen in 1865), and the specimen was erroneously related to the similar mainland dinosaur, Hylaeosaurus. Wilkins made another reference to 'Hylaeosaurus' and 'scutes' in a book he co-authored:

> The Hylaeosaurus affords another example of the blending of the Crocodilian, with the Lacertian type of construction. This reptile had a very formidable dermal covering, with the elliptical and circular skin-bones or scutes lying immediately under the skin, and a series of angular spines of great size, arranges along the middle of the back. Of the former, I have obtained a considerable number in juxtaposition, having underneath a continuous series of vertebrae (Wilkins & Brion 1859).

Wilkins appears to be describing another specimen of Polacanthus. To find such an articulated specimen would be unusual and if the armour was in life position, it would have been one of the best finds of an armoured dinosaur in Europe. What happened to the material is unknown.

Ernest Wilkins came from an established Island family, qualified as a doctor of medicine and practised in Newport. He had a lifelong interest in antiquities and geology and in 1856 became a Fellow of the Geological Society. Wilkins was curator of the Newport museum from its formation in the Guildhall in 1852, and during its move to rented premises. Unfortunately interest in the museum declined and it closed in the 1870s (Bingham & Cooper 2015).

Newport Young Men's Literary Society Museum 1882-1911

After the death of Ernest Wilkins, the Newport Young Men's Literary Society purchased the 'old Newport Museum' and the private collection of Dr Wilkins '*with the object of preserving the contents for the Island and in the reasonable expectation of deriving an income from it*' (Bingham & Cooper 2015). At that time, there was significant opposition from members of the Literary Society to this expenditure. While the collection was at the Literary Society's buildings in Quay Street, the geological specimens were arranged by Henry Keeping of the Woodwardian Museum (now the Sedgwick Museum), Cambridge. Mr John Wood acted as honorary curator of the Museum and began to work on a catalogue of the collection; however this remained unfinished when he died in 1887.

In 1911, almost thirty years after the Literary Society opened their Museum, history repeated itself in that members desired the space for other purposes, just as members of the Isle of Wight Institution had done in 1852, and Mr R. Roach Pittis, the instigator of the museum, had to admit that the museum had been a 'white elephant'. The museum contents were again 'purchased for the Island', this time by Mr Frank Morey.

The Ryde Museum c.1854-c.1875

It is uncertain when the Philosophical Society based in Newport expired, though this may have been as early as the 1830s; however, in 1850 a Philosophical and Scientific Society was formed in Ryde as part of its fashionable development. The patron of the Society was Prince Albert, and included among the honorary members were Charles Lyell, Richard Owen and Adam Sedgwick. Its objectives were:

the cultivation of natural science in all its branches; the encouragement of antiquarian researches; the recording of observations, and formation of a museum illustrative of these subjects; the establishment of a library and circulation of scientific works; the delivery of occasional lectures; the holding of conversazioni, and the making of scientific excursions.

Rule ten of the Society stated:

The Council may accept donations of books, philosophical apparatus, and specimens of natural history; but in the event of the dissolution of the society, all such donations shall be returnable to the respective donors. They may also receive like donations as loans, reclaimable on the conditions agreed upon at the time of their being presented; it being understood, that while they engage that the same care shall be taken of such loans, as of the property of the society, they will not be responsible for their perfect preservation, nor their accidental destruction. Of the donations and loans, a record shall be kept in a book provided for that purpose.

By the late 1850s, the Ryde museum had moved to a building in Melville Street formerly occupied by the National Schools. Charles Lockhart writing in 1870 noted that the museum '*occupies a large and good room, well fitted with suitable wall and table cases. There is a MS: Catalogue of fossils ranging from the Wealden to the Hampstead beds of the Isle of Wight – Arranged in the wall cases*'. Unfortunately, a copy of this manuscript is not known to have survived.

A description of the geological contents of the museum in 1859 by a visitor Mr Pattison can be found in the Isle of Wight Observer:

The largest heap of materials for the future is to be found in the geological department, but at present the local is hopelessly mixed with the universal, so that little can be learnt at a glance... Poor Edward Forbes' careful subdivisions of the upper tertiaries are tolerably well represented here by the fossils, and so are the Binstead remains, whilst the London clay of the extreme West furnished its contingent of delicate and beautiful shells, fresh with the gloss of untold ages upon their surface. Next come the loose crumbling shells of the basement beds, and then the deep-sea forms of the chalk. A capital picten (scallop) from Messley (sic) Down will convince the most sceptical that sea-shells are really found in solid beds and high hills, the lower chalk, and the green sand, the latter especially, furnish a whole row of huge ammonites fit to be chariot wheels of the Island goddess. The gigantic oyster and mussel-like shells which stick out of the sandy cliffs at Atherfield are all here, waiting to be marshalled and named. We then descend to the romance-land of the geology and encounter the bones of the gigantic lizard beast of the Wealden, the mighty Iguanodon... Unwisely mingled (of course only for the present) with the Vectine remains are oolitic fossils of Wilts, coal plants, and some few Siberian remains. (Pattison 1859)

By 1875, the Ryde museum closed and its contents were moved to the School of Art in George Street. As the IW Observer noted:

We paid a visit to the building of the School of Art in George-street one day this week, and were pleased to see the progress which had been made. The interior of the large room which is entered from the street is being neatly fitted up, and we observe that all the curiosities have been removed from the museum in Melville-street, and will be arranged here.

In 1883 a brief advert appeared in the IW Observer:

The Late Isle of Wight Philosophical Society. Mr Frederick Davis, of Appley Rise, Ryde, Isle of Wight, being desirous of ascertaining the names and addresses of those gentlemen who in 1875 were acting as trustees of the above society, and who in that capacity and in that year handed over their collection, subject to restrictions and reservations, to the Ryde School of Art, will feel obliged by their communicating with him.

The precise details of the demise of Ryde museum are uncertain, although from the evidence above, the Society's rule ten is unlikely to have been followed, as by 1883 even the identity of the trustees was unclear. There is some evidence that Mr Benjamin Barrow, one of the founding members of the Ryde Philosophical and Scientific Society possessed some items from the Ryde museum, as a unique flint tribrach was subsequently purchased by Mr G. W. Colenutt at the sale of Barrow's wife's effects:

Mr. G.W. Colenutt exhibited some of the most interesting specimens of Island flint implements from his collection, including the Tribrachiate implement, the only known instrument of its shape found in the United Kingdom... The museum in the course of years fell into neglect. The last trustee of the museum was Dr. Barrow, a prominent inhabitant of Ryde some years ago. When he wound up the affairs of the society he annexed some of the contents of the museum. At his death he left his wife a life interest in his belongings. At her death he (the speaker) made a point of finding where the implement was. Dr. Barrows' belongings were on view at the house, and by dint of search he found that stone amongst others (County Press 21 August 1915, 3).

Thirty-nine geological specimens from the Ryde museum ended up in the collection at Sandown, although it is uncertain if this occurred via the collection of the Newport Literary Society, or directly. The collection that was transferred consisted mostly of fossils from the Chalk and Greensands, particularly ammonites and other molluscs, but also some Wealden remains including crocodile and Iguanodon vertebrae: presumably these are the artefacts described in the above letter to the IW Observer from Mr Pattison.

Museum of Isle of Wight Geology at Sandown Library (1913-2001)

In 1911 Frank Morey purchased for the people of the Isle of Wight the museum collection that had been displayed by the Newport Literary Society at Quay Street, for the nominal price of £100 (Bingham & Cooper 2015). The non-geological items were transferred to the gatehouse museum at Carisbrooke Castle. The geological collection, however, was transferred after a short delay to Sandown Urban District Council and housed on the upper floor of the Free Library at the corner of the High Street and Victoria Road. In all the new Museum of Isle of Wight Geology was founded with 554 geological specimens originating from the Newport museums and 39 specimens attributed to the former Ryde museum. This was a sizeable collection for a local museum of the time, and the collection was varied, with a good representation of the geology and palaeontology from all parts of the Isle of Wight.

Initially the collection at Sandown was arranged by Hubert Poole, but he apparently did not complete the task before he joined the army and went to fight in France. The task of curating the collection was taken on by the Reverend J. C. Hughes, possibly not before the 1920s, and he occupied the role until his death in November 1929. The Proceedings did not carry an obituary for Hughes, but the note of the general meeting held on 30th November 1929 recorded that:

> The President referred in feeling terms to the great loss sustained by the Society through the untimely death of one of its Vice-Presidents, the Rev J. C. Hughes, B.A., who was to have been their lecturer that night. The President recalled Mr Hughes's many services to the Society, to the Museum of Isle of Wight Geology at Sandown, and to the Carisbrooke Castle Museum, and deplored his death as a heavy blow to all students of the history, antiquities, and geology of the Isle of Wight.

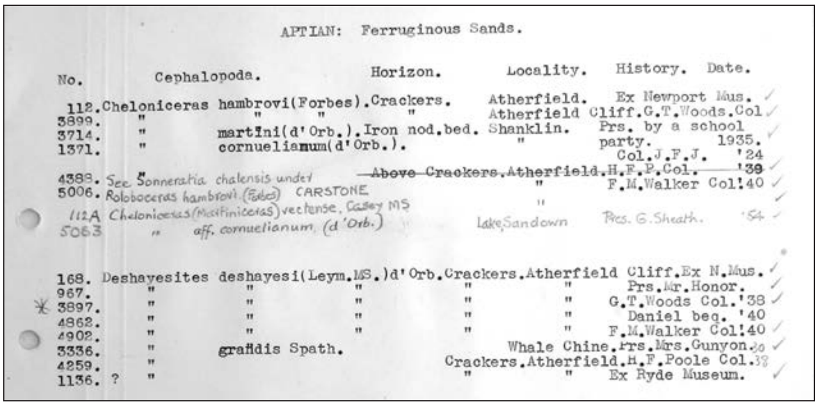
Of particular note is the fact that Rev. Hughes is possibly the only posthumous author to appear in the Proceedings – his article 'A Brading deed of the 13th century' was published in 1934.

James Frederick Jackson, Curator 1924–1943

In January 1924, James Jackson took up post as scientific assistant to Frank Morey (Howe 1994). A significant duty assigned to Jackson was Joint Curator of the Museum of Isle of Wight Geology, as well as other responsibilities including assistant secretary to the Isle of Wight Natural History and Archaeological Society. When Frank Morey died in December 1925, Jackson continued as paid scientific assistant to Frank's sister Catherine until her death in 1943, and took over the role of sole Curator of the Sandown Museum upon Hughes' death in 1929.

Whilst Jackson was curator it appears he invested much of his time in field work, with 2073 of his self-collected specimens being accessioned to the museum during his time there. Jackson was a knowledgeable geologist, and his collecting habits revealed someone with a clear interest in the museum being truly local, collecting all possible geological and palaeontological samples from across the Island, with no particular bias to any group or stratigraphy.

At some point during his time as curator, Jackson made the first comprehensive catalogue of the museum's specimens, making two bound and typed catalogues, one recording the Cretaceous specimens, the second all Palaeogene and younger specimens. Organised firstly chronologically by stratigraphy, and then by taxonomy of the specimen, the catalogue was likely compiled sometime in the 1930s, judging by the acquisition dates of specimens in the register – though it may have been started earlier, with re-typed pages incorporating new donations.


APTIAN: Ferruginous Sands.

No. Cephalopoda. Horizon. Locality. History. Date.
112. Cheloniceras hambrovi(Forbes). Crackers. Atherfield. Ex Newport Mus.
3899. " " " " Atherfield Cliff. G.T.Woods.Col
3714. " martini(d'Orb.). Iron nod.bed. Shanklin. Prs. by a school party. 1935.
1371. " cornueliamum(d'Orb.). " Col.J.F.J. '24
4388. See Sonneratia chalensis under ~~Above Crackers. Atherfield. H.F.P.Col. '39~~
5006. Roloboceras hambrovi (Forbes) CARSTONE " F.M.Walker Col. '40
112A Cheloniceras (Martiniceras) vectense, Casey MS "
5063 " aff. cornuelianum (d'Orb.) Lake, Sandown Pres. G.Sheath. '54

168. Deshayesites deshayesi(Leym.MS.)d'Orb. Crackers. Atherfield Cliff. Ex N.Mus.
967. " " " " " Prs.Mr.Honor.
3897. " " " " " G.T.Woods Col. '38
4862. " " " " " Daniel beq. '40
4902. " " " " " F.M.Walker Col. '40
3336. " grandis Spath. Whale Chine. Prs.Mrs.Gunyon. 30
4259. " Crackers. Atherfield. H.F.Poole Col. 38
1136. ? " " " Ex Ryde Museum.

Figure 2: A representative page taken from the original typed catalogue of the Sandown Museum made by Jackson, with handwritten notes added at a later date by Honorary Curator A.T. Grapes.

Figure 3: MIWG : 37, *Polacanthus* sp. scutes in the collection of Dinosaur Isle, possibly those referred to in Wilkins' catalogue.

Figure 4: One of the specimens transferred from the Ryde Museum to the collections of the Newport Museum. MIWG : 215 - *Desmoceras sp.*, an ammonite collected from the Upper Greensand on the Isle of Wight.

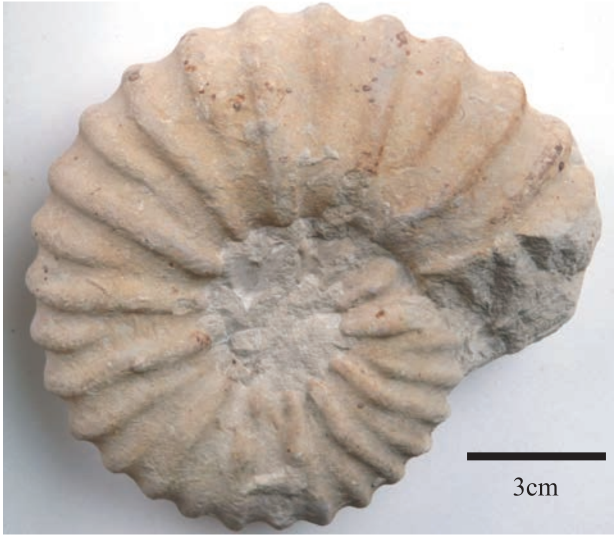


Figure 5: Transfer from Newport Museum. MIWG: MIWG : 1984, *Calycoceras naviculare,* an ammonite from the Island.

Figure 6: Transfer from Newport Museum. MIWG : 908, Diplocynodon hantoniensis, the lower jaw of an alligator from Hamstead, Isle of Wight.

Figure 7: Transfer from Newport Museum. MIWG : 5253, six cervical vertebrae of *Iguanodon bernissartensis,* found on the Island.

Figure 8: Transfer from Newport Museum. MIWG : 65 *Homarus longimana,* a complete lobster found at Atherfield, Isle of Wight.

Unfortunately no photos of the displays from the interwar period have been located, but glimpses of what the museum was like in the time of Jackson can be found in various references:

> The assistant secretary had continued his work of making the Museum of Isle of Wight Geology in Sandown Free Library of educational value by arranging two long window-ledge cases containing the specimens illustrating, (1) the origin of the principal types of rocks and how plants and animals became fossils, and (2) the various modes of preservation under which fossils occurred in the rocks. (County Press 28 January 1933, 3)

Jackson was undoubtedly proud of what he had achieved at Sandown as in a letter on the history of the Museum dated 31 May 1959 he noted:

> The museum was rearranged on modern educational lines during the years 1929-32, a large number of explanatory models, labels, maps, diagrams, pictures etc being placed in the cases to render the exhibits interesting and instructive to beginners and the general public.

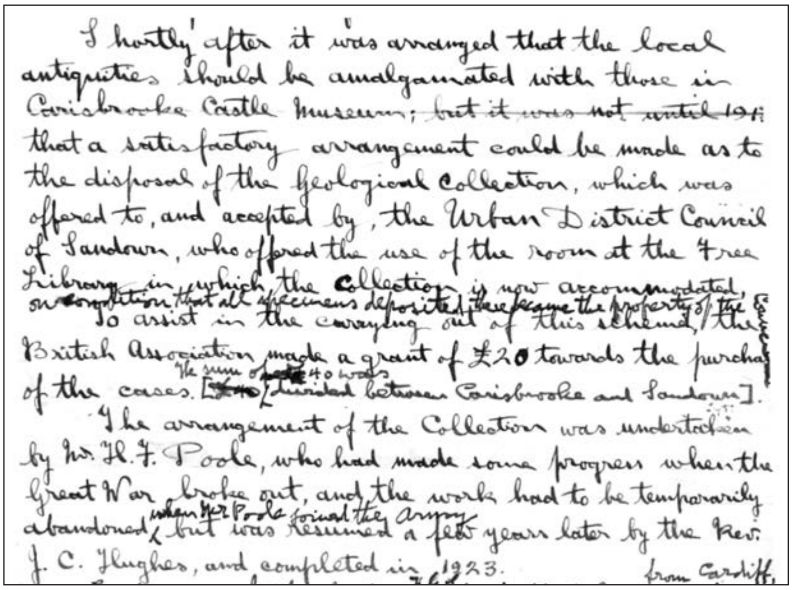

Shortly after it was arranged that the local antiquities should be amalgamated with those in Carisbrooke Castle Museum; ~~but it was not until 191~~ that a satisfactory arrangement could be made as to the disposal of the Geological Collection, which was offered to, and accepted by, the Urban District Council of Sandown, who offered the use of the room at the Free Library in which the Collection is now accommodated, on condition that all specimens deposited there became the property of the [illegible]. To assist in the carrying out of this scheme, the British Association made a grant of £20 towards the purchase of the cases. [The sum of £40 was divided between Carisbrooke and Sandown]. The arrangement of the Collection was undertaken by Mr. H.F. Poole, who had made some progress when the Great War broke out, and the work had to be temporarily abandoned, when Mr Poole joined the Army, but was resumed a few years later by the Rev. J. C. Hughes, and completed in 1923. from Cardiff.

Figure 9: An extract from a handwritten note dated 31/05/1959 by J.F. Jackson on the history of MIWG. A full set of the letters is housed at Dinosaur Isle.

Under the curatorship of Jackson, the collections were developed and added to by notable donors. In addition to specimens from Jackson himself, large donations were made by G.W. Colenutt who left an important collection of fossil insects from the North coast of the Island, and G.J. Woods and H.F. Poole, who together amassed a large collection of Island fossils.

James Frederick Jackson (1894-1966)

James Jackson was a self-educated fossil collector/dealer, and sometime museum assistant, who had poor health and was often short of money. He was born in Mold, Clwyd, but was mostly brought up in Hunstanton, Norfolk, where his mother imparted a love of geology. Unfortunately Jackson failed to obtain a school matriculation certificate and this limited his employment prospects. In 1914 he obtained a post as general assistant at the National Museum of Wales, but in 1919, his services were 'dispensed with' (Howe 1994). Jackson then worked as a labourer supplementing his income by collecting geological specimens and selling collections to museums and university departments.

In January 1924, Jackson took up an offer from Frank Morey to be his scientific assistant. The two men had first met on a collecting trip to the Island in 1913 when some of the specimens Jackson had collected were added to the Sandown Museum. When Frank Morey died in December 1925, Jackson was retained by Frank's sister Catherine as her scientific assistant, continuing until her death in 1943. As Catherine Morey became increasingly frail, one of Jackson's jobs was to read her the newspaper.

After Jackson left the Island, he worked as a self-employed gardener and continued as a geology collector/dealer, eventually settling in Charmouth, Dorset, where he made some important fossil discoveries. He had a number of friends in the world of geology and they helped him to make a successful application to the Murdoch Trust for the benefit of 'indigent widowers and bachelors of good character who had made significant contributions to scientific studies'. The Trust paid him a small pension for the last eleven years of his life, and allowed him to shed the more burdensome part of gardening employment (Howe 1994).

It was only through the generosity of Frank and Catherine Morey that the Sandown Museum had a permanent, paid curator until 1943. Subsequently for several years until 1956, when Mr Alan T. Grapes took the position of honorary curator, the museum may have had interludes without a dedicated member of staff. An obituary in the County Press for 6 July 1963 (page 14) states that Mr John Edwin Barker had been honorary curator, but no further details are known.

It appears that during the Second World War, items were left on display at the museum, although some of the collection was housed in various council stores. During the war, after Jackson had left, a number of specimens were stolen by visitors. The old cases that had been bought by the Moreys had little or no security, and specimens were often left underneath cabinets with easy access for any would-be thief.

> The Geol. Mus. was very lucky to escape war damage, though I have been told that some cabinets were broken open and fossils stolen by war time 'visitors'. Have you any idea what is missing?… I wonder if the remainder of the G.W. Colenutt collection was recovered from its war time repository? All I could hear was that it had been taken to some shed belonging to the council and when I asked Mr Jackman some years later I had no reply concerning same.
>
> (Extract from a letter from Jackson to Grapes, 31 May 1959)

Alan Grapes, Curator 1954–1966

An unfortunate part of the history of the Museum of Isle of Wight Geology is the loss of almost one-fifth of its collection, sometime in the early 1950s. The loss was noticed by Alan Grapes when he became curator of the museum in 1954 and documented in letters between himself and Jackson. As well as a small number of fossils stolen by visitors during the war, a total of 976 specimens were found to have been lost sometime between Jackson leaving the museum and Grapes taking over. Although it is not known exactly when the losses occurred, it is clear that this state of affairs continued until at least 1952, with the disappearance of MIWG: 5071, an ammonite found at Redcliff by Grapes and donated to the museum in 1952.

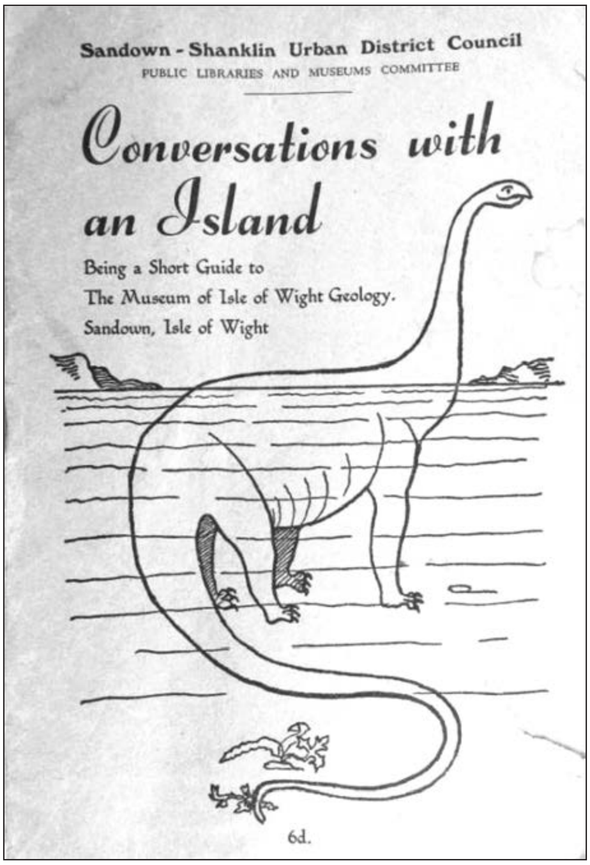
> Your meticulously-kept catalogue was what I had to depend on for checking, and, taking the greatest possible care to be accurate, the checking and re-checking occupied me for the best part of two years. The final result? Believe it or not, no fewer than 976 specimens had vanished completely, and not by the hands of casual visitors, either. I say that confidently because, unfortunately, most of the missing exhibits were either exceedingly rare (many of them being spp. Nov.) and because only the expert could have recognized them as being of ordinary value. The casual visitor would not trouble to take a second glance at most of them.
>
> (Extract from a letter written by Grapes and sent to Jackson, 4 June 1959)

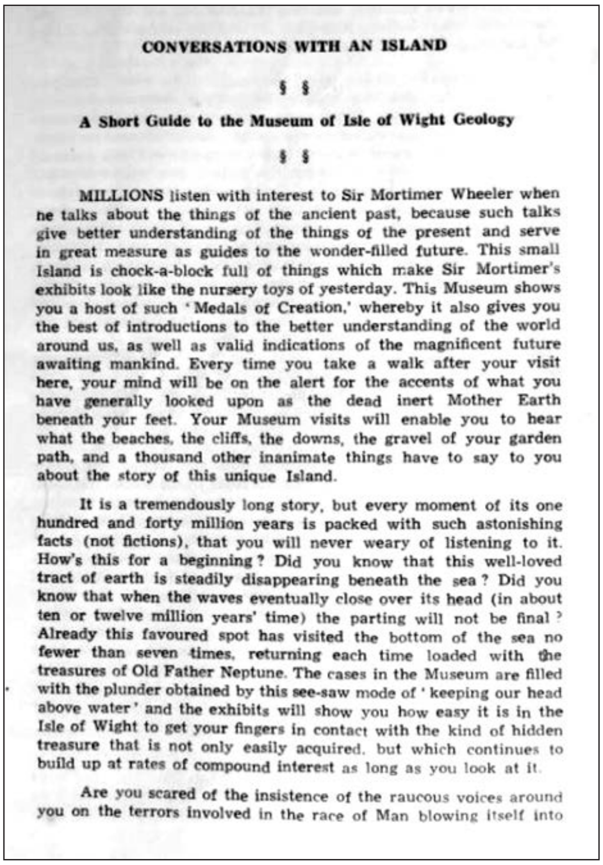
In the correspondence between Grapes and Jackson, they concluded that the thefts had been undertaken by one or more ‘academics’. They noted that the specimens which had disappeared were not necessarily showpieces but obscure specimens of scientific value, and their importance would likely only have been recognised by a professional geologist or palaeontologist. Many of the missing specimens are noted in the accession register as being unrecognised or new species. Grapes and Jackson were surprised that no staff at the Library or any member of the public ever noticed. The large quantity of the specimens, along with the size of some of the specimens – including examples of *Tropaeum sp.*, an ammonite common to Whale Chine with individuals often weighing tens of kilos – would have suggested that someone might have noticed the fossils being removed from the museum.

> There are several curious and, as yet, unexplained features about this affair, the most extensive museum robbery for many years. While it is certain from the nature of much of the material taken that the raiders had expert knowledge, they seem to have left such obvious “plums” as Woods; beautiful Iguanodon jaw, *Heminautilus saxbyi* and the chelonian skull from Atherfield and the Upper Greensand lobster *Homarus*, perhaps their bags were full! How was all this lot removed? The total bulk and weight was very considerable; was it taken away in lots or at one fell swoop? The there is the weight of some single specimens among the Cretaceous fossils: such things as the ponderous *Morosaurus* vertebra, *Tropaeum bowerbanki* and the huge fragment of an undescribed *Tropaeum* must have gone straight into a car – the last mentioned was so heavy I could hardly raise it from the ground much less carry it to the street! Indeed it rather suggests local collusion, for how could all this have been done without attracting some attention?
>
> (Extract from a letter written by Jackson and sent to Grapes, 26 August 1959)

The current whereabouts of the specimens is unknown. In 1954 when Mr Grapes took the position of honorary curator one of his first actions was to further secure the specimens, adding extra locks to the cases, and although security was still lacking with specimens being on open storage beneath cases, no more losses took place.

Alan Grapes wrote a small guide book to the museum entitled *Conversations with an Island* and published reports in the IWNHAS Proceedings. His work spoke highly of the museum, frequently referring to the number of new donations, numbers of, or notable visitors, and showed a good working knowledge of the geology of the Island. Although referring to now redundant ideas, such as dinosaurs living in water to support their weight, his understanding was current for the time.





CONVERSATIONS WITH AN ISLAND

§ §

A Short Guide to the Museum of Isle of Wight Geology

§ §

MILLIONS listen with interest to Sir Mortimer Wheeler when he talks about the things of the ancient past, because such talks give better understanding of the things of the present and serve in great measure as guides to the wonder-filled future. This small Island is chock-a-block full of things which make Sir Mortimer's exhibits look like the nursery toys of yesterday. This Museum shows you a host of such 'Medals of Creation,' whereby it also gives you the best of introductions to the better understanding of the world around us, as well as valid indications of the magnificent future awaiting mankind. Every time you take a walk after your visit here, your mind will be on the alert for the accents of what you have generally looked upon as the dead inert Mother Earth beneath your feet. Your Museum visits will enable you to hear what the beaches, the cliffs, the downs, the gravel of your garden path, and a thousand other inanimate things have to say to you about the story of this unique Island.

It is a tremendously long story, but every moment of its one hundred and forty million years is packed with such astonishing facts (not fictions), that you will never weary of listening to it. How's this for a beginning? Did you know that this well-loved tract of earth is steadily disappearing beneath the sea? Did you know that when the waves eventually close over its head (in about ten or twelve million years' time) the parting will not be final? Already this favoured spot has visited the bottom of the sea no fewer than seven times, returning each time loaded with the treasures of Old Father Neptune. The cases in the Museum are filled with the plunder obtained by this see-saw mode of 'keeping our head above water' and the exhibits will show you how easy it is in the Isle of Wight to get your fingers in contact with the kind of hidden treasure that is not only easily acquired, but which continues to build up at rates of compound interest as long as you look at it.

Are you scared of the insistence of the raucous voices around you on the terrors involved in the race of Man blowing itself into

Figure 10: 'Conversations with an Island', written by A.T. Grapes.
From a copy kindly loaned to the authors by Mr Nigel Locke.

Alan Townsend Grapes (1887/8-1970)

Alan Grapes was honorary curator of the Museum of Isle of Wight Geology from 1953 until 1966, when he retired due to ill health. Grapes was born in Sandown and became one of the first group of students to attend Sandown Higher Grade School (now Sandown Bay Academy). He worked in London as a chargehand chemical worker for South Metropolitan Gas Board until moving back to the Island in his thirties for health reasons.

Grapes was very active in promoting the museum, making sure that there was regular coverage in the County Press of visitor numbers, notable visitors, or specific loans of importance, i.e. certain researchers requesting museum fossils. He actively encouraged the public to collect fossils, and worked with a rehabilitation project at Camp Hill Prison, giving lectures on geology and encouraging the inmates to collect fossils whilst they were at work, with 30 specimens being presented to the museum (IOW County Press 20.02.1954 page 6). He was also thought to have identified cow bones found by children as dinosaur bones in order to encourage them to collect further (J. E. Marshall pers. comm.).

Grapes was known to be happy to give tours of the collection to any of the visitors, and although he was not a hugely active collector in comparison to Jackson or other curators, he still made significant finds. He was well informed on the geology and palaeontology of the Island and was noted as being of great help to visiting scientists to the point that Raymond Casey named an ammonite new to science collected by Grapes in his honour (*Deshayesites grapesi*).

Whilst Grapes was curator of the museum a significant donation of specimens was received from the Ventnor Museum. Although small in number these included a couple of notable specimens most likely collected by a prominent Victorian palaeontologist.

Figure 11: MIWG : 3480, the chelonian (turtle) skull referred to in the letter written by Jackson. Given the extreme rarity and preservation of the fossil it is hard to explain why the fossil was also not stolen. The specimen, found at the crackers (between Atherfield Point and Whales Chine) is now the holotype of *Sandownia harrisi* (named after the Sandown Museum, and Mr. Harris, finder and donor of the skull).

Figure 12: GSM 108161, *Deshayesites grapesi*, an ammonite found by Grapes at Redcliff, and named in his honour.

Figure 14: MIWG : 5101, a pair of crabs (*Xanthopsis sp*.) found at Alum Bay; one of the specimens transferred from the Ventnor Museum to the Museum of Isle of Wight Geology.

The Ventnor Museum 1886-1955 and Mark Norman

The Ventnor and Bonchurch Literary and Scientific Institution was established in 1847 and its building, including a library, was opened in 1850 (Hewitt Brown 1996). A small museum was initiated in 1852, but in 1886 a natural history museum was established within the Institution with Mr Mark Norman as its superintendent.

Norman was a self taught geologist who had several different jobs but also collected fossils for much of his life. Years before his association with the Ventnor Museum he was selling fossils to subsidise his living. '*Mr. Norman is pursuing his business as a fossil dealer, has a vast number of fossils of the Upper Greensand passing through his hands.*' (Wilkins 1859)

Some of the specimens Norman sold have been traced to the British Geological Survey (BGS), and give an insight into his collecting habits. The specimens, all from 'The Crackers' bed (a unit within the Atherfield Clay), includes two blocks of multiple fossils, i.e. various bivalves and ammonites, and what is described as a fine example of the ammonite *Deshayesites*. They were sold for three pounds on May 17^{th} 1872. No accession number is listed in the purchase register, but presumably relate to GSc 1935-1937, a series of fossils from The Crackers. (Details provided by the BGS.)

In 1887 Norman published a book titled *A Popular Guide to the Geology of the Isle of Wight, with a note on its relation to that of the Isle of Purbeck*, which accurately details the stratigraphy of the Isle of Wight from his own experiences, as well as detailing other geological interests, the Island's economy and relevant museums of the time.

Mark Willian Norman 1807-1899

Mark Norman was born in 1807; his father was an Irish butler and his mother a native of Niton. His obituary in the Isle of Wight Mercury for 16 September 1899 states: '*Niton, where it is thought he was born, although it is also stated that he was born in London*'. During his younger years Norman lived in London, where he was described as gaining 'dogged determination from the death of both his mother and his father whilst he was a child'.

Moving in-between his grand-mother's cottage at Newchurch and his original home before returning to London, he enlisted on a training ship then worked on a collier serving the east coast ports. Eventually he returned to Ventnor, where he made his living selling fish, and built his own house.

Norman had no problem speaking his mind and could be quite condescending about others. In his diary entry for January 1st 1884 he referred to the ratepayers of Ventnor as 'poor specimens of humanity, good at shopkeeping, praying and chapel-going and nothing else, many of them being arrant "holy willies"'.

He died aged 92 in 1899 and the maintenance of the museum was left to the Ventnor Institution. The achievements of Norman and his contributions to the foundation of the museum were documented in an article published by Leo Waldegrave in 1922 in the Isle of Wight Mercury, giving the impression of a competent individual who interested himself in all manners of the local society for the benefit of himself and others, but in an outspoken manner.

> He was never too busy to send a contribution, biographical, ethical or political to the Ventnor papers. Gaining his knowledge by a fierce wrestle with nature, his writing was as fresh as the seasons and as attractive. As one of the local fathers who sat round the Council table he held communion for the food of the town. Hating with a blazing hatred all he considered time-servers and selfish, he made enemies by his outspokenness, as he made friends by his simple and sincere character.
>
> The Museum he established, and which with his book, is his best monument, can be visited at advertised hours. Almost alone he has gathered a collection of which any town might be proud. With the help of a young man named Ryan, he says, "Having obtained the use of the hall, and the then Secretary, Mr Bralam, I set to work, drew up a neat prospectus, which I left at houses, calling again after three weeks, with the result that I managed to gather nearly £30". With this he renovated the hall, fixed cases on the wall and placed therein a representative collection of the fossils of the Island, augmenting these by smaller cases of British Birds and some large drawings of extinct animals.
>
> For some years, he gave constant attendance and was ever ready to give visitors the benefit of his knowledge in explanation of the exhibits, not repeating a dry-as-dust lecture, like those that spoil for us so much we journey to see, but talking naturally and well of the things he understood, and drawing vivid pictures of the world as it was in the ages before civilisation was continuous. (Waldegrave 1922)

Mark Norman recorded much of his doings in diaries which are now held at Ventnor Heritage Centre. In it he accurately documents the finds he made, showing a strong knowledge of palaeontology and the Island's stratigraphy. His diary speaks of the formation of the Museum in 1885, as well as the troubles he had with raising the funds, which he attributed to sectarianism in the area.

> 1884, October 22nd. I have been busily engaged in an endeavour to establish the nucleus of a Natural History Museum in connection with the Scientific and Literary Institute, soliciting the support of the inhabitants of Ventnor and Bonchurch. I got on very well at Bonchurch, amongst the church party, but have been unsuccessful in Ventnor, which I attribute to the large amount of sectarianism in the place. There are nine different sects, each a clique with no taste for anything beyond their own church… 1885, March 22nd. A nucleus is established, whether to be continued or not remains to be seen after I am gone. (Chambers 1988)

Whilst curator of the Sandown Geology Museum, Jackson also worked on the Ventnor Museum, and subsequently documented this in a letter to the County Press:

> Then there is the old Ventnor Museum geological collection, which I re-arranged a few years before the war, but was banished to a dimly-lighted, locked attic when the County Council took over the building as a public library. There are also a few local prehistoric objects of much interest.
>
> The collection of fossils was originally formed in the spacious days of Queen Victoria by that picturesque Ventnorian Mark Norman, author of a "Guide to the Geology of the Isle of Wight", which, despite short-comings, was a notable achievement for a self-taught geologist. There are some fine specimens, and if Ventnor is unwilling to provide for their exhibition they ought to be sent to Sandown. Unfortunately, however, the room at Sandown is far too small to do justice to the unique geological interest of the Island. (Jackson 1948)

As with so many of the other Museums that had already closed on the Island, a lack of interest in the collections and limited funds appears to have led to the demise of the Ventnor Museum. In 1955 when the museum closed the collection was dispersed to various facilities, with six specimens being transferred to the Sandown Museum, and at least part of the collection being given to the Secondary Modern School at Sandown (now Sandown Bay Academy) – including a partial but remarkably well-preserved Cretaceous crocodile skull.

Amongst the specimens transferred to the Sandown Museum was MIWG : 5101, a pair of *Xanthopsis sp*. crabs artificially cemented into a block of matrix. The crabs give an interesting insight into Victorian palaeontology, where making specimens look attractive took precedence over their scientific value: the specimens have been glued in, thereby obstructing a view of the underside of the shells. They were most likely collected by Mark Norman and figure in his 1887 book.

> During the year, the valuable geological collection formerly owned by the old Ventnor Literary Society has found a roomier home at the new Secondary Modern School at Fairway, Sandown, where it will form an interesting adjunct for educational purposes. Before the transfer was made, by courtesy of the County Library Authority, the Museum of Isle of Wight Geology at Sandown was invited to select any specimens suitable for inclusion in its collections and the Hon. Curator accordingly made a choice of a small number of exhibits which filled gaps in the Sandown series.
>
> While making this selection, it was observed that the Ventnor collection contained a number of Lower and Upper Greensand species of ammonites representing groups hitherto unrecorded from the Island and of first importance in certain researches now being made under the auspices of the Geological Survey. It has now been arranged that such specimens shall be transferred to South Kensington, where they will be available for examination and further research by the large number of British and foreign specialists who know the high reputation of the Survey's collections. The school collection is to receive other suitable Island specimens from the Survey and will be arranged and labelled by specialists from London. Thus more geological treasures from the Island will be made available to a much wider and more important field of scientific work. (Grapes 1955)

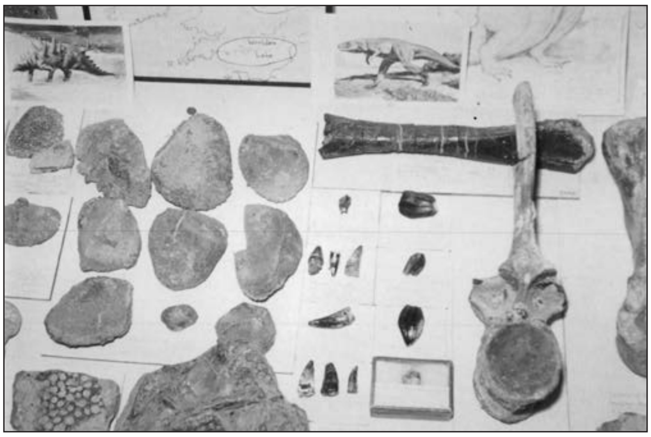
The passage above taken from the Proceedings shows that the majority of the specimens were transferred to the British Geological Survey (formerly based at the Natural History Museum, London, now with their own facilities at Keyworth, Nottinghamshire). It is interesting that given first viewing of the specimens, Mr Grapes only took the specimens he did, knowing that many had the potential to be important in their field. His description of the fossils being 'made available to a much wider and more important field of scientific work' may have been a reflection of his concern for the security of specimens at the Sandown Museum in view of the losses in the 1950s.

Although making connections with the right-minded people would have been harder at the time, it seems strange that he did not secure a much larger collection for Sandown or try to point out their importance to particular researchers, as any curator would gratefully receive such a collection today, shuddering at the thought of further local treasures moving off the Island to a national collection.

It is at the end of Grapes' time as curator that we first get to see what the displays at the museum were like, with several photos taken when the Earl Mountbatten visited in 1966.

Figure 15: Alan Grapes (left), Earl Mountbatten (centre), and chairman of the Sandown-Shanklin UDC (right)

Figure 16: Wall displays showing numerous dinosaur reamains, mostly Iguanodon.



Figures 17 & 18: Predominately dinosaur remains laid out in some of the cases including MIWG : 37, the earliest fossil traced to the Newport Museum, centre left of Figure 17.

The photos of the museum show a display seemingly based on traditional Victorian principles, cramming a large number of specimens into a small amount of space in a very regimented fashion. Interpretation of the specimens left a lot to the imagination, but for their day they provided good local interest and illustrated the range of fossils that could be found.

Alan Grapes retired from Sandown Museum in 1966 due to ill health, leaving the museum to be run by short-term honorary curators, with articles in the County Press indicating at least three different curators including Albert Baker, S. Richardson and N. Preece. In 1976 the role of curator was taken by a qualified geologist, Dr Allan Insole, who was joined in 1978 by the self-taught palaeontologist and collector Steve Hutt (who later completed an MPhil).

Sometime before Mr Richardson took over another theft of museum objects occurred. The theft has never been properly documented but seems to follow a similar pattern to the previous one, with specimens of notable research value having been stolen. Mr Nigel Locke, who visited the museum at the time the theft occurred, described a scenario of multiple cases having been prised open and the contents removed, including blocks with multiple examples of *Scaphites* (an uncommon form of ammonite found on the Island) from a particular quarry, and ray teeth in blocks of chalk (N. Locke pers. comm.).

Modernisation of the Sandown Museum Display

By the 1980s it had become increasingly clear that the museum on the upper floor of Sandown Library was overcrowded and not the tourist attraction it should be. Typically, visitors to a geology museum including dinosaur remains had come to expect full-sized reconstructed skeletons and interactive exhibits. The museum was redesigned within the available space and re-opened in 1987 by Magnus Magnusson. Exhibit MIWG : 5126, a partial, but impressive, example of *Iguanodon bernissartensis* found by Steve Hutt, was put on display as a full-sized wall mount, showing what potential the Isle of Wight had for exceptional finds, and began to consolidate the idea that a local museum on the Island could be home to the kind of important, full-sized skeletons which the Natural History Museum in London had become associated with. (The same specimen can still be found on display in the dinosaur gallery at Dinosaur Isle.)

During the 1980s and '90s spectacular finds continued to be brought into the museum, furthering the profiles of both the museum and the Isle of Wight as a dinosaur hot-spot. Included in the specimens donated were MIWG : 6977, a spectacular, complete skeleton of a juvenile and adult *Hypsilophodon* found together by Nick Chase; numerous finds from the Palaeogene of the Isle of Wight found by Andy Yule, such as MIWG : 6525; a complete turtle carapace; and IWCMS : 1997.302, the holotype of the Plesiosaur *Vectocleidus sp.*

The outstanding finds of such dedicated local collectors without doubt helped raise the awareness of the museum in the eyes of both the public and the Council, who eventually all helped towards the creation of a new museum.

Figure 19: Sandown Museum in 1999: the displays remain similar to how they were formed in 1987.

Dinosaur Isle – The New Museum

In the early 1990s, plans to relocate the Geology Museum from Sandown Library to a new site by Sandown boating lake on the seafront began under the guidance of Museums Officer Kevin Brown. However, the plan for 'Dinosaur Isle' received a setback in 1994 when plans were rejected for a one million pound bid in the 'Rural Challenge Competition', but even then plans to put in a new bid with the Heritage Lottery Fund were being made.

Even before the development of the new museum had begun, preparations for new displays were underway. Assistant curator Dr Martin Munt was reported in the County Press as saying:

> We have more than 20,000 items and very, very limited space to display them... Volunteers are helping staff in a room the size of a broom cupboard to prepare items for display and also using facilities at Dinosaur Farm [near Brighstone]... The prospect of the Sandown museum is extremely exciting and we are looking forward to the time when we can move into top gear to prepare for what will be a superb employment-creating facility. (IW County Press, 12 September 1997, 5)

The application process took several years, but on 24 December 1998 funding of £1.3 million from the Heritage Lottery Fund was announced, with the Isle of Wight Council providing a further £580 thousand in match funding. Land close to where the new museum was to be located was sold in order to raise some of the money (the land was earmarked for a cinema multiplex to be built by a private developer, but this has yet to come to fruition). Further match funding was raised from some local businesses including Wightlink, the contribution of staff time to the project and other means, bringing the total funds to £2.7 million (Peter Pusey pers. comm.)

Acknowledgements

The authors would like to thank Allan Insole, Steve Hutt, Martin Munt, and Peter Pusey for imparting their personal knowledge and providing references relating to the Museum of Isle of Wight Geology. Richard Smout and Corina Westwood of IOW Heritage Services advised on publication in respect to 'losses'. Becky Loader of IOW Heritage Services provided a copy of Wilkins' catalogue. Nigel Locke provided an excellent personal account of the post-Grapes era museum and kindly loaned a copy of 'Conversations with an Island'. Simon Harris, Paul Shepherd and Mike Howe, all of the British Geological Survey, provided details relating to their collection of Mark Norman specimens. Peter Pye of Ventnor and District Local History Society provided information on the life, collection and museum of Mark Norman.

Picture credits

British Geological Survey: Figure 12
County Press: Figure 19
Dinosaur Isle: Figures 2, 3, 4, 5, 6, 7, 8, 9, 11, 14, 15, 16, 17, 18,

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Authors: Alex Peaker, Dinosaur Isle, Culver Parade, Sandown, Isle of Wight, PO36 8QA
Alex.Peaker@IOW.gov.uk
Paul Bingham, 6 Forest Close, Newport, Isle of Wight, PO30 5SF

THE APPLICATION OF ACOUSTIC SURVEY AND SPECIES DISTRIBUTION MODELLING IN ESTIMATING BATS' USE OF HABITAT IN DETAIL FOR SMALL AREAS

Jon Whitehurst

Abstract

The objective of this work has been to demonstrate that acoustic surveys can be an effective way of generating bat species presence data and that presence-only species distribution modelling tools can be used to estimate bats' use of habitat, in detail for small areas. This paper addresses transect design protocol, detection probability of bat detectors, the echolocation call classification approach, and the impact of all of these in setting up a habitat suitability model (HSM) and the subsequent limitations these impose on the results.

Introduction

Acoustic survey employing broadband echolocation call recorders is now a well accepted technique to establish bat species presence over a wide landscape area, and the portability of such equipment enables significant areas of landscape to be covered within a short period of time. In addition, such recorders are also used for long-term recording from static locations such as for monitoring roost exits or known commuting routes. In all cases, the main difficulties faced with acoustic only surveys is the variation in probability of detection of the different bat species due to the physics of ultrasound propagation and the linearity and dynamic range of the bat detector, and the difficulty of making automated positive bat identification from recordings made in the field. This paper considers the impact of these factors and the constraints that they place on the ability to generate HSMs.

The modelling tool adopted for this work was MaxEnt (Phillips, Dudík & Schapire 2004; Phillips, Dudík & Schapire 2006, Elith *et al.* 2011), which is a well established (if not bench-mark) presence-only modelling method that has seen use in a wide range of habitat suitability and species distribution modelling applications. Presence-only modelling presents some particular difficulties in model testing, and several papers are available that recommend varying degrees of rigour depending on the application (Pearson 2007; Pearce & Boyce 2006; Dennis & Thomas 2000). However, the main area of concern with any HSM generation is ensuring that the environment variables used in the modelling process have a valid justification for their incorporation, since statistical modelling methods such as MaxEnt do not provide any protection against unrealistic environment grid data. This work has been constrained to environmental grid variables similar to those used in larger scale models (Bellamy 2011; Bellamy, Scott & Altringham 2013). These modelling methods are also susceptible to bias in the presence samples used to train the model, and this imposes constraints and the need for rigour in the presence sampling protocols, and compensation in the model if residual bias remains.

Some typical results for representative species are discussed that relate to the conservation value of such models when considering bats' use of landscape through the use of acoustic surveys and species distribution modelling in detail for small areas. In particular, such models enable a statistically justifiable and least biased view of landscape use to be formed. Such models also have the potential to make a much more reasonable estimate of the impact of any future developments such as housing or deforestation than relying upon "expert judgement" using the species detected and the habitat assessment alone.

The Study Area

The Parkhurst Forest is located on the Isle of Wight and lies approximately half way between Cowes and Newport (grid reference SZ 474 896). The forest is one of the oldest in the UK (Chatters 1993), and activities within the forest have been varied including a royal hunting ground in medieval times, large coppiced areas supporting local laundry and brickmaking kilns in the 19th century, to the multi-purpose mixed woodland of today. In particular there are large areas of semi-natural ancient woodland (predominately oak) dating back to pre-Napoleonic times. A significant difference between Parkhurst Forest and the other local forests of the same era is the lack of intensive woodland management, which has resulted in a significant number of "poor quality" trees (dead, bent, leaning, split, etc.) which would have normally been removed (Forestry Commission 2007). This lack of tidying has provided the ideal background environment for woodland bat species such as the Barbastelle bat which are wholly dependent on tree splits and lifted bark for roosting sites. The forest is currently an unusual mix of both semi-ancient woodland and stands of commercial species such as spruce, larch and pine, and is surrounded on the majority of its perimeter with grazing pasture. This unusual composition of tree species, surrounding pasture and the internal networks of road, track, ride and streams has the potential to support a very wide range of species, and it was therefore considered to be an ideal study site. The Parkhurst Forest site was first recognised to be of particular importance as a bat habitat by Davidson-Watts in 2008 when radio tracking activities resulted in the discovery of the largest known Barbastelle maternity roost in the UK (115+ bats) (Davidson-Watts 2008).

Echolocation Call Detection and Recording Equipment

A reasonably up to date assessment of the detection probability (Pd) of currently available bat detectors has been published by Adams *et al.* (2012). In summary, the Pd of any particular detector for a given species is driven by:

- The peak frequency and energy contained in the call (because the sensitivity of the bat detector itself varies across the frequency range)
- The nature and amplitude of the echolocation call (chirp, constant frequency, or hybrid of these)
- The prevailing sound propagation conditions (free space, canopy density, humidity, pressure, temperature)

The choice of detector is therefore critical; high sensitivity and consistent response across the frequency range 15kHz to 150kHz would be the ideal. This programme of work employed the Elekon BatLogger on the basis of its nearly flat frequency response and high sensitivity, combined with the ability to geo-tag the recordings (this unit also performed exceptionally well in the independent tests carried out in Adams *et al*. (2012). The BatLogger typically gives a full scale reading for a Bechstein's bat at a range of 4m, but this range is estimated to be nearer to 40m for a Noctule bat. This degree of difference has a profound impact on the detection probability, and therefore the effectiveness of an acoustic only survey, and this difference in species Pd, compounded by the tree canopy attenuation, explains why bats with low amplitude and/or high frequency calls are usually under-represented in acoustic surveys. Indeed the Pd of some commercial broadband detectors is so ineffective that such bat species may not be detected at all. The impact of the ability of the equipment to detect the bat echolocation call has a profound impact on the survey effort required to have reasonable probability of detecting species present. This is illustrated in Table 1 below, which shows the empirical evidence from a large scale woodland survey, demonstrating the relative survey effort needed for different UK bat species (Scott & Altringham 2014).

Table 1. Empirically derived relative survey effort for different woodland bat species to achieve 95% Pd using acoustic survey methods.

Species	Relative Survey Effort
Pipistrellus	1
M. *brandtii*/*mystacinus*	2
Barbastellus	2
Rhinolophus	4
M.*alcathoe*	4
M.*nattereri*	4
M.*bechsteinii*	6
Plecotus	9

To have a reasonable chance of success with detecting those species with very low amplitude echolocation calls, a very sensitive detector with good high frequency response is required together with an appropriate transect protocol that will bring the detector within less than 10m of the bat.

Echolocation Call Identification

Automatic call identification is essential when dealing with hundreds of recordings in a single sampling session, however there is no single solution to this problem. Virtually all the commercially available classifiers and the open source classifiers such as BatClassify (Scott 2014) will classify to genus level with a high probability, but separating the Myotis, Nyctalus and Plecotus genera members is a significant challenge (even with recordings made in the clear and clutter-free) due to the overlap of the echolocation call structure between species. Add to this the additional complications brought about by propagation through the canopy clutter, the bat detector frequency response flatness, and the non-linear attenuation across the frequency range of a chirped echolocation call, and classification becomes a very difficult task since the high frequency component(s) of the call is often missing.

For this programme of work, BatExplorer (supplied as a package with the BatLogger) was used as the initial classifier followed by a pass of the data through BatClassify. All Myotis, Nyctalus and Plecotus calls were then examined manually before the final classification was assigned in these cases. The primary reference for manual call classification was based on the work compiled by Jon Russ (2012) plus local release recordings made with the help of the Isle Wight Bat Hospital. Approximately 5% of the presence samples had to be discarded where it was not possible to make a reasonable judgement based on a "2 from 3" application of these classification methods (though the number discarded is closer to 50% if one includes spurious recordings caused by crickets, etc.). The reason for discarding calls was usually because the echolocation call was on the limit of the detection capabilities, or because the high frequency components were not recorded due to either the canopy attenuation or distance to the bat. The discarded calls were relatively low in number, in part because the recordings were made using the BatLogger in a call triggered mode, so recordings were only made when a recognised bat call was captured.

Model Formulation: Habitat Feature Variables

The model area selected was approximately 3km square and included the surrounding pasture and developed areas as well as the forest itself. The model was built on the hypothesis that the bats' landscape use would be linked in some way to features listed in Table 2. Each of these features has been shown in previous work (albeit at a larger environmental scale) to potentially hold some influence on the bats' landscape use.

Table 2. Landscape variables employed in deriving the habitat suitability models

Feature	Variable Type	Description
Land cover type	Categorical	e.g. Tree species planted, pasture, built-up, etc.
Exterior Distance from forest outer edge	Continuous	Distance outside of the deep forest edge
Interior Distance from forest outer edge	Continuous	Distance inside the forest from the forest edge
Distance from hedgerow	Continuous	Nearest distance to a hedgerow centre line
Distance from water	Continuous	Nearest distance to a water edge (pond or stream)
Ground elevation	Continuous	Height above sea level
Ground slope gradient	Continuous	Gradient of the slope face
Ground slope compass direction	Continuous	Compass direction of the slope face

In particular, the response to "distance from" variables are ones that can be directly used in environment impact assessments for neighbouring developments, and so are especially relevant. The land cover grid was generated from a number of sources including the forestry commission GIS data describing the forest plantation plan, Ordnance Survey GIS data for buildings, plus local survey. The watercourse data was derived from Ordnance Survey GIS data, and Forestry Commission GIS data for the recently created ponds. Hedgerow data was generated by creating maps using QGIS (Quantum GIS Development Team 2009) based on Google Maps aerial imagery with local survey being used as a crosscheck. The edge, water feature and hedgerow data were processed in QGIS in order to create a grid of "nearest distance to feature" points. The elevation data was extracted from a terrain map generated by digitising the Ordnance Survey elevation contour data, and this data was then further processed in QGIS to find the ground slope and compass direction. It was decided to use a grid spacing that was approximately the same as the detection range for the least detectible species with the equipment used, and was set at 7.5m, giving a grid of 436 x 299 points. This requires some additional steps to be taken during the model run-time set up for those bats with greater detection ranges, which is described later.

Model Formulation: Presence Sampling Protocol

A walked transect strategy was adopted so that a large geographic area could be covered in each session. The survey area was divided into 10 routes within the forest with minimal overlap, and four external areas were selected around the forest edge that represented forest edges in the main compass directions. The internal transects were also chosen such that they covered a mix of deciduous, evergreen and clear felled areas, and were also planned so there was as near equal mix as possible of road, covered track and grass ride. This was done in order to avoid potentially biased results due to preferential use of any particular habitat type over the season. In addition, random spurs were employed off the main transect path in order to improve the detection probability of any gleaning species present (bearing in mind, the maximum detection range of a Bechstein's or Brown long-eared bat is only about 10m in the clear, and for example if the transect is an open ride 20m wide, the probability of detecting a Brown long-eared bat foraging on the opposite side or inside the canopy is minimal). The outer field areas were covered by "lawn mower" pattern transects with nominal 25m spacing.

Staggering the start points for the repeat transects reduced the probability of any time-related bias due to say a local roost site in close proximity to the transect, or being located on a regularly used commuting route. Repeat transect start times were staggered by changing the start point on the circular routes and the start time was 15 minutes post sunset, or the first bat sighting. In the case of the one way routes, the start and end points were reversed on alternate surveys.

A presence sample was defined to be a positive bat identification within 2.5 seconds of the recorder being triggered. The recording interval of 2.5 seconds provides sufficient sampling time to enable positive bat echolocation call identification to made, but minimises the error introduced by the detector motion during the sampling period, and also reduces the probability of multiple bat echolocation calls being captured on the same recording, so simplifying post processing. Clearly, such a short record time means the same bat will appear many times within any individual transect, however the intention was to establish the areas of habitat being used by the bats in order to provide the best possible input to the model, not the absolute number of bats. All the recordings are geo-tagged and time-stamped using the Elekon BatLogger built-in GPS.

In terms of positional error, the reported GPS HDOP (horizontal dilution of position) averaged +/-2.8m (2-sigma) over all surveys, and the error due to motion during recording was typically +/-1.2m, so the typical RSS positional error was 3.1m, or approximately 0.5 of a grid cell. This error is important since it drives the minimum regularisation parameter in the MaxEnt model, and in this case a minimum regularisation multiplier of 1.5 was assumed to inform the model that it needs to take appropriate account of the neighbouring grid cells as well as the one that presence sample falls into. Positional accuracy is not the only driver for this parameter and this is discussed further under model tuning. The residual sampling effort bias, though minimal in the plan employed, was managed within the model as a bias grid.

Model Run-time Set-up and Tuning

All models were set up to run 100 replicates with 20% of the presence samples set aside for testing the model trained using the remaining 80% of presence samples. All duplicate presence samples were reduced to one instance to avoid biasing the models, and the regularisation parameter was set between 1.5 and 4 depending upon the typical amplitude of the echolocation call associated with the species, and hence the likely detection range. In these models 1.5 typically represented the case for Plecotus genus, and 4 representing the case for the higher amplitude calls of the Nyctalus genus. Failure to set the regularisation parameter correctly for the detection range corresponding to each species would have potentially resulted in incorrect habitat associations in the model (Merow, Smith & Silander 2013; Anderson & Gonzalez 2011; Phillips 2009). All models were run with the response curve and jack-knife options enabled in MaxEnt so that the relative importance of each background variable could be assessed. Once the models were run with all the environment variables, the jack-knife diagram showing the relative AUC (Area Under Curve) contribution from each of the model variables was used to identify any variable with a contribution of less than 5%, which were then subsequently removed from the final model runs.

Results: Presences Recorded

In total 936 km was covered (232 hrs sampling time) over the three seasons, and a total of 13,081 presence records identified. The total presence records are given in Table 3 below:

Table 3. Presence records in ascending order

Species	Records
Rhinolophus ferrumequinum	1
Myotis brandtii	4
Plecotus austriacus	7
Myotis bechsteinii	26
Pipistrellus nathusii	56
Myotis alcathoe	57
Myotis daubentoni	60
*Plecotus auritus**	127
*Myotis nattereri**	163
*Nycatlus leisleri**	226
*Myotis mystacinus**	310
*Nyctalus noctula**	329
*Pipistrellus pygmaeus**	483
*Eptesicus serotinus**	565
*Barbastella barbastellus**	901
*Pipistrellus pipistrellus**	9615

* Denotes sufficient samples to run a statistically significant HSM

The very large number of Barbastelle bats was unexpected and indicates a local population that is much higher than might be estimated from the published species number and range in the UK. It was also a surprise to record a small number of distinct Alcathoe bat echolocation call signatures, backed up by a few visual sightings of this smallest member of the Myotis family.

Results: Habitat suitability models results

It was possible to generate meaningful habitat suitability models (i.e. an AUC >0.75) for the top 9 species recorded. Three examples of habitat suitability models are given in figures 1-3 to demonstrate the wide difference between bat species in their use of habitat, in particular the use of the forest boundary region, and the relative importance of the main species of tree present. For each of the HSM examples, the following observations are made:

Barbastelle Bat (Figure 1)

- The species is very well suited to the general forest habitat, indicated by the relatively high logistic probability estimated by the model.
- The species is most suited to the northern section of the forest, which is where there is a prevalence of the older oak and beech trees, and has generally not been subject to intensive management.
- The species is not a large scale user of the fields surrounding the forest, but will often be found out approximately 200m from the forest boundary. This feature of the model correlates well with the presence observations noted in the more sheltered Stagwell and Crockers Farm areas to the north and east of the forest respectively.
- The one area of the forest where the logistic probability is 0.1 or below corresponds to the clear-felled area located between the public car park area off the Forest Road and Signal House.

Noctule Bat (Figure 2)

- This species is also very suited to the general forest habitat, with a minimum logistic probability of 0.5 indicated over almost the whole forest area.
- The species appears to make more use of the central area of the forest where the tree species are dominated by Corsican Pine and Douglas Fir. The high density of presence samples in this area and time of recording would indicate that roost sites are likely to be located nearby.
- The species is a large-scale user of the surrounding fields, and is regularly seen feeding over 200m from the forest edge.

Brown Long-Eared Bat (Figure 3)

- The species is well suited to the general forest habitat.
- Unlike the previous examples, the HSM has no obvious habitat associations with tree species.
- This species is generally found inside the forest, or very close the forest edge (typically less than 25m away from the outside edge).

HSMs for the individual species provide a statistically quantifiable insight into the bats' use of habitat, and at the scale used in this particular survey, are capable of estimating the habitat significance down to a particular tree species presence, or distance from a modelled landscape feature. HSMs at this scale therefore provide a powerful tool for impact assessment of habitat change, such as tree harvesting or other disruptive changes in the landscape such as hedgerow removal.

A key metric by which to describe the ecological value of a habitat is species richness, and by using the HSMs generated from this programme of work, a view of the Parkhurst Forest bat species richness has been generated and is shown in Figure 4. This species richness map has been generated from the nine individual species HSMs produced and these have then been thresholded at a logistic probability of 0.25 (which represents the lowest logistic probability at which the bat species is likely to be using this area) and overlaid. Using the QGIS package these binary layers are then added logically to form the species richness map. So in this example, a species richness of 9 indicates that 9 species will be likely to be using this area of the forest. It should be noted that 0 in this case does not indicate that no bats will be found in these areas, but it is very unlikely that a bat will be observed. This particular result indicates that the most species rich areas of the Parkhurst Forest are in the north and eastern regions where there is a high percentage of mature Oak and Beech trees present, and where there has been limited forest management.

One of the key objectives of this work was to investigate whether the technique was sensitive enough to detect habitat preference shifts, and the particular species of interest in this respect was the Barbastelle bat. In order to achieve this, HSMs were produced for each year of the study using only the data collected in that year and then the difference between these HSMs was plotted. The first example in Figure 5 shows the habitat preference shift between 2012 and 2013 seasons. In this figure, a red shade indicates an increased preference shift, a blue shade indicates a reduced preference shift, and black indicates no change from the previous year. The white bounded areas indicate where forestry work was being carried out in the intervening winter between the two sample sets. The main observation is the noticeable habitat preference shift to the western and south eastern edges of the forest, however there is no obvious correlation with the forest work carried out over the winter season (flailing of the trees and sub-canopy beneath the high voltage transmission line along the eastern boundary and removal of Japanese Larch in the northern part of the forest). The changes between the 2013 and 2014 seasons are shown in Figure 6, where it is observed that there has been a further shift in the preferred areas of habitat use within the forest. In this case the area of the forest that was significantly thinned out during the winter of 2013 has actually seen a preferential increase (again shown by the white boundary mark). Overall, the only observation it is possible to make is that the Barbastelle bat is making use of different areas of the forest in different years, but there does not seem to be any obvious link with forest management activities. This result is not that surprising since the area of forest management work carried out at any one time has been small with respect to the likely range of the Barbastelle bat in the forest and surrounding area.

Discussion & Conservation Implications

One of the primary advantages of the MaxEnt modelling methods employed is that from a statistical standpoint they are inherently "self-validating", however this does not necessarily mean that the model is correct in ecological terms. This work is unique in that no other study to the author's knowledge has attempted to form a bat species HSM in such detail for a small area. Studies have generally been conducted at a macro level using variables such as percentage tree cover as opposed to detailed tree species presence and do not generally permit direct comparison. However, work carried out by Bellamy (2011) in the Lake District National Park (LDNP) included a similar "distance from forest edge" component in her model and a direct comparison for this variable response from both models is shown in Figures 7a and 7b. Setting aside the fact that the Parkhurst Forest model is constrained to 1.5km, whereas the LDNP model is not, it is observed that both models predict the same order of logistic probability at the forest edge and decay at very similar rates, except for the Common Pipistrelle (this difference is almost certainly due to the very different model scales and sampling area size). The overall correlation for this model component is very good and is a positive indicator of the Parkhurst Forest model validity and the general application of MaxEnt employing environment grids at a detailed habitat scale.

Whilst it was clear that a full season of data was required to generate a complete picture of habitat use, it was also noted that each half-season generally produced enough data to form a HSM view, and for some species (notably the Barbastelle) significant variation in habitat use was observed between the models run for the half-season datasets in any one year. This "nomadic behaviour" in habitat preference would need to be allowed for if these techniques were used to assess the impact of major habitat change such as harvesting or development.

During the survey period, no direct detrimental impact was observed due to the forest management operations that were carried out, and in one case a small but positive increase was noted when an area of the forest was thinned out. It was noted however that the clear-felled areas are generally avoided by all bat species, and clear-felling is therefore not a preferred forest management option in terms of bat conservation.

The work has demonstrated that acoustic surveys using full spectrum recorders with the necessary sensitivity and using appropriately planned transects and with appropriate survey effort can be used to capture the full range of species present, though the significant increase in survey effort needed to find the presence of the Plecotus genus makes other methods (such as an active lure and harp trap) a more attractive proposition. The processing of the call data also presents a problem, and it will always be difficult to achieve reliable separation of the Myotis genus under anything other than exceptionally good recording conditions. Therefore there will always be a number of calls that cannot be classified with sufficient confidence to be used in a HSM.

Finally, the work has demonstrated that the Parkhurst Forest area supports a very wide range of bat species, with 16 species recorded in total and that it is a particularly important habitat for the Barbastelle bat.

Acknowledgements

My thanks go to the Forestry Commission England (Jay Doyle) for providing the GIS data defining the Parkhurst Forest plantation plan, so enabling the fast and accurate generation of the habitat component of the model and for permission to conduct the long term survey on the Parkhurst Forest Estate. In addition, the survey work would not be complete without the free access granted by Crockers Farm (Mary and Paul Bradley), Stagwell Farm (Graham and John Ward) and Broomfield Farm (Jill and Roger Broomfield). Finally, the ability to make controlled recordings of bat echolocation calls was critical to the success of improving the bat classifiers used for this programme, so my final thanks go to Graham and Donna Street (Isle of Wight Bat Hospital) in letting me make a series of bat release recordings during this period for the classifier library.

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Author: Jon Whitehurst, 97 Noke Common, Newport, Isle of Wight, PO30 5TY.
jon.whitehurst@onwight.net

Figure 1. Barbastelle Bat HSM

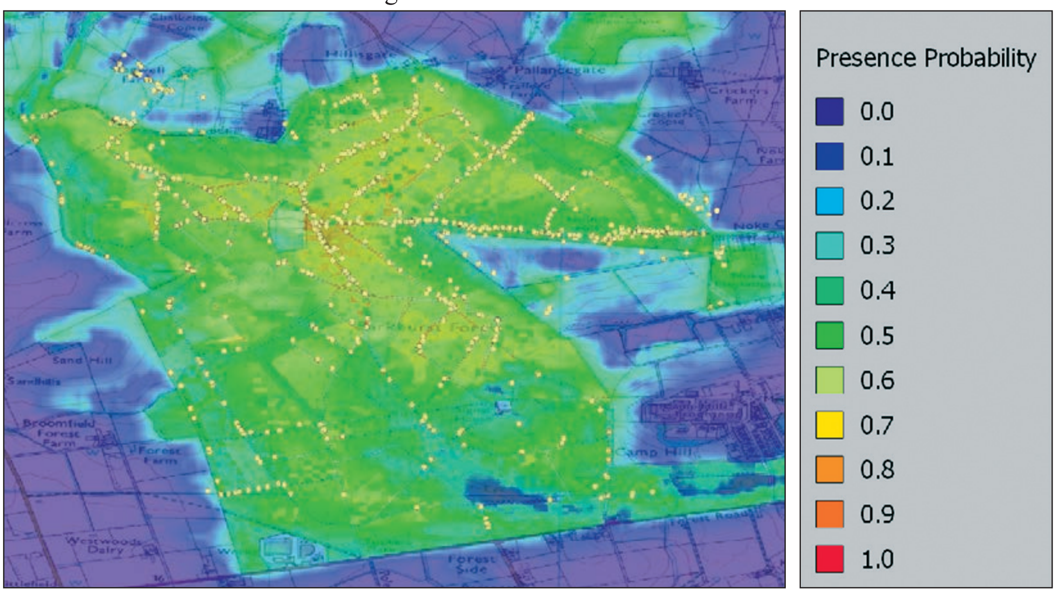


Figure 2. Noctule Bat HSM

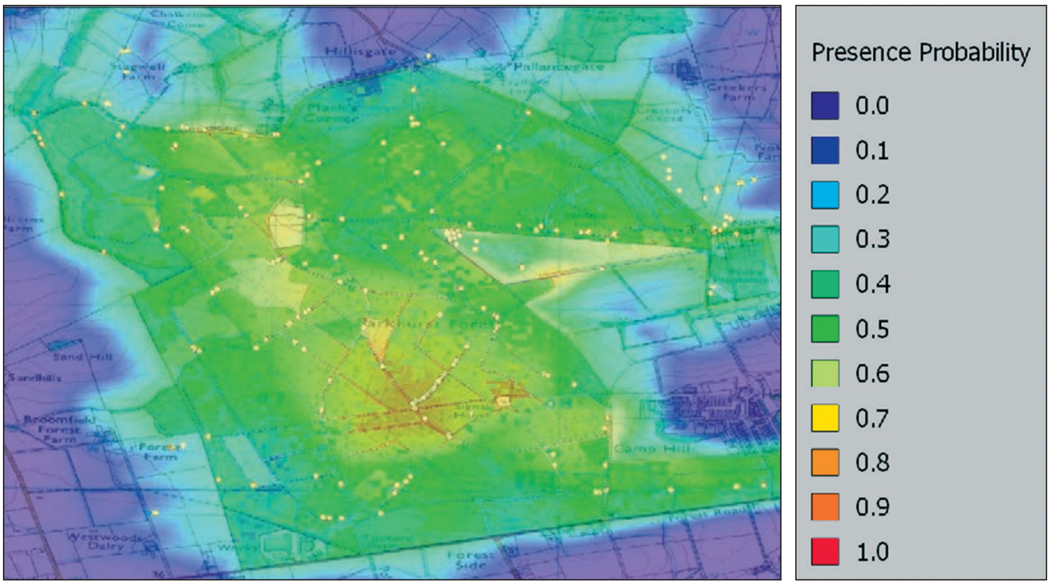
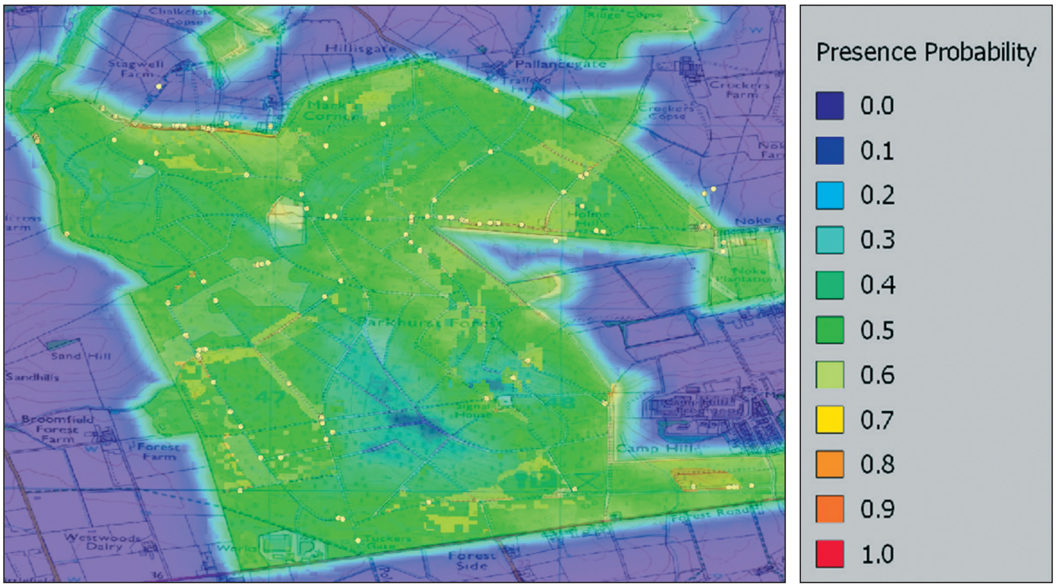


Figure 3. Brown Long-Eared Bat HSM



All maps in WGS-84 projection, North at top of page. Yellow marks indicate presence sample

Figure 4. Parkhurst Forest Bat Species Richness Map

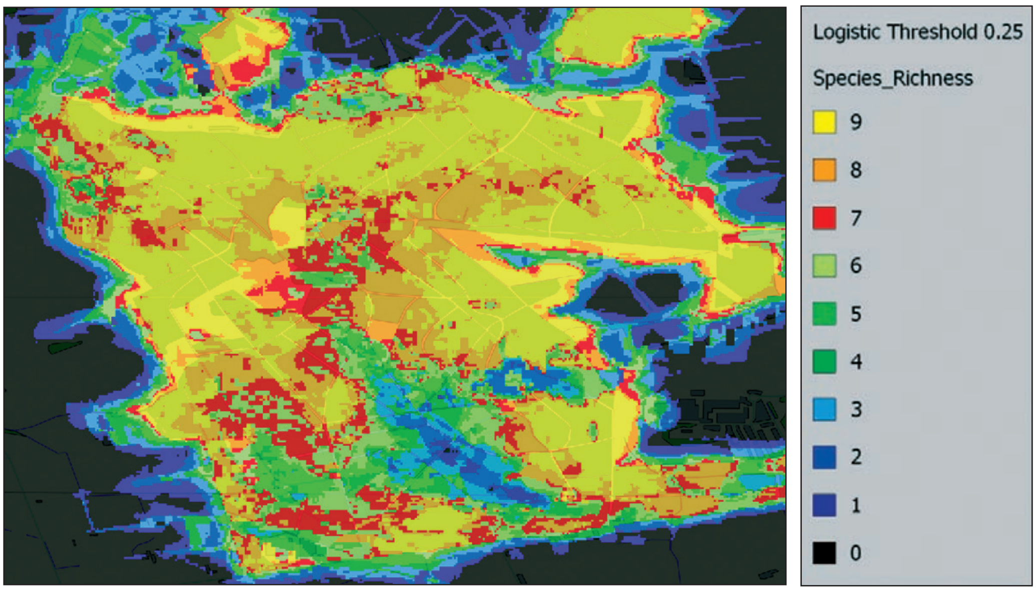


Figure 5. Barbastelle Bat Habitat Use Preference Shift 2013-2012

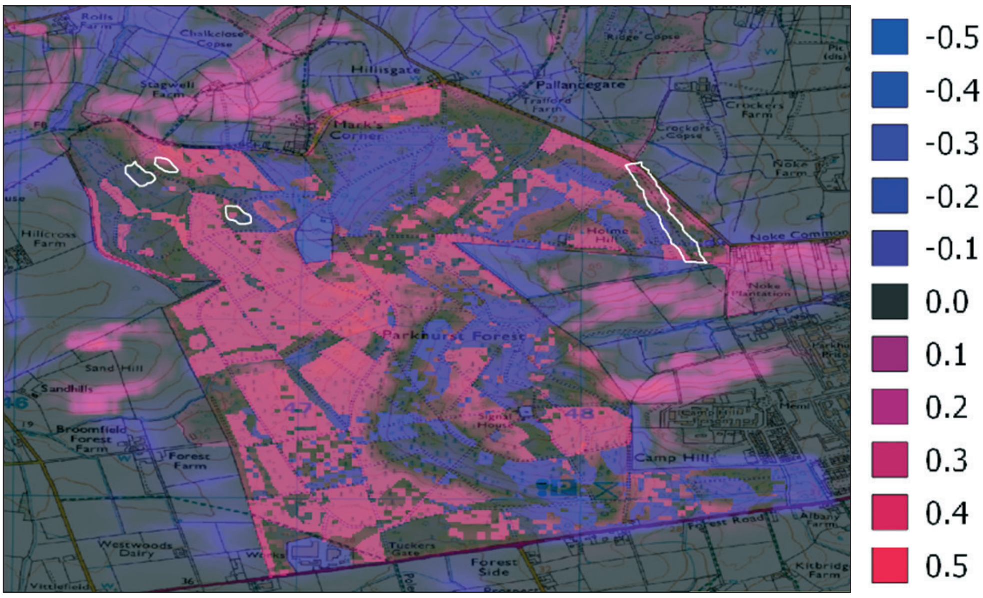


Figure 6. Barbastelle Bat Habitat Use Preference Shift 2014-2013

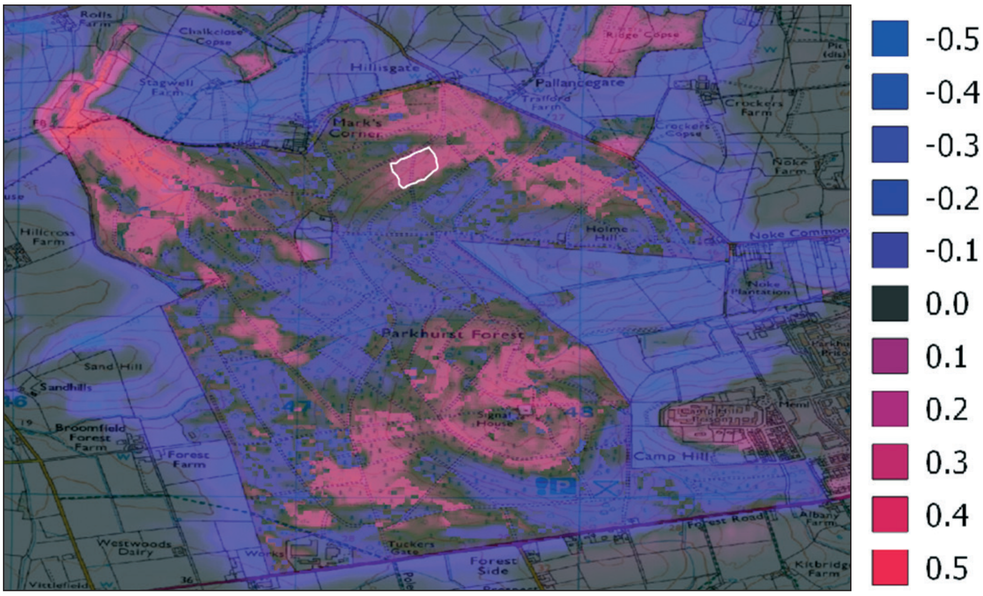


Figure 7a. Parkhurst Forest Edge Functions

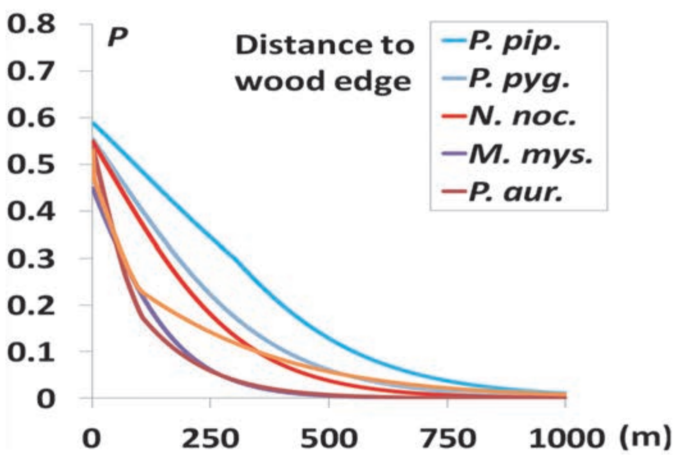
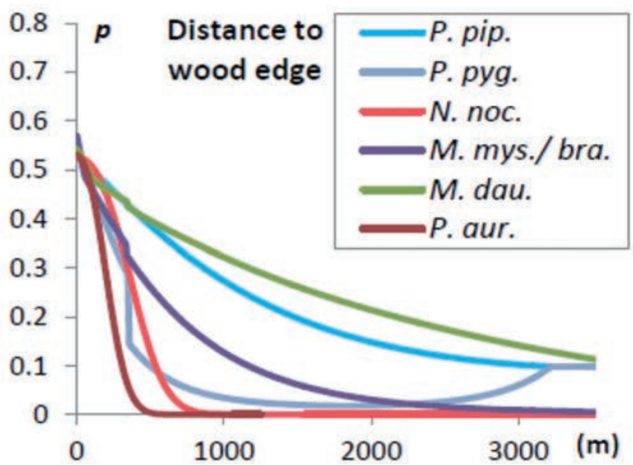


Figure 7b. Lake District National Park Edge Functions



CENTIPEDES AND MILLIPEDES FROM VENTNOR BOTANIC GARDENS INCLUDING A SPECIES NEW TO BRITAIN

Tony Barber (British Myriapod & Isopod Group)

The first account of myriapods (centipedes and millipedes) from the Isle of Wight seems to be that found in the *Victoria History of Hampshire and the Isle of Wight* (Pocock 1900), a list that was subsequently included in Frank Morey`s *Guide to the Natural History of the Isle of Wight* (Morey 1909). An article entitled *Notes on Some Light Producing Organisms* in the *IWNHAS Proceedings* in 1950 (Damant 1950) refers to luminous centipedes but without mentioning particular species. In 1967 the present author, during a brief visit to the Island, recorded several species including *Henia vesuviana* (as *Chaetechelyne vesuviana*) from Carisbrooke (Barber 1967). At that time there had been only a handful of records for this very distinctive animal which we now know to occur widely across southern England.

In the 1970s Andy Keay who was at the time living on the Island, started to record these animals, publishing a short paper on Isle of Wight centipedes in 1980 (Keay 1980), making significant numbers of myriapod records both on the Island and elsewhere and being co-author of the centipede provisional atlas (Barber & Keay 1988). By the time of the atlas the number of British records of *H.vesuviana* had jumped from the five of 1967 to 67, including records from nine of the 10km National Grid Squares on the Island. In 1984 he found the tiny pill millipede *Trachysphaera lobata*, then new to Britain, at Bembridge (Keay 1987; Jones & Keay 1986). Apart from a futher population a few hundred metres away, now destroyed by development, searching in apparently suitable sites elsewhere on the Island has failed to find more examples (Lee *et al* 2005, 2011). More recently it has been found in Wales (Wilbrandt *et al.* 2015). In recent years a number of new records of both centipedes and millipedes from the Isle of Wight by Steve Gregory, Paul Lee and Helen Read have been contributed to the National Recording Schemes, and Victoria Burton has added centipede records from Winkler extraction and soil pits at Timber Copse and Great Mead Copse in 2013. Most recently, Stephen Plummer has made further records.

Botanical Gardens are always of interest, especially if they have glasshouses or similar structures and, given the almost frost-free location, it seemed a pity when visiting the Island in September 2015 not to ask if I could collect myriapods and woodlice in the Ventnor Botanic Garden. Permission was readily given and we were made most welcome by Chris Kidd and Colin Pope, and the latter has also found various references for me subsequently. Despite gradually deteriorating weather which caused us to abandon collecting mid-afternoon, the garden, which is certainly very well worth visiting for its diversity of exotic plants, generated a number of specimens for examination when searching in leaf litter, under wood and stones, etc. The Tropical House with its splendid Amazonian water-lily was in fact rather dry for the most part and generated little of interest other than a specimen of the common brown centipede, *Lithobius forficatus*. Outdoors, the garden is laid out in a number of areas with representative plants from various world biomes as well as such features as a palm garden, herb and medicinal garden, grape arbour and oriental garden.

SPECIES FOUND AT VENTNOR BOTANIC GARDEN

CENTIPEDES (CHILOPODA)

These are distinguished by having at least 15 pairs of legs, one pair on each trunk segment, as well as a pair of forcipules (poison claws), with which they capture their prey, underneath the head.
British species are placed in four orders:

Scutigeromorpha: A single species *Scutigera coleoptrata* (house centipede), is found very occasionally inside buildings in Britain, although it can be seen outdoors in Jersey and Guernsey and so might possibly be found outdoors in sites such as the Garden in the future. It is a strange-looking creature with yellow/violet "go-faster" stripes and fifteen pairs of extremely long legs, and runs very fast. There are, as yet, no records from the Island as far as I am aware.

Lithobiomorpha ('stone centipedes'). Relatively short, fast moving animals with fifteen pairs of legs and long antennae. Most, but not all, of our species are some shade of light / chestnut / dark brown. The 1980 list gave seven species for the Island but there are more than twice that number known from Britain as a whole.

Lithobius forficatus **('common lithobius')**. A rather large (up to 30mm) chestnut brown animal which is the common large member of this order over almost all of Britain outside truly rural areas. There is, however, a similar species, *Lithobius pilicornis*, which is often somewhat darker and can be larger (up to 35mm) and widespread on the Island.

There are a number of features that distinguish the two including the shape of certain tergites along the back. *Lithobius forficatus* was recorded in the Mediterranean Garden as well as the Tropical Greenhouse and might be expected to be common in the Garden as a whole.

***Lithobius melanops* (‘garden lithobius’)**. A smaller animal (up to 17mm) is a very typical animal of gardens (also coastal areas and in cool greenhouses), where it is found under wood, bark of dead wood, stones, old bricks, etc. It is relatively light in colour with a darker broad longitudinal stripe along the body. Found around the decking in the Herb Garden area and also in the South African area, it is probably widespread in the Garden as a whole.

Other species might also be expected, notably the small (up to 9.5mm) chestnut brown *Lithobius microps* (‘least lithobius’), which tends to curl up when disturbed.

Scolopendromorpha: This order, which also includes the tropical ‘giant centipedes’, has three species found outdoors in Britain, all superficially similar, mid-brown in colour, 21 pairs of legs and fast running. All are most often found in strongly human-influenced locations although the smallest and commonest species, *Cryptops hortensis* (‘common cryptops’, not found this time), can occur in woodland, etc. in the south. The three different species are best identified by magnified examination of their last legs – which they happen to shed easily as a defence mechanism.

***Cryptops parisi* (‘Paris cryptops’)**. This is up to 30mm, usually larger, and, along with *Cryptops anomalans*, is one of the two ‘larger’ *Cryptops* species which are generally only found in significantly human-influenced sites in more southern locations. Its name derives from the person who collected the first named specimen, M.P. Paris, rather than the city, although no doubt it occurs there. A specimen was collected in the Australian Garden.

***Cryptops anomalans* (‘greater cryptops’)**. A juvenile, clearly of this species (it has a characteristic cruciform (cross-shaped) suture on the first trunk tergite) was found in the Herb Garden area. It can grow up to 50mm long and, if handled, can inflict a noticeable but harmless bite with its poison claws.

Geophilomorpha (‘earth centipedes’, ‘wire centipedes’). These are long, worm-like animals with at least 31 pairs of legs (up to 83 pairs in IW species) which have, at various times, been called ‘wire-worms’ or, since some of them are luminous in certain conditions, ‘glow-worms’. The number of pairs of legs, although slightly variable in an individual species, is useful in identification, along with other characters, especially since it is the same in both juveniles and adults.

***Haplophilus subterraneus* (‘western yellow centipede’)**. This is a common large yellow centipede (up to 70mm long) in much of southern and western Britain. It has between 77 and 83 pairs of legs and examination with a lens of the coxae (leg bases) of the last pair of legs reveals a large number of minute pores on both upper and lower surfaces. These characters, along with the distinct oval pore-groups on the sternites, make it one of our most easily recognized geophilomorphs. It was found in the Herb Garden area but is probably widespread.

***Schendyla nemorensis* (‘common schendyla’)** is a small (up to 20 mm) pale species which was not seen during the initial visit but was found subsequently in a sample of millipedes which Colin sent to Paul Richards for photography and which was identified by Steve Gregory.

***Henia vesuviana* (‘white-striped centipede’)**. This is a very distinctive, robust centipede, often found rolled into a ball in soil, lower surface outwards. It is a greyish colour but the head and the rear end are a distinct light reddish brown, almost orange. The tergites (upper body plates) are semi-transparent and through them can be seen the long white dorsal vessel or ‘heart’ (in living animals it can be seen pulsating) running along the length of the body above the greenish-grey gut. It is up to 50mm or more long and with 63-75 leg-pairs. A specimen was found in the Herb Garden.

Almost certainly there are likely to be other geophilomorphs present in the Garden and appropriate searching or extraction from soil or litter should reveal them.

MILLIPEDES (DIPLOPODA)

These are distinguished from centipedes by having two pairs of legs on most body segments (‘diplosegments’) and lacking poison claws as they are herbivorous. They are a diverse group with a number of orders found in Britain, with others overseas or in hothouses. Not all British orders were represented in the collection made in the Garden.

Polyxenida: A single British species is known, the 3mm long 'bristly millipede' (*Polyxenus lagurus*). It is found on old walls, lichen, etc. and has been recorded from the Island. Could well be found in the Garden, especially by searching at night in the summer months.

Glomerida: These are the 'pill millipedes', characterized by their ability to roll up into a ball like a pill woodlouse. Reference has already been made to *Trachysphaera lobata* but the common, large (up to 20mm) blackish *Glomeris marginata* is widespread in the Island. It tends to favour woodlands.

Chordeumatida: A diverse group of millipedes, relatively short in relation to diameter and characteristically with 'bumps' or projections on body segments, in some cases sufficiently well developed to give a distinctive 'flat-backed' appearance. Animals have varying numbers of ocelli (eyes) and generally the appearance of an apparent 'neck' between the head and the trunk segments. As well as the species noted below, the small (7.5mm), pale *Brachychaeteuma melanops* has been found on the Island and might be sought for in the Garden during the winter and spring. Another member of the order, *Chordeuma proximum*, which somewhat resembles a snake millipede but with longer legs, is known from Hampshire and other places and could easily turn up on the Island; and further members of the order, new to Britain, continue to be found in various locations in Britain and Ireland.

***Nanogona polydesmoides* (*Polymicrodon polydesmoides*, 'false flat-back millipede')**. This might be mistaken for a true 'flat-backed millipede' (see below) but has about 30 segments rather than about 20 of the latter and has clearly visible ocelli (eyes). It is fawn to dark brown in colour and up to about 20mm long and adults are most often found in the autumn and winter. It occurs in a wide range of locations including urban areas and caves and there are a number of records from the Island. It has sometimes been mistaken for a centipede but the two pairs of legs per segment are quite distinct. A specimen was found in the Palm Garden.

Polydesmida ('flat-back millipedes'): These are rather short millipedes with flat or arched backs with about 19 or 20 diplosegments, no ocelli and without the distinct "neck" of chordeumatids.

***Polydesmus* sp**. Immature specimens which were found in the Garden are often impossible to identify to species level. British members of this genus (with one exception) are brownish in colour and up to more than 20mm long with 20 rings. Three species, *P.angustus*, *P.coriaceus* and *P.denticulatus* have been recorded from the Isle of Wight.

***Brachydesmus superus* ('mini flat-back millipede')**. Resembles a small (10mm), paler *Polydesmus* but with only 19 rings. A common and widespread animal known from several sites on the Island. In the Garden it was found in the Herb Garden and the Compost Yard.

***Oxidus gracilis* ('greenhouse millipede')**. Probably originally a native of East Africa but spread throughout the tropics and well established in botanic gardens and nurseries in Britain, although appearing to be unable to survive outdoors here. It grows up to about 23mm long and the smooth, shiny, dark reddish-brown dorsal segments are distinctive. Often recorded as a vagrant in pot plants, garden centres, etc. (Lee 2006). Two specimens were found outdoors amongst old building material in the Compost Yard. Possibly they derived from the Tropical Greenhouse or maybe are able to survive in appropriate microsites in the climate of the Gardens.

Julida ('snake millipedes'): These are the long, cylindrical animals with many segments and relatively short legs which are typically recognized as millipedes, and represent about half the British species. They are diverse in colour patterns but typically have a row of 'dots' along the body which represent defensive glands. A useful identification feature of a number of species is the appearance of the posterior end of the animal and the telson (tail). This latter may be absent, club-shaped or pointed. In the latter case, it may be continuous with the line of the body, upturned or downturned. Although a number of different species might occur in the Garden (about 12 have previously been recorded from the Island), our collections yielded only two, both in substantial numbers.

***Haplopodoiulus spathifer* ('Kew spine-tail millipede')**. This millipede was first found in Kew Gardens in 1976 and subsequently at Bedgebury in 1987 and at Wakehurst Place in 1990, both linked to Kew (Corbet & Jones 1996, Lee 2006). It was subsequently found at the Wildlife Garden of the Natural History Museum, London, in 2008 and at the National Trust garden at Trelissick in Cornwall in 2009. It seems to favour leaf litter and tends to occur in large numbers whilst being active when disturbed. It is quite a large animal (up to 30mm), dark with lighter mottling and with a telson which is slender and pointed with a hyaline (transparent) tip, numerous setae (hairs) and either straight or slightly curved upwards. It was found in large numbers in the Mediterranean Garden and the Compost Yard.

Cylindroiulus appeninorum **(Brölemann, 1897)**. Slightly smaller (although apparently large females can grow up to 33mm) and generally paler than the preceding, this species is most easily characterised by the appearance of its rear end. As well as having a clearly projecting but rather blunt telson without an obvious hyaline tip, there is a very long anal scale ventrally, clearly separate from the anal valve for about half its length and nearly as long as the telson. The colour, as seen in the pictures, seems rather variable; possibly the very pale ones are immatures (Brölemann, in his original description (1897) described it as "Entirement de couleur jaune olivâte" but it is not clear whether he was referring to living or preserved material). Males are recognized by the modified first pair of legs which are crochet shaped (see picture – they are in front of the "normal" second pair).

Up to now, the only British species known with a similar prominent ventral anal scale has been the much smaller and paler *Enantiulus armatus* from Devon and Cornwall. This is the first British record of *C.appeninorum*, determined for me by Henrik Enghoff of Copenhagen, and found in numbers in both the Palm Garden (in litter) and the Australian Garden. Prof. Enghoff advises me that it is a common Italian species (originally described by Brölemann from Romagna and Tuscany) and has been introduced to The Netherlands. It appears that animals that might have been this species but were unidentifiable as they were juveniles have been previously found in South Wales.

Discussion

Clearly the variety of species found is limited and one might anticipate that at different times of the year and different preceding weather conditions and conditions on the day, the list might have been much more extensive. It is notable that smaller animals such as smaller lithobiid centipedes and julid millipedes were not found. This was as much due to the relative dryness of the soil at the time as to the difficulties of collecting in the poor weather. Using other collecting techniques such as soil extraction and/or pitfall trapping might also result in finding further species. It is to be hoped that further collections might possibly be made by local naturalists.

What is missing from the list is, however, well compensated for by the species found, notably the two julid millipedes in large numbers. As indicated, the earliest record in Britain of *Haplopodoiulus spathifer* is less than forty years old and the Kew area had certainly been collected previously. Presumably it arrived with plant/soil material and has been well able to establish itself both at Kew and at the other sites. There is a possible Kew connection between most of these although when I suggested to a member of staff at Trelissick that it might have come there from Kew, he responded that it might equally well have been the opposite way round and reached Kew from that Cornish location. One must assume that *Cylindroiulus apenninorum* reached Ventnor by a similar route, i.e. with plants/soil. The site has a wide variety of exotic plants as well as a local climate that would favour possible establishment of southern species. It is curious that the two species were found, in large numbers, in separate, apparently single-species, populations in the Garden and it would be interesting to look at this in more detail and to monitor any changes with time. Are there sufficient differences between the Mediterranean Garden / Compost Yard and the Palm Garden / Australian Garden to offer any explanation or are we looking at, possibly, one species, presumably more recently established, replacing the other?

Acknowledgements

Thanks to Chris Kidd and Colin Pope for allowing collections to be made and to the latter both providing me with various older local references and for sending specimens of *C.appeninorum* to Paul Richards for photographing; also to the latter both for the pictures and for permission to use these and others (indicated JPR). Henrik Enghoff must, indeed, be thanked for identification / confirmation of the two julid millipedes and comments and Paul Lee of the BMIG Millipede Recording Scheme for millipede identifications/confirmations and advice. Also to John Holding (JH), Keith Lugg (KL), Alan Outen (AO) and Christian Owen (CO) for the use of their photographs of specimens from other sites to illustrate the range of species found at the Garden. All pictures are of living specimens.

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Author: A.D.Barber, Rathgar, Exeter Road, Ivybridge, Devon, PL21 0BD.
abarber159@btinternet.com

Cylindroiulus appeninorum

Male showing the crochet shaped first pair of legs.

Adult.

Presumed immature showing pale colour.

Posterior end showing the prominent (ventral) anal scale as well as the (dorsal) telson.

(All pictures by J. P. Richards)

Centipedes

Haplophilus subterraneus (AO)

Henia vesuviana (JH)

Nanogona polydesmoides (JPR)

Lithobius forficatus (AO)

Millipedes

Nanogona polydesmoides (JPR)

Brachydesmus superus (JPR)

Oxidus gracilis (JPR)

Haplopodoiulus spathifer (KL)

LEPIDOPTERAN GALLS ON THE ISLE OF WIGHT

Dr. D. T. Biggs

Gall-inducing Lepidoptera comprise only 5% of cecidogenous insects (Zangheri 1966). According to Mani (1964) out of 120,000 species of Lepidoptera in the world only about 100 are gall-inducing (cecidogenic). Buhr (1965) included 75 in his European lists. Swanton in his 1939 paper on Isle of Wight galls included only one Lepidopteran, *Tortrix paleana* on *Plantago lanceolata* (Ribwort plantain). The abnormality he described is now, however, thought to be of genetic origin and not to be caused by the moth. Field work from 1975 to 2015 has revealed only five Lepidopteran galls.

HELIOZELIDAE

***Heliozela sericiella* (Haworth, 1828)** on Oaks (*Quercus* spp.)
The gall caused by the larva of this moth is an elongate swelling of the leaf petiole, mid-rib or major side-vein of an Oak, *Quercus* spp. If the petiole is involved, it is often crooked, and yellowish in colour. In length the gall varies from 3mm to 8mm, and in width up to three times that of the ungalled part. A long internal chamber contains a single whitish larva with a brown head and two black spots on the prothorax. The larva can be found from June to July.

The larva later leaves the gall to mine a small area of the leaf blade near the midrib from which it cuts out an oval 3 x 4 mm case and descends within it to the ground where the larva pupates from August to April. The cut outs are more evident than the galls.

The adult moths emerge April to May and can be found flying around Oak leaves in small swarms. They are very small with a wingspan of 6-8 mm and are a shiny grey in colour. The species is reported to be common in England and Wales and occurs all over Europe. The first Island record of the moth was in 1929 from Parkhurst Forest.

The gall has now been recorded from six Island sites: from Walter's Copse, Newtown, on *Quercus robur;* from Werrar on *Q. ilex;* and from Osborne, Quarr Abbey, Appley Park and from Ventnor Botanic Gardens on *Q.cerris,* that from Osborne being the first record on October 30th 2009.

MOMPHIDAE

***Mompha sturnipennella* (Treitschke, 1833)** on Rosebay Willowherb (*Chamerion angustifolium)*
I found a single thickened and contorted seedpod of this plant in Bouldnor Forest SZ384902 on August 26th 1998. It contained a red larva with a brown head. I was able to rear it to pupation, and emergence as an imago on September 11th. The moth has a wingspan of 12mm and was dark grey in colour with two white oblique fasciae. Dr John Langmaid confirmed the identification as a first record for the vice-county. The moth is known to have two generations. The larvae of the first generation inhabit galls in the flowering stem from May to June. Those of the second generation are reported to live from July to August in a seedpod without galling it. So my specimen seems to be the first evidence of galling of a seedpod by this species.

The moth was not recorded in Britain until 1951 but since then it has expanded its range throughout southeast England. It first appeared in Hampshire in 1995. It is found throughout central and northern Europe, across Asia to the Russian Far East, and in 1996 was discovered in Canada.

PTEROPHORIDAE

***Adaina microdactyla* (Hübner, 1813)** on Hemp Agrimony (*Eupatorium cannabinum)*
The gall caused by the larva of this our smallest Plume Moth is a cylindrical swelling in the main or sidestem near one of the nodes, 10-12 mm long and 3-4 mm thick. Sometimes several galls are formed near each other but they remain separate. In each larval chamber lives a single yellowish-white larva with a brown head, from July to October.

H.G. Jeffery and J.F. Jackson found several galls on St George's Down on September 15th 1938. Subsequently I found an adult moth on August 14th 1999 on Mersley Down SZ5587 but the only other record of the gall is from Saltern Wood at Norton SZ3489 when a visiting Entomologist, Doug Taylor, found several galls on one plant on October 22nd 2005.

The moth has a wingspan of 12-20mm and is yellowish-white in colour with small brown spots. There are two generations flying April to June and again in July to September. The larvae which induce the galls develop into the spring generation; the summer brood larvae feed on the flowers and seeds.

This species is described as locally common in Hampshire and the Island where Hemp Agrimony grows in drier habitats. It is found throughout Europe and across Asia to Japan, Indonesia and the Solomon Islands.

TORTRICIDAE

***Cochylis atricapitana* (Stephens, 1852)** on Common Ragwort (*Senecio jacobaea)*

The only record of this gall so far was made by Colin Pope on July 13th 2008 on St Helen's Duver SZ637889. There was a sinuous swelling measuring 40 x 5 mm near the top of a flowering stem. The leaves on the stem were somewhat crowded due to shortening of the internodes. Within was an elongated cavity containing frass and a single larva which had a pale yellowish-red body with a brown head.

Despite this being the only record of the gall, the moth is described as widespread and fairly common in Hampshire and the Island, mainly on the chalk downs and along the coast. It is found throughout Europe and north Africa to southern Russia.

With a wingspan of 12-16mm, the adult moth has a ground colour of creamy white tinged with pink and marked with mottled brown transverse bands.

There are two generations a year, the first emerging in May and June, the second in July and August. It is the larva of the first generation which burrows into the stems in July to induce the gall. Larvae from the second generation feed in the lower parts of the stem and rootstock, without gall formation, overwintering until the following spring.

Cydia servillana* *(Duponchel, 1836) on Grey Willow *(Salix cinerea)*

I found the only example of this gall so far in Shide Chalk Pit SZ507881 on June 14th 1999. This remains the only Island record of the moth. It is described as locally common in Hampshire.

The gall was a very long and slender fusiform swelling of a second-year twig 15 x 2.5 mm and with an empty pupal case held in the exit hole by silk. There was a narrow elongate larval chamber inside. The identity of the gall causer was confirmed for me by Barry Goater.

The larva which induces the gall has a bright greenish yellow body with a dark brown or black head and can be found feeding from July. It continues to live within the gall over winter and eventually prepares a capped exit hole before it pupates. The adults emerge in May and June in one generation.

With a wingspan of 11-14mm, the moth has wings which are whitish in colour, suffused greyish and with dark grey markings basally and apically. It is described as local from the Midlands southward and similarly in Europe, widespread but not generally frequent.

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Author: Dr D. T. Biggs, Plum Tree Cottage, 76 Albert Road, Gurnard, Cowes, Isle of Wight. PO31 8JU.

FLOWERING PLANTS AND FERNS - 2015

Colin R. Pope

As usual, many interesting new plant records were made in 2015, but the emphasis has been very much on non-native species, reflecting the already good coverage of native plant recording. An increasing palette of plants grown in gardens together with ameliorating weather conditions seems to be allowing a greater range of species to 'escape' from gardens. It will be particularly interesting to see how many of these become permanent fixtures in our countryside over time.

The list below covers the principal highlights. I am grateful to everyone who submits their records; all of them are valuable and all records have been stored whether reported here or not and submitted to the BSBI. Particularly valuable at the moment are the species lists which are contributing towards the BSBI's Atlas 2020 project to publish updated national distribution maps for all species.

Abbreviations used at the start of the accounts are an attempt to establish the status of the records, namely: N. Native; C. Casual Alien; and E. Established Alien.

Adder's-tongue Fern *Ophioglossum vulgatum*
N. Wydcombe, growing at edge of marsh to SW of house. SZ504784 mo. This was a substantial population of Adder's Tongue Fern. There is also known to be a large population to the north of here, showing that the Wydcombe area is particularly important for this species.

Corsican Hellebore *Helleborus argutifolius*
C. A single outcast plant on the south verge of the Downs Road near Downend. SZ542873 PS

Common Purslane *Portulaca oleracea*
C. Several plants in pavement cracks in front of garage, Latimer Road, St Helen's SZ631886 mo

Four-leaved Allseed *Polycarpon tetraphyllum*
E. Well established in grass in front of Sea Breezes holiday houses, Military Road SZ419820 PS

Sea Heath *Frankenia laevis*
N. Colony 150m north of the Folly Inn, Medina abutting disused industrial site. Sea Heath appears to be spreading along the banks of the middle section of the Medina estuary but this is the first record from the eastern side SZ508930 RA

Flixweed *Descurainia sophia*
C. Single plant on roadside verge near Lower Rill SZ496830 PS First modern record.

Woad *Isatis tinctoria*
C. Woad is grown at Brading Roman Villa, and plants are appearing spontaneously around here. There were about 12 plants on rubbish tip at the Villa and one in field to SE SZ599862 PS

Gold-of-pleasure *Camelina sativa*
C. In quantity in field sown with a cheap seed mix by the Wildlife Trust in the field adjoining the Field Cow-wheat site at St Lawrence SZ536768 TS First modern record.

Garden Cress *Lepidium sativum*
C. 2 or 3 plants off Wellington Road, Carisbrooke, sterile material but with swollen ovaries SZ488885 SB conf. EJC. First modern record.

Least Pepperwort *Lepidium virginicum*
C. 2 plants on a recently developed offshore shingle bank at Appley beach, Ryde SZ610923 PS First modern record. There has been a recent small spate of records for this taxon in southern England.

Perennial Wall-rocket *Diplotaxis tenuifolia*
E. c40 plants growing in cul-de-sac Middleton, Freshwater SZ338867. PS

Greater Mexican-stonecrop *Sedum praealtum*
C. Ryde Town Cemetery, on top of boundary wall SZ589920 SB

Tree Cotoneaster *Cotoneaster frigidus*
C. Parkhurst Prison carpark SZ491908 PS, conf. Jeanette Fryer. First Island record.

Bearberry Cotoneaster *Cotoneaster dammeri*
C. Gurnard cliffs SZ479962 PS conf. Jeanette Fryer. First Island record.

Tibetan Cotoneaster *Cotoneaster conspicuous*
C. Dodnor Industrial Estate SZ499902 PS conf. Jeanette Fryer. First Island record.

Prostrate Cotoneaster *Cotoneaster prostratus*
C. Dodnor Industrial Estate SZ499902 PS conf. Jeanette Fryer. First Island record.

Mistletoe *Viscum album*
N. On Silver Maple (*Acer saccharinum*), a street tree at Solent View Road, Gurnard SZ477954 HH. This is a new recorded host for Mistletoe.

Spotted Spurge *Euphorbia maculata*
E. Well established in scree bed at Ventnor Botanic Gardens, growing with *Euphorbia serpens.* Both of these are small, glaucous, prostrate spurges from warmer climates. SZ545769 CP

Heron's Bill *Erodium pelargoniflorum*
C. A single flowering plant in carpark off Great Preston Road, Ryde SZ598914; clump outside gardens at Brighstone SZ420829 Both PS First Island records of a recently introduced showy garden plant.

Kopata Geranium *Erodium inodorum* [Fig. 1]
E. South facing sandy bank at Ryde Canoe Lake SZ601926 SB, det EJC. A remarkable find of at least ten plants flowering in the autumn. This plant is a native of Australia and New Zealand. It is not listed as being available from plant nurseries and it is remarkable how it has become established here. It is rather similar to *Pelargonium grossularioides* from South Africa, which is occasionally grown in gardens. The only previous records of *Pelargonium inodorum* from this country are a very few casual records, generally associated with wool shoddy. First Island record.

Orange Balsam *Impatiens capensis*
E. At least 50 plants growing amongst reeds and willows at the north end of pond, east of the inlet, Quarr Marsh SZ675929 CP. In the 1950s and 1960s, this plant was known from above the beach at Binstead and Quarr, but since then only occasional, sporadic records have been made, most recently in 2005. This discovery shows that there is a significant, well-established population of plants here.

Bullwort *Ammi majus*
C. Growing amongst carrots in garden Howgate Road, Bembridge. SZ649873 AC, conf. EJC.

Comfrey hybrids *Symphytum*
E. A hybrid swarm around The Green at the start of Newbarn Lane, Shorwell SZ458832 PS. This comprises abundant *Symphytum orientale* growing *S.* x *uplandicum,* together with a few blue flowered plants which have been identified as the rarely recorded hybrid *Symphytum orientale* x *caucasicum.* This hybrid is grown in Northcourt Manor gardens just across the road.

Pennyroyal *Mentha pulegium*
E Dominant in front lawn, Fernside Way, Wootton SZ541918 PS. Pennyroyal is known to be a contaminant of some grass seed mixes.

Corsican Mint *Mentha requienii*
C. In gravel beneath display beds at Jubilee Nursery, Newchurch SZ554839 PS

Balm-leaved Figwort *Scrophularia scorodonia*
E. An established clump of at least twenty plants on earth mounds close to the aggregate sorting plant at Bembridge Spit, SZ641887 AC / PS. A lot of heavy traffic passes alongside this site and it is likely that this is an accidental introduction. However, Balm-leaved Figwort, which is a native in southwest England, has gradually been extending its range eastwards in recent years although there are currently only a small handful of coastal records for Dorset and Hampshire. It seems very likely that Balm-leaved Figwort will start to appear in other locations on the Island over the coming years.

Mexican Petunia *Strobilanthes sp.* [Fig. 2]
E. Well established in Charles Wood, St Lawrence, SZ527762 DT. It has been present here for several years and is spreading. It was first identified as *S. atropurpureus* but John Wood (Department of Plant Sciences, University of Oxford) believes it to be *S. lachenensis* from Nepal and E. Himalaya. This is the first British record of this showy autumn flowering garden plant becoming established in the wild.

Knapweed Broomrape *Orobanche elatior*
N. 105 plants were counted on lower slopes of Shanklin Down SZ567797, RW. This site was first discovered in 2014, when there were two flowering plants, so the increase in flowering in 2015 was remarkable.

Nettle-leaved Bellflower *Campanula trachelium*
N.? Growing and flowering in a shrubby, untended bank at Ventnor Botanic Gardens SZ549769 CP. It has not been cultivated in the gardens, suggesting that it is one of the survivors from the time that the site was a Hospital. Nettle-leaved Bellflower was recorded as growing in the Undercliff in Sheridan's Guide (1856).

Wall Bedstraw *Galium murale*
C. c40 plants in paving cracks, Juniper Close, Carisbrooke SZ489892 PS. This is an addition to the other known site alongside of the Premiere Inn by the river at Fairlee, Newport.

Small Cudweed *Filago minima*
N. Thousands on heathy ground west of sewage works, north of Chale Green SZ489807 PS. A previously unrecorded site for this scarce plant.

Blue Fleabane *Erigeron acris*
N. Hundreds on heathy ground west of sewage works, north of Chale Green SZ489807 PS. A previously unrecorded site for this rather infrequent plant.

Fleabane hybrid *Conyza floribunda (bilbaoana)* x *Erigeron acer*
C. 2 plants on heathy ground west of sewage works with both parents, north of Chale Green SZ489807 PS. Bilbao Fleabane was first found in Southampton in 1992 and has since shown a remarkable increase throughout southern England and Ireland. It is known to occasionally hybridise with the native Blue Fleabane where their ranges meet and this is now being increasingly recorded across the country.

Bog Pondweed *Potamogeton polygonifolius*
N. Several patches in a base-enriched to neutral fen below Centurion's Copse, SZ619870 CP. This is part of the RSPB reserve and has benefitted from water control structures creating an interesting, Sphagnum dominated fen. There are no historic records of Bog Pondweed from Brading Marshes but the adjacent Centurion's Marsh provided conditions conducive to this species some fifty years ago.

Bearded Fescue *Vulpia ciliata* ssp. *ambigua*
N. 2 plants in carpark, Dinosaur Isle, Sandown SZ606847 PS. This is a new site for this nationally scarce grass, otherwise known from sites around Bembridge Harbour and Ryde Canoe Lake banks.

Reed Sweet-grass *Glyceria maxima*
E. Good sized patch in pond on Marlborough Road, Carisbrooke SZ488890 SB. This plant, common in wet places on the mainland, is generally considered to be an introduction with us.

Tor Grass *Brachypodium pinnatum*
N. Near Culver Battery on Bembridge Down, SZ636856 TT; an extensive clump north of Downend chalkpit on Arreton Down, SZ534875 RW; south side of Northcourt Down, Shorwell, SZ468833 PS. These are unwelcome signs that this aggressive species of chalk grassland is increasing its spread on the Island. There were no records prior to 1996. A large patch in the meadow below Osborne House, SZ519949 PS, requires further study.

Hybrid Grass x *Elytrordeum langei* (*Elytrigia repens* x *Hordeum* secalinum)
N. One vigorous clump on Sandown Levels SZ608852 EJC, CP & RW det. Tom Cope. This is a rare but probably overlooked hybrid of brackish grasslands, with only a handful of records nationally. New Island record.

Marsh Helleborine *Epipactis palustris*
N. At least 200 flowering plants on a ledge at Rocken End. This is a previously unrecorded site of a substantial population of Marsh Helleborines but there are two much earlier records from this general area. There is a herbarium specimen at the South Kensington Natural History Museum collected by Dr George Anne Martin from 'near Blackgang' in July 1841. 'Chale' (no further details) is listed as a site in Drabble & Long's *A list of plants from the Isle of Wight* published in 1931. These records suggest that plants may have survived on an inaccessible ledge to provide a seed source to colonise the ledge at Rocken End when it became suitable. SZ490759 CP

Early Spider-orchid *Ophrys sphegodes*

N. One on Tennyson Down near Monument. This is the third (or possibly the fourth) time that a single plant of Early Spider Orchid has been spotted on Tennyson Down, close to the Monument, in the last 25 years, suggesting that there may be an as yet undiscovered population on the cliffs. Interestingly, on this occasion the plant was forming at least one ripe capsule because cross pollination is generally considered to be necessary to produce ripe fruits. SZ324852 SOM.

Recorders

AC Ann Campbell
CRP Colin Pope
DT Dave Trevan
EJC Eric Clement
HH Hilary Higgins
mo many observers (Botany Section)
PS Paul Stanley
RA Robin Attrill
RW Rob Wilson
SB Sue Blackwell
SOM Stephen Oakes-Monger
TS Tony Stoneley
TT Tony Tutton

Author: C.R.Pope, 14 High Park Road, Ryde, Isle of Wight, PO33 1BP

FUNGI NEW TO THE ISLE OF WIGHT - 2015

Colin Pope, Alan Outen & Jackie Hart

There never seems to be a 'typical' autumn, weather wise and as the appearance of fungi is very much triggered by the right combinations of warmth and humidity, autumn forays are always unpredictable. This autumn saw many of the later fruiting fungi appearing much earlier than unusual. Perhaps that is why, despite the lack of any hard frosts, on later forays, fungi proved to be rather thin on the ground. However, our main foray weekend, 2nd and 3rd October, was highly productive, assisted by favourable weather conditions together with our visiting experts Alan Outen and members of the Hampshire Fungus Recording Group.

On Saturday 2nd we visited the grounds of Osborne House, courtesy of English Heritage where a remarkable total of 224 taxa were recorded. This was a higher number than achieved at any of this year's forays held by the Hampshire, Herfordshire and Bedfordshire fungi groups. Alan Outen reports that toadstool species worthy of note (for various reasons) included *Amanita gemmata, A. phalloides* (Deathcap), *Asterophora parasitica, Aureoboletus gentilis, Gomphidius glutinosus, Hygrocybe intermedia* (one of an impressive total of nine waxcap species), *Lactarius semisanguifluus* (again, one of nine species of this genus), *Lepiota clypeolaria, L. ignivolvata, Leratiomyces ceres, Lyophyllum gangraenosum (=fumatofoetens), L. konradianum, Mycena crocata, M. diosma, Pholiota tuberculosa, Russula praetervis, R. turci* (among a total of eighteen species of this genus) and *Suillus granulatus*. Alan Lucas and Sue Rogerson identified the infrequently recorded corticioids *Phlebioposis roumigerii (=ravenelii), Scopuloides rimosa, Trechispora nivea* whilst three microfungi on land plants not often recorded were also of interest, these being *Leptotrochila ranunculi, Septoria unedonis* and *Spilopodia nervisequa.*

On Sunday October 3rd, we visited Combley Great Wood and had another very successful foray, recording 165 taxa. Alan Outen reports that among the interesting finds were the toadstools *Amanita pantherina, A. phalloides, Asterophora lycoperdoides* and *A. parasitica, Cortinarius* cf *saniosus, Entoloma sinuatum, Hebeloma radicosum, Lactarius chrysorrheus, Leccinum aurantiacum, Pluteus leoninus*, R*ussula illota, R. laccata* (among a total of fourteen species of this genus) and *Tricholoma portentosum*. Of the non-toadstool Basidiomycetes a large and impressive ring of *Clavariadelphus pistillaris* attracted a great deal of attention whilst other very good finds included *Amphinema byssoides Laxitextum bicolor, Pseudocraterellus sinuosus, Ramaria flaccida, Thelephora penicillata* and *Lycoperdon echinatum* (the last often over-recorded by beginners but this was the 'genuine article'!). Microfungi species not often recorded included *Cercospora scandens, Ramularia rhabdospora* and *Mycosphaerella hedericola* here in the *Septoria hederae* anamorphic state.

Throughout the season, *s*ome twenty-one taxa were recorded for the first time on the Island. As in recent years, they include a number of resupinates and small ascomycetes, specialist groups which have only recently started to receive serious attention.

AGARICS

Entoloma ortonii
Osborne House grounds, Alan Outen

Lactarius fluens
A milk cap which is rather similar to the frequent Beech Milkcap, *Lactarius blennius*, and is also associated with beech. Combley Great Wood, Alan Lucas & Sue Rogerson

Mycena crocata
The Saffrondrop Bonnet, so called because of the abundant saffron or orange milk exuded from both the cap and stipe when damaged. Osborne House grounds, Sue Rogerson

Russula ilota
Combley Great Wood, under oak. Eric Janke

Russula laccata
Combley Great Wood, under willow. Eric Janke

TOOTHED FUNGI

Coral Tooth *Hericium coralloides* [Fig. 3]
Perhaps the most exciting mycological find of the year. Coral Tooth is one of our most beautiful, and rarest fungi and is of particular interest because it is considered to be one of the old-forest fungi. It is confined to large logs or stumps, principally in ancient beech woods. Most records are from Windsor Forest and the New Forest. Even in the New Forest it is scarce, known from only a handful of trees. It was a complete surprise when Dave Dana found it in Span Copse on a fallen ash bough on 20th September. The specimen measured 18 x 13 x 10 cm. However, Span Copse is part of the Appuldurcombe Estate and was historically old-forest with big ancient beech trees. Span Copse, Appuldurcombe, found by Dave Dana, identified by Colin Pope

POLYPORES
Oligoporus ptychogaster (*Postia ptychogaster*)
Powderpuff Bracket. Osborne House grounds, Alan Lucas

RESUPINATES
Gloiothele lactescens
A whitish steroid crust on decayed, fallen branches, described as widespread but uncommon. Osborne House grounds, on beech log. Alan Lucas & Sue Rogerson

Laxitextum bicolour [Fig. 4]
A semi-pileate resupinate which is nationally very rare. Combley Great Wood, on fallen oak branch. Found by Mike Cotterill, determined by Alan Lucas

Phanerochaete velutina
A common steroid resupinate. Lack of previous records must have due to it having been overlooked. Osborne House grounds, on fallen beech. Alan Outen

Phlebiopsis ravenelii
A steroid resupinate described as uncommon. Osborne House grounds, on oak log. Alan Lucas & Sue Rogerson

Trechispora nivea
A white hydnoid crust, described as rare. Osborne House grounds, on fallen beech. Alan Lucas & Sue Rogerson

Tulasnella violea
An athelioid resupinate described as rare. Combley Great Wood, on fallen birch. Alan Lucas & Sue Rogerson

ASCOMYCETES
Hypocrea aureoviridis
Osborne House grounds, Alan Lucas & Sue Rogerson

Neotiella rutilans [Fig. 5]
A small orange cup fungus appearing in sandy ground late in the season growing amongst *Polytrichum* moss. St Helen's Duver, Colin & Jillie Pope

Orbilia inflatula (*Orbilia auricolor*)
A small cup fungus on dead wood. Osborne House grounds, Alan Outen

Spilopodia nervisequa
A distinctive pathogen of Ribwort Plantain leaves. Osborne House grounds, Alan Outen. Once pointed out, it was subsequently discovered at many other sites.

MICROFUNGI
Colletotrichum lindemuthianum
On leaves of Runner Beans, Nettlestone, David Biggs

Phyllostricta magnolia
On leafspot on Magnolia leaves. Carisbrooke, David Biggs

Ramularia rhei
On Rhubarb. Nettlestone, David Biggs

Sphaerotheca balsaminae
On leaves of Orange Balsam (*Impatiens capensis*), Quarr marsh, Colin Pope & David Biggs

Recorders
AL Alan Lucas; AO Alan Outen; CP Colin Pope; DB David Biggs; ER Eric Janke; SR Sue Rogerson.

Reference
Hugill, Paul & Alan Lucas (2015) *A Field Guide to Resupinates of Hampshire.* Privately printed.

Authors: C. R.Pope, 14 High Park Road, Ryde, Isle of Wight, PO33 1BP
A. R. Outen, 14 Fairfax Close, Clifton, Shefford, Beds SG17 5RH
J. Hart, 18 Cherrytree Road, Seaview, Isle of Wight, PO34 5JF

Fig. 1: *Pelargonium inodorum* growing at Ryde Canoe Lake Photo: Colin Pope

Fig. 2: *Strobilanthes sp.* growing in Charles Wood. Photo: Dave Trevan

Fig. 3: *Hericium coralloides*
Appuldurcombe

Fig. 4: *Laxitextum bicolor*
Combley Great Wood

Fig. 5: *Neotiella rutilans*
St Helen's Duver

ARCHAEOLOGICAL INVESTIGATIONS IN THE VALLEY OF THE MEDINA RIVER AT NEWCLOSE CRICKET GROUND, NEWPORT, ISLE OF WIGHT

David Tomalin

The site and its setting

This report describes the results of a fieldwalk survey and subsequent stripping, mapping and archaeological sampling on a gravel bench on the eastern flank of the Medina river (fig. 1). The site lies within the valley gap of the river where it passes through the Island's median range of Chalk downs and its adjoining Greensand escarpment. (For the purpose of this text, the term 'Medina Gap' is deemed to be the river corridor between Newport and the hamlet of Blackwater). This investigation was carried out in 2006 prior to the construction of the Newclose County Cricket Ground.

The site is some 2.2km south of the town centre of Newport and is sited at SZ 45035 87161. An artefact scatter revealed by the fieldwalk is recorded in the County Historic Environment Record of the Isle of Wight as HER 7599. The Pleistocene gravels examined at this site are HER 7588 and the evaluation excavation is EIW403.

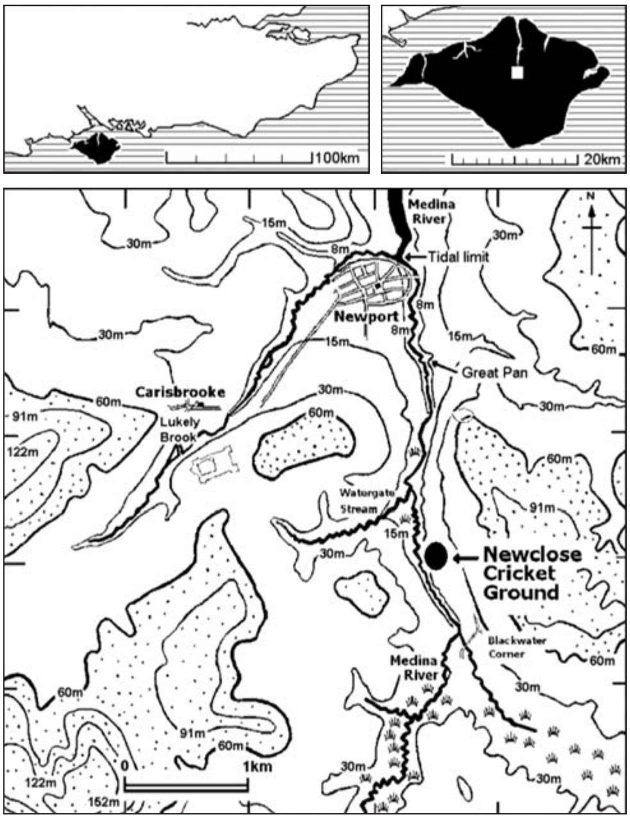

Fig. 1: The topographic setting of Newclose Cricket Ground.

Pre-disturbance field assessment: the fieldwalk

Fieldwalking was conducted between the 24m and 11m contours on a shallow slope between the Newport-Blackwater road (A3056) and the wooded floor of the Medina valley. Later, a large body of topsoil and gravel was removed between the 24m and 17m contours. Below 17m, much of this soil was subsequently re-deposited to provide a new level surface for the cricket ground (fig. 2b). The contours shown in fig. 2b, and subsequent distribution maps, reveal the course of two minor fluvial channels descending westwards towards the valley floor. The new cricket ground and most of the items recovered from the fieldwalk were sited on the interfluve between these two minor declivities.

In this report the results of the fieldwalk survey are presented in distribution plots arranged by class and by period (figs. 3, 13 & 16). The fieldwalk grid is shown in fig. 2a. Experienced fieldwalkers examined a total of 2635 items from a total of 244 collection points. These were abutting radial zones set at 10m intervals. The disposition of these collections cells is shown in fig. 2a.

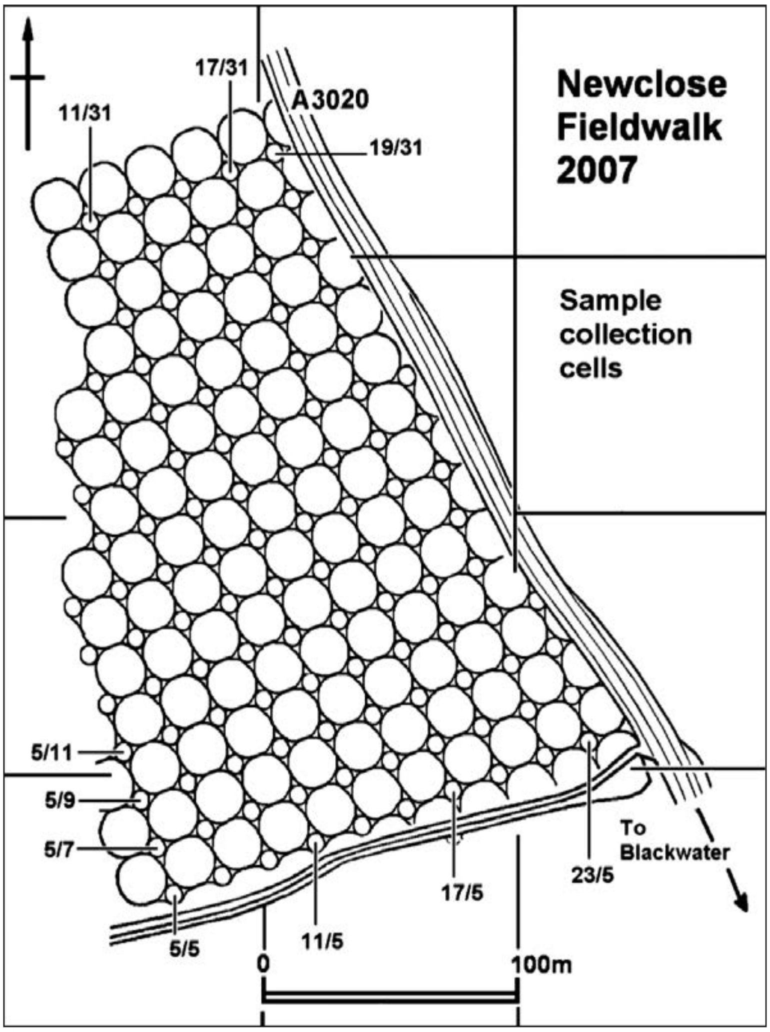

Fig. 2a: The disposition of 10m sampling cells in the fieldwalk survey of Newclose Cricket Ground field. To achieve total coverage the intervening gaps were examined in 5m intermediate cells. Cells were numbered from west to east and from north to south as indicated by select reference numbers shown on this plan.

Features revealed by the strip-map-sample process

After the development footprint had been stripped, all features were mapped and archaeologically investigated. This procedure followed the principles of archaeological evaluation advance by Hey and Lacy (2001). No relationship could be determined between surface artefacts and belowground archaeological features. This was deemed to be the result of repetitive and aggressive ploughing that had removed much of the sub-soil from the upper part of the field. Of the 45 logged features, just 9 were found to be archaeologically significant. The latter are listed here:

F140/145/170. Complex of three shallow scoops associated with burnt flint and sherds of prehistoric pottery.

F180. Quenching pit? associated with smithing slag. Dated by 19^{th}-20^{th} century glass.

F280. Small scooped pit containing burnt ferruginous sandstone and a crushed portion of an organic-tempered vessel attributed to the Middle Iron Age.

F290. Small scooped pit containing burnt ferruginous sandstone as per F280 and some sherds of a flint-tempered jar attributed to the Middle Iron Age.

F310. Shallow linear ditch dated by fragment of glass bottle attributed to the 1920s.

F510. 19^{th}-20 century burial of *bos*. Disturbed by digger trench 4 of Section 1.

520/530. Sparse scatter of charcoal particles in a natural re-cut in the Standen fluvio-colluvial channel. Equated with context 603.

F540. Pit bisected by Section 1 trench 1. Fill contains rare burnt flint particles. Perhaps associated with disturbed sherd of Bronze Age cordoned vessel (artefact 543).

603/604/605. Alluvial fill in recut channel of the Standen fluvial track. Contains rare charcoal flecks and sparse eroded prehistoric sherds.

Excavations at feature complex 140/145/170

The location of this cluster of features is shown in fig. 2a. Fig 10 shows an area of 28 sq m containing three shallow pits or scoops. Prior to excavation all were blanketed by a shallow spread of fine dispersed charcoal particles. This was a unifying context providing a distinct indication that these features were contemporary or very near contemporary.

Investigations of the deep gravel stratigraphy in sections 1 and 2

Quaternary gravel and colluvial deposits were sectioned by two deep trenches cut to a maximum depth of 3.6 metres. The position of these deep sectional trenches (1 & 2) is shown in fig. 2b. The full results of these investigations are contained in the site archive. An OSL date of 33,000 BP ± 3000 (GL-08005), obtained from the deep fluvial gravel, is discussed later in this report.

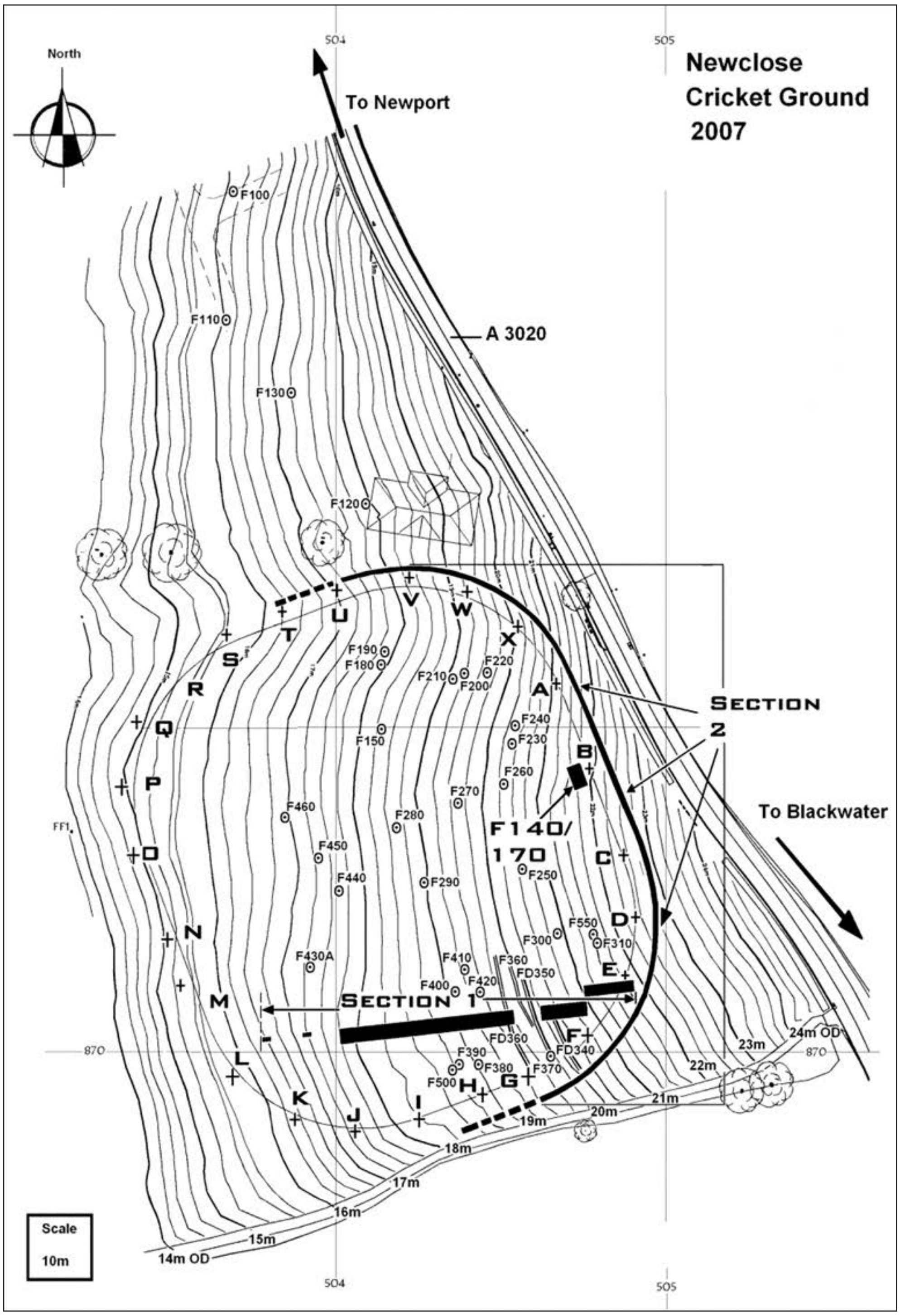

Fig. 2b: The contoured topography at Newclose Cricket Ground showing the principal cross sections and field pegs around the development footprint.

Quantifying the results of the fieldwalk

A full archive of the fieldwalked material was compiled on an *Access* database held with the site archive. The principal materials and artefact classes identified in the database are listed below.

Quantification of artefacts by period

Possible Palaeolithic flint artefacts	8	gravel-patinated flint flakes
Mesolithic	22	flint artefacts
Neolithic	115	flint artefacts
Bronze Age	12	flint artefacts
Indeterminate prehistoric flint	31	
Iron Age Roman artefacts	13	sherds and tile fragments
Saxon	1	grass-tempered sherd
Medieval	18	sherds and roof-ridge fragments
Post-medieval	365	Earthenware sherds, peg tile, etc.
19^{th}-20^{th} century	1765	Earthenware, china, glass, brick, slate, etc.
Metal detected objects	38	Sundry 19^{th} century & 20^{th} century items
Unclassified	260	Queried foreign stone, building materials, etc.

Principal artefact classes in the fieldwalk database

Lithic artefacts perceived to be possibly Palaeolithic	Building materials and foreign stone
Lithic artefacts of Mesolithic character	Roman ceramic tile
Lithic artefacts of Neolithic and Bronze Age character	Roman roof slabs
Iron Age ceramics	Green slate
Roman ceramics	Blue slate
Saxon ceramics	Peg tile
Medieval ceramics	Brick
Post-medieval artefacts prior to the 19^{th} century	Pane glass
Artefacts of 19^{th} century and early 20^{th} century date	

Relative dates for features, contexts and items from logged find-spots

F100	Pit fill with peg tile, blue slate & brick fragments	19^{th}-early 20^{th} century
F110	Blue slate and occasional coal particles	19^{th}-early 20^{th} Century
F140	Body sherd of dark reduced fabric	Prehistoric. IA?
F180	Iron slag with associated glass bottle fragment	19^{th}-early 20^{th} century
F190	Isolated sagging based cooking pot sherd	Saxo-Norman
F270	Willow pattern sherd in disturbed pit fill	19^{th} century
F280	Crushed vessel with organic temper	Mid. Iron Age
F290	Crushed vessel with flint temper	Mid. Iron Age
F300	Flint flake in disturbed fill of post-hole	Neolithic-EBA
F310	Glass bottle top	1920s
F450	Willow pattern frag. - disturbed fill of French drain	19^{th}-early 20^{th} century
F510	Peg-tile & brick with bos burial	post-medieval
1210	Serrated brown patinated flake from topsoil	Palaeolithic?
516/540/543	Prehistoric cordoned sherd	Early-Middle Bronze Age
517	Flint sickle - field find	Neolithic
602	Verwood sherd	18^{th}-early 20^{th} century
603-5	Sherds SF 42, 43, 45 & 46	Late Iron Age-Roman

Quantifying the lithic evidence

A total of 180 lithic artefacts were recovered from the field. Four items received particular attention as potential Palaeolithic artefacts but closer examination of their form, abrasion and patination reduced this possibility to one. Four others were indeterminate. All of these artefacts were recovered from the plough-soil of the field where their patination suggested that they had, at some time, been disturbed and removed from the underlying or neighbouring gravel.

The remaining 172 flint artefacts could all be confidently assigned to the Holocene period. Some 22 of these items could be attributed to a Mesolithic presence while most were typical of Neolithic workmanship.

Types of Neolithic scraper recovered from Newclose Cricket Field

End scrapers	*34%*
Side/end scrapers	*24%*
Side scrapers	*22%*
Steeped scrapers	*15%*
Nosed scrapers	*5%*

The recovery of a fragment of a flint sickle (fig. 6, SF 250) gave the only intimation of Neolithic cereal agriculture at or near this locality. The presence of this tool complements pollen evidence for Early Neolithic cultigens just 1.2km upstream in the Medina Valley at Gatcombe peat mire near Blackwater (Scaife 1980 & 2003). It also complements a notable number of sickles now reported by John Dunn from the neighbouring Greensand hillcrest at Blackwater Chute (Dunn 2012, 76 & 94; Nat. grid ref., 5078 8545).

Judged by their small size and their fine, and button-like appearance, two scrapers might be attributed to Bronze Age activity. These may complement feature F540 and the presence of an Early Bronze Age urn on the site (fig. 8, SF 39). There was, however, no spatial evidence to link these artefacts directly with the position of the urn fragment.

Prehistoric ceramics from field investigations

A total of 99 sherds were recovered from 9 contexts. Most of these pieces were found to be uninformative body sherds, often in an eroded or degraded condition. The chronological information offered by these sherds is summarised in the following table. Fragments reduced by recent and repairable fractures have been counted as a single sherd.

Context	Ceramics	Date
105	Durotrigian/Vectis form 7 bowl	1st Cent BC/AD
140 scoop	71 sherds of 6 discernable coarse wares	Middle Iron Age
170 scoop	3 crumb-size sherds	Attrib. M Iron Age
280 pit	9 sherds of organic-tempered fabric	Middle Iron Age
290 pit	9 sherds	Middle Iron Age
543 attrib. to pit 540	Single cordoned sherd from urn	E/Mid. Bronze Age
550	Featureless body sherd	Prehistoric?
603	2 thin-walled body sherds	Late Iron Age/Roman
605	2 unclassified body sherds	Unclassified

Sherds of prehistoric pottery were recovered from contexts 140/142, 170, 280, 290, 540/543, 550 and 603/605. Few of these fragments offered evidence of vessel form. For identification, heavy reliance fell upon textural characteristics and familiarity with comparable ceramics known elsewhere in prehistoric Wight.

Iron Age sherds were obtained from two shallow bowl-shaped cavities F280 and F290. These lay near the 19m contour and were 19m apart. Both contained some perceptible charcoal flecks and some ferruginous sandstone and flint fragments. F280 also contained a large crushed fragment of organic-tempered pottery of Iron Age character. F290 contained a few sherds of a flint-tempered jar of similar date.

Absolute dating

Context 1240

At a height to 16.10m OD, a sandy silt deposit was sampled within the deep fluvial gravel. This provided an OSL date of *c.* 33,000 ± 3000 BP (GL-08005). Through its extrapolated stratigraphy, this deposit, examined by Dr Simon Lewis and Professor Rob Scaife, provides an inferred *terminus post quem* for the 'implementiferous' gravel situated 1.4km downstream at Pan Farm (Poole 1924; Shackley 1973). A description of the Late Pleistocene and Holocene stratigraphy, compiled by Dr Lewis, is contained within the site archive.

Summary of the artefacts and their contexts

The distribution of lithic artefacts attributed to Mesolithic and Neolithic activity

Due to a lack of stratified evidence there were no means of identifying specific artefact assemblages within the collection assembled from this fieldwalk. With the exception of a few clustered items on the interfluve there was also no indication of spatially meaningful groups. This lack of context invalidates the use of the metrical data to compare and define characteristics of discernable assemblages. There is, moreover, no evidence that any of these artefacts may claim contemporaneity with each other. Despite the limitations posed by this field-walked collection, useful archaeological evidence can still be gathered.

When refined by period, the distribution of Mesolithic flint artefacts suggests less activity on the interfluve and perhaps more activity on the lower margins of the two fluvial channels where they merge with the floor of the river valley. Some of these flint artefacts bear tranchet edges but caution is needed in attributing these exclusively to Mesolithic activity. The tranchet axe also enjoys a prolonged time trajectory in the Neolithic. When the tool distribution is refined to Neolithic artefacts, these present a more discrete distribution, favouring the central ground of the interfluve.

The character of the Mesolithic flint artefacts

A small number of the cores and blades offer evidence of Mesolithic activity. Barton (1992) and Butler (2005) both describe a process of 'core curation' in which good quality flint is retained and sparingly flaked by its owner when blades are required for particular purposes. The cricket ground field produced two small cores of this type (fig. 4, SF 132 & 269). The first of these bears the scars of long narrow blades some 35mm in length struck from a single platform. The same core has been vertically cleaved. Core 296 has produced blades and flakes struck from three platforms that have been prepared on a fossil echinoid (perhaps *hemicidaris*). Small tri-planar blades recovered from the field have been struck from Mesolithic cores of this type. In figure 4, example 126 show minor evidence of edge abrasion or fine retouch.

Two core tools recovered from the field are unusual, being of axe-like appearance but of diminutive size (fig. 4). Item 291 is best described as an extremely small tranchet axe of triangular cross-section. It is just 62mm long. Its blade has been produced by a single transverse tranchet flake. Item 131 is 50mm long and displays a trapezoidal cross-section and pick-like tips. Battering and deep-biting scars on one side of this tool suggests that its purpose may have been fabrication. Similar tools, described as 'picks' have been found scattered amongst the Mesolithic and Neolithic flint items at Blackwater Chute (Dunn, *ibid*). The weak evidence for on-site flint knapping and waste production seems to be consistent with the poor quality of flint resources in this particular neighbourhood. Here the available raw material is very heavily dominated by old degraded and oxidised gravel flint. Such material is of little value to the discriminating flint knapper**.** The distribution of Mesolithic flintwork on the field appears to have been random (fig. 3a).

The distribution of burnt flint

Further evidence of human activity during the prehistoric period is offered by the distribution of burnt flint. A general scatter was observed over much of the southern half of the field yet at each of the sampling points the quantity of white heat-crazed fragments seldom exceeded three. Only along the lower and western margin of the field were greater quantities of burnt flint observed. This is a location used for minor Mesolithic activities.

The surface distribution of flint artefacts attributable to the Neolithic and Bronze Age periods

Figure 3b shows the total distribution of flint tools recovered by fieldwalking. This scatter is concentrated on the southern half of the field where the use and discard of tools seems to favour the higher ground on the interfluve on the valley side. (The presence of a second and smaller fluvio-colluvial channel is betrayed by in-turned contours along the southern boundary of the field).

A total of 127 Neolithic and Bronze Age lithic artefacts were distinguished. The presence of a number of large end-scrapers and a broken flint sickle indicate a clear Neolithic element. These were concentrated on the centre of the interfluve, mostly above the 17m contour (fig. 3c). Despite the care exercised by the field team, the recovery of flint debitage was noticeably low. Initial recognition of flint artefacts was generally assisted by colour/patina. This meant that struck and retouched items of human manufacture could usually be distinguished by their blue-grey colour and a distinct lustre. These attributes aided discrimination against a background of natural gravel and riverine flint blanketing the field.

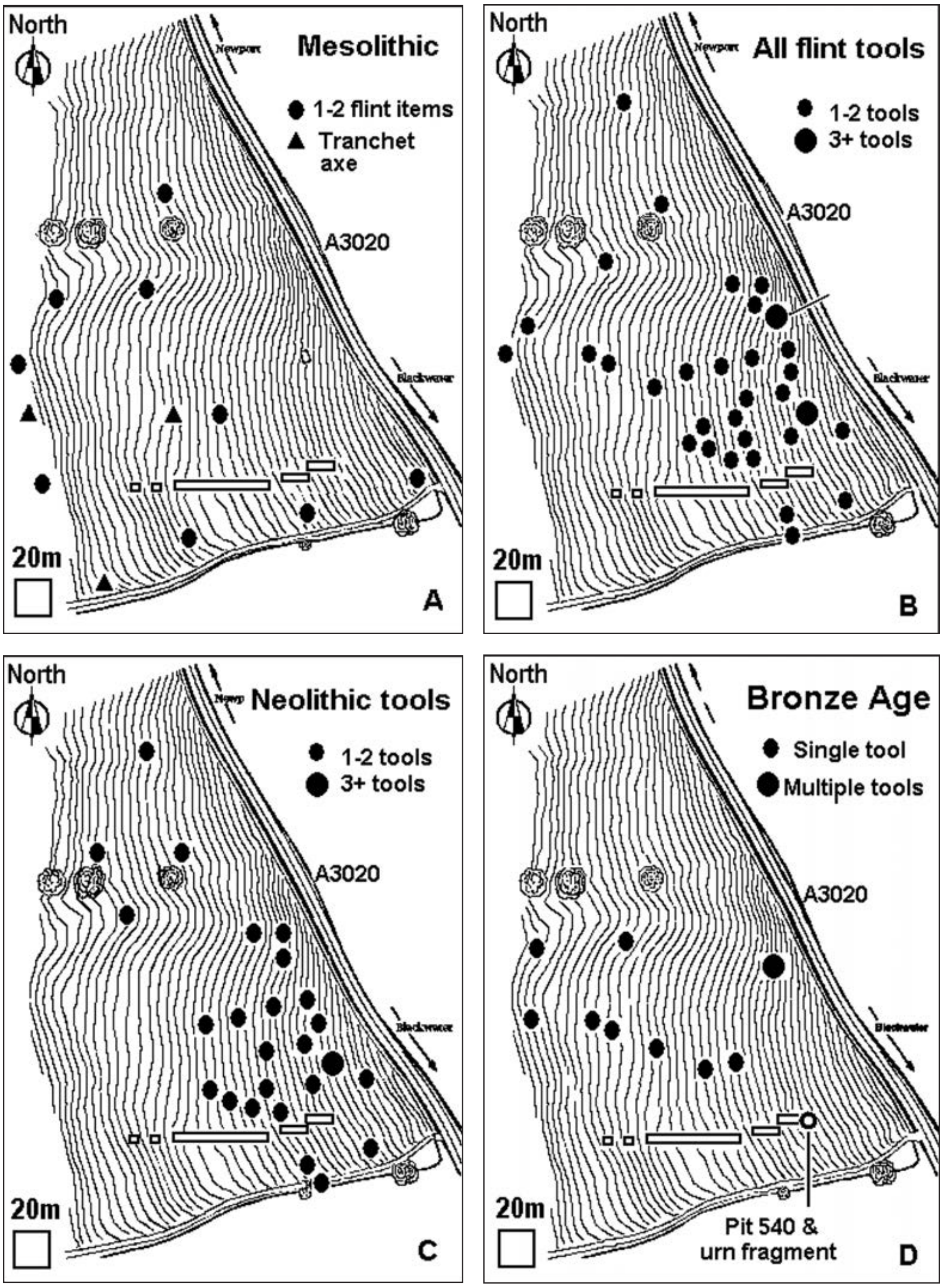

Fig. 3: Distributions of flint artefacts.

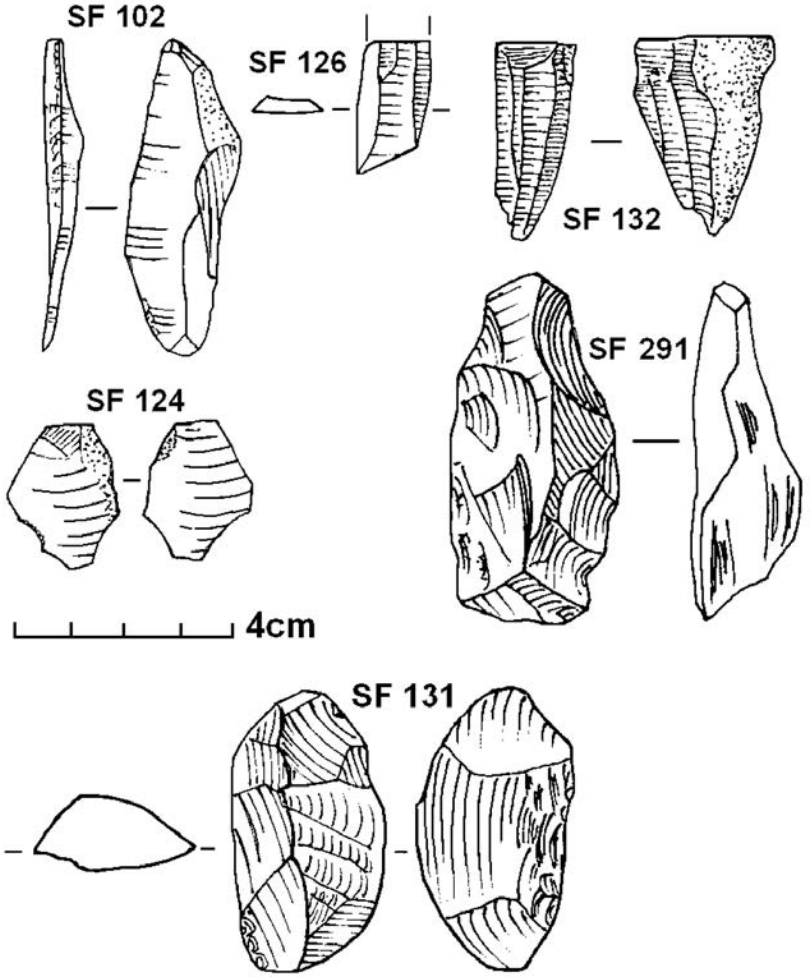

Fig. 4: Flakes, core, and core tools of Mesolithic character.

Plate 1: Cropmarks revealing trails of outwashed colluvium across Newclose field in 2002. The A3020 road still occasionally floods at this point. In the right (SE) corner of the field, a rectangular cropmark reveals the position of a lost building otherwise mapped by John Andrews in 1769.

Description of flint artefacts attesting Neolithic activity

The quantity of flint artefacts attributable to Neolithic manufacture amounted to 114. Like the Mesolithic collection, the quantity of flint waste was remarkably low. This also points towards brief visits that involved very little activity in the manufacturing of tools. Again, the poor quality of on-site raw material offers an appealing explanation. In this collected sample the tool/waste ratio amounts to 58.7%. This is an astonishingly high percentage of tools given that habitation sites of this period can often yield no more than 5% tools amongst the strewn flint debitage.

The Neolithic tools are dominated by scrapers. These amount to approximately 63% of the tool assemblage of this period including the utilised flakes. Five classes of scraper can be recognised. Amongst these the end scraper predominates.

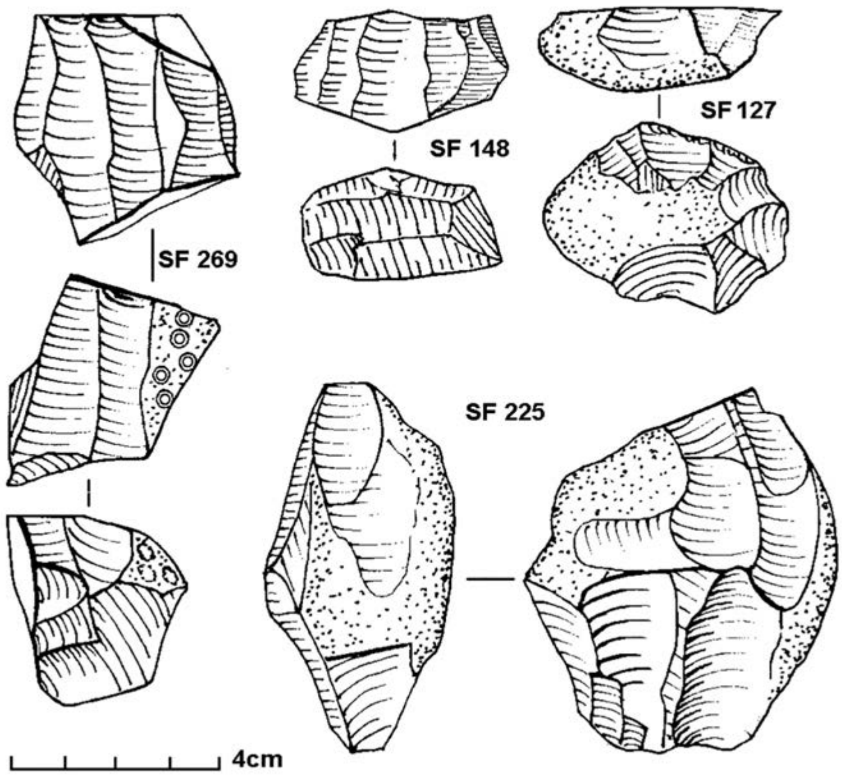

Fig. 5: Neolithic flint cores. Item SF 269 has been struck from a fossil echinoid, possibly Hemicidaris.

Neolithic lithic artefacts recovered from Newclose Field

Cores	*3*	
Core rejuvenation flakes	*3*	
Flakes	*33*	
Utilised flakes	*15*	*Fig. 6, SF 125*
Notched flakes	*3*	
Spurred flakes	*2*	*Fig. 6, SF 128 & 179*
Notched tool	*4*	*Fig. 6, SF 140*
Spurred core tool	*1*	
End scrapers	*14*	
Side scrapers	*9*	*Fig. 6, SF 117*
Side-end scrapers	*10*	*Fig. 6, SF 193*
Steeped end scrapers	*6*	*Fig. 6, SF 236*
Nosed scrapers	*2*	
Sickle	*1*	*Fig. 6, SF 250*
Hammerstones	*2*	
Hammerstone spall	*1*	
Unclassified/indeterminate	*5*	
TOTAL	***114***	

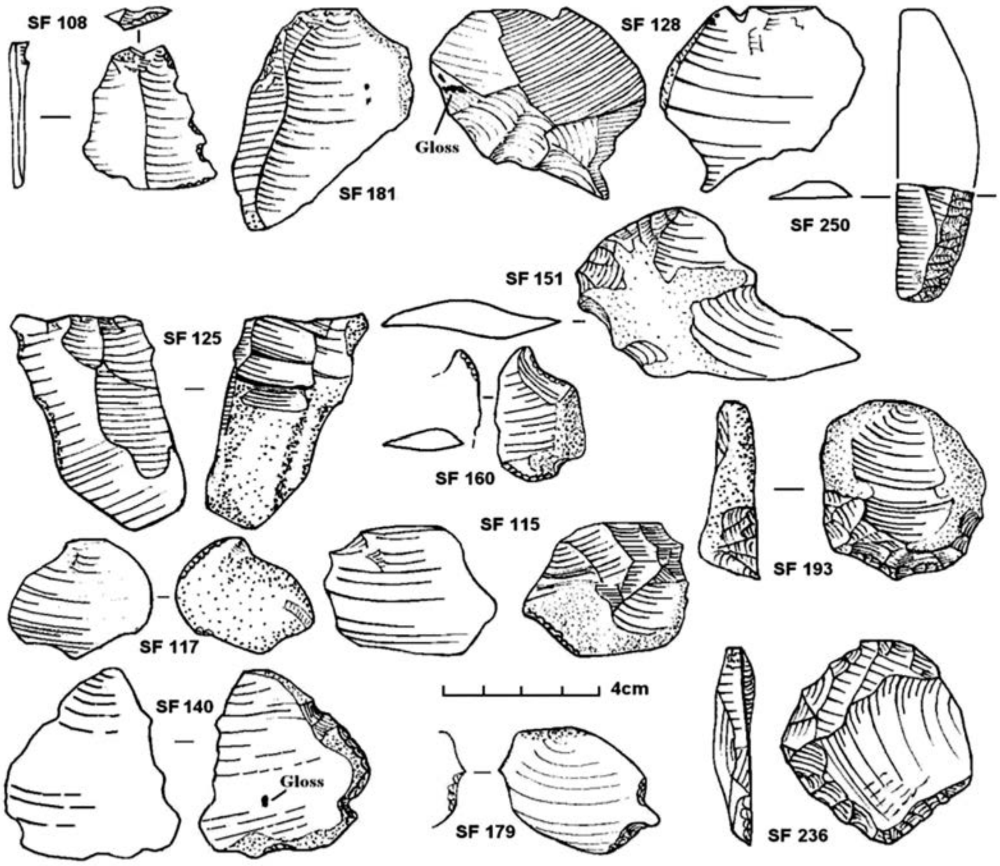

Fig. 6: Neolithic flint flake tools.

Artefacts attributed to Bronze Age activity

Flint tools

Just nine flint items were suggestive of a Bronze Age activity. These included two small thumbnail scrapers, a discoidal (button) scraper and some small end scrapers. Three more were indeterminate. A date in the early 2nd millennium BC is implied. All are scrapers of notably small size with fine and partial retouch. Most are of discoidal shape yet unlike the typical Early Bronze Age 'button scraper' they fail to show extensive or encircling retouch (fig. 7, SF 173 & 211).

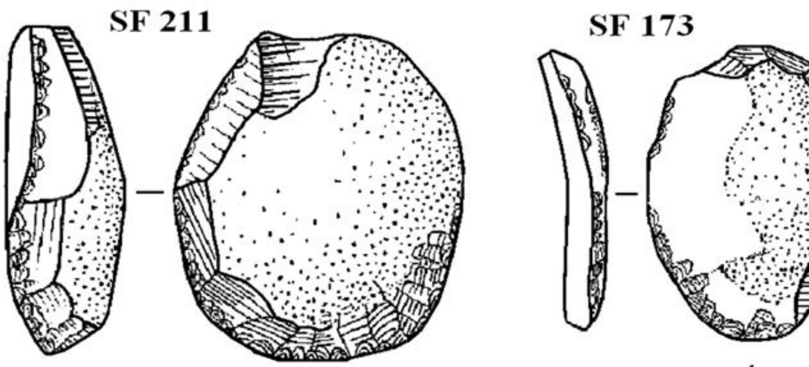

Fig. 7: Small scrapers of Early Bronze Age character recovered from the fieldwalk.

Scrapers of Bronze Age character recovered at Newclose Cricket Field

'Thumbnail' scraper	*Artf. nos. 173, 175, 176, 211, 248,*
Small side scraper	*Artf. nos. 237, 249, 252.*
Small side/end scraper	*Artf no. 254*

The distribution of these items shows a preference for activity on the crest of the interfluve in the cricket field (fig. 3d).

Excavation at pit F540

Activity during the 2nd Millennium BC is unambiguously attested by the recovery of a shoulder fragment of an Early Bronze Age urn from a disturbed position next to pit F540 (fig. 3d). It was considered that some 30% of the fill of this pit had been lost to the cut of the digger bucket. In the up-cast left by the digger immediately above this pit was urn sherd SF 39. It should be noted that the position of the pit and the urn fragment showed no conformity with the distribution of the meagre scatter of Bronze Age flint tools (fig. 3d).

Early Bronze Age urn SF 39

In figure 8, sherd SF 39 represents the shoulder of an urn with a wall thickness of 9mm. A gently rounded shoulder bears a very weak plain horizontal cordon that appears to be have been fashioned by pinching. No deliberate decoration with fingernail or fingertip impressions is present yet there is a very weak suggestion of regular indentations in the fashioning of the cordon. The calculated diameter at the cordon is around 14cm. There are no fresh breaks on this sherd and the excavators are of the opinion that it is unlikely to belong to a complete vessel once contained within the pit. (The remainder of the pit fill was very carefully removed and sieved). The fabric of the vessel is soft and virtually devoid of temper other than occasional particles of grog that were no larger than 1.5mm mhi. The matrix is very dark brown and the external surface is superficially oxidised to reddish yellow (7.7YR 7/6).

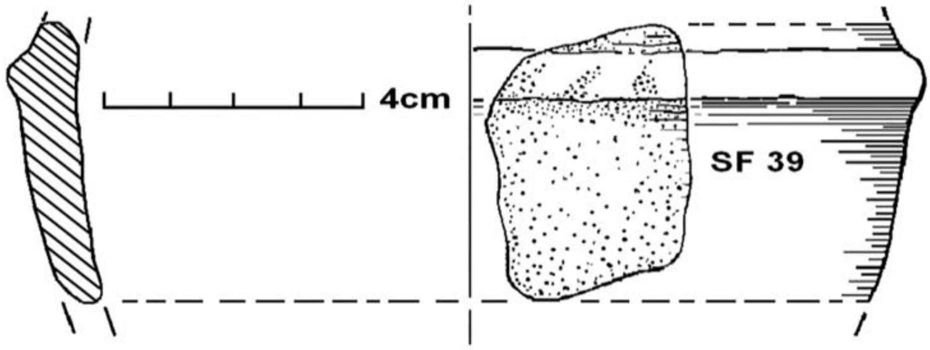

Fig. 8: Fragment of an Early Bronze Age cordoned vessel SF 39 attributed to the mechanical disturbance of pit F540.

Vessels bearing shoulder cordons of this kind often belong to the family of pots that emerged towards the end of the British Early Bronze Age when biconical urns of continental style were appearing in Southern England. The soft grog-tempered fabric of this sherd could represent the clay recipe employed by a local potter adopting this new continental style. The relatively small diameter of this vessel and its incomplete base-to-rim profile leaves the precise form unresolved**.**

Pits and pottery of the Middle Iron Age

Middle Iron Age activity was represented by pottery recovered from scoops F140 and F170 and from scooped pits F280 and F290.The two scooped pits were 19m apart and both were of similar size and filling (figs. 9 & 10). No other pits of this particular nature were identified.

Post-holes, pits and scoops

The distribution of pit and scoop features across the site was no more than a random palimpsest. However, the position of a cluster of three shallow pit/scoops (F140/145/170) was identified by a charcoal smear near the 22m contour. Here mechanical stripping was immediately halted and investigation proceeded by trowel. At the same level, a fragment of a black burnished carinated bowl in the style of Vectis Ware form 7 (fig. 14, SF 28) was found some 2.5m from a charcoal smear at location F240. No demonstrable association could be drawn between the two find-spots.

Excavation of pit/scoop complex F140/F145/F170

Excavation revealed three shallow scooped pits of slightly differing nature. Pit F140 was a sub-rectangular scoop with poor edge definition. Its depth was 10cm where it had penetrated a natural deposit of highly compact nodular gravel and yellow/brown clay (context 105). Its maximum diameter was 1.9m. This pit contained a fine dark yellowish brown fill with some 2% fine charcoal particles, common white fire-crazed flint, burnt ferruginous ironstone from the Greensand and some small decayed prehistoric body-sherds of Middle-Late Iron Age character. A small number of highly oxidised and irregular iron fragments were also present.

F145 was a small shallow scoop penetrating no more than 4cm into the surface of gravel deposit 105. Its diameter was 0.5m. Its fill contained just one piece of fire-reddened flint and some 7% charcoal flecks.

F170 was a round bowl-shaped scoop with a penetrative depth of 12cm. Its fill contained burnt and reddened ferruginous sandstone blocks and charcoal flecks held in yellowish brown earth. Some occasional fired clay pellets and some very occasional particles of white fire-crazed flint were present.

This collection of shallow scoops gives the impression that three fires may have been used for different purposes. F140 with its common lumps of fire-crazed flint and a scatter of small pot sherds seems best suited for cooking where, perhaps, the *fulacht fiadh* process was employed. F145 and F170 did not employ hot flint and may have been used for subsidiary cooking tasks where hot materials may have been drawn from the main fire. While the possibility of iron-production was consider for pit F140, the quality of the ferruginous sandstone fragments was certainly insufficient to produce bloom iron. Moreover, the few ferruginous lumps recovered from this pit were entirely oxidised and contained no surviving metallic iron.

Excavation of pits F280 and F290

Pits F280 and F290 produced evidence of Middle Iron Age activity. Both of these bowl-shaped pits were approximately 0.5m in diameter and 0.2m deep. The fills were virtually identical, being composed of damp sandy silt containing some 5% fine charcoal flecks and tabular fragments of burnt ferruginous sandstone. Pit F280 contained body sherds of a severely crushed vessel of jar proportions. These fragments were insufficient to show anything other than the relatively straight taper of the lower body of the pot. The fabric of this vessel was organically tempered. In Pit 290 a few sherds of a flint-tempered jar were recovered. These were similarly unhelpful with regard to form.

Pottery of the Middle/Late Iron Age

The pottery from pit F140 amounted to a total of 72 small eroded pieces. Four textural groups could be defined in this assemblage.

Fabric A

Twenty-four sherds contained varying quantities of flint temper that was mostly white and finely crushed. In Newclose sub-type A1, ten of these sherds represented thin-walled vessels in which white flint fragments with a particle size mode around 0.8mm had been added in quantities of some 10-12%. The fabric of this pottery is soft, black or very dark grey and it is reduced throughout its thickness. Sherd SF 9 from scoop F140 represents a small shouldered vessel that was well burnished. Sherd SF 2 represents another small vessel with an everted rim. In Newclose sub-type A2, white angular flint of a slightly coarser grade was employed in quantities of 3-5% for the production of jars and bowls. From scoop F140 come fragments of a bowl of this fabric. Shown in fig.11, (SF5 & 6), its precise form and height remain uncertain, yet the weak-footed base suggests a bowl rather than a jar.

Some general analogies can be found at Danebury where one example from pit 906 has an absolute date in the 5th century BC (Cunliffe 1984, (2) 264 fig. 6.28 no. 533). Possibly, the vessel represented by sherds SF5 & 6 is much taller than conjectured in the present reconstruction (fig. 11).

Fabric B

Some sparse grog-temper was observed or suspected in 37 sherds in the assemblage from F140. Like the first group, the fabric was soft reduced and either black or dark grey. Grog was visible in these sherds where it was oxidised and sub-angular, but the quantity never exceeded 3%. This led to the suspicion that another tempering medium had once been present. The same fabric also shows small sub-tabular voids giving the impression that a fine crushed shell had since been dissolved from the body of these pots. All of these sherds were extremely eroded, a condition that could be the result of excessive exposure to groundwater.

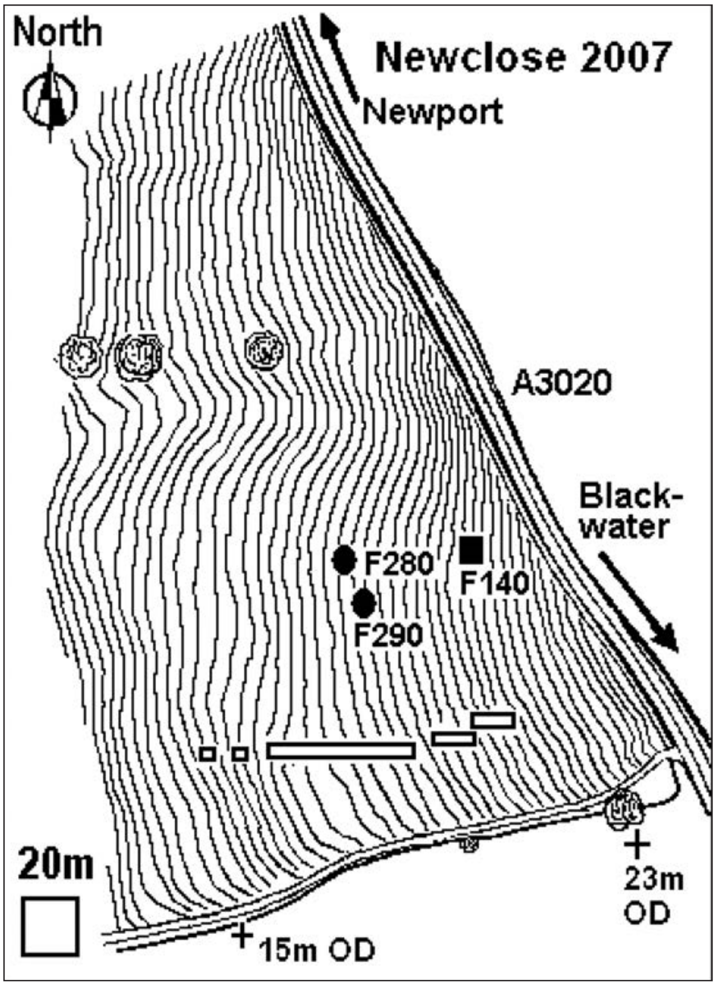

Fig. 9: The location of scooped Middle Iron Age pits F140, F280 & F290.

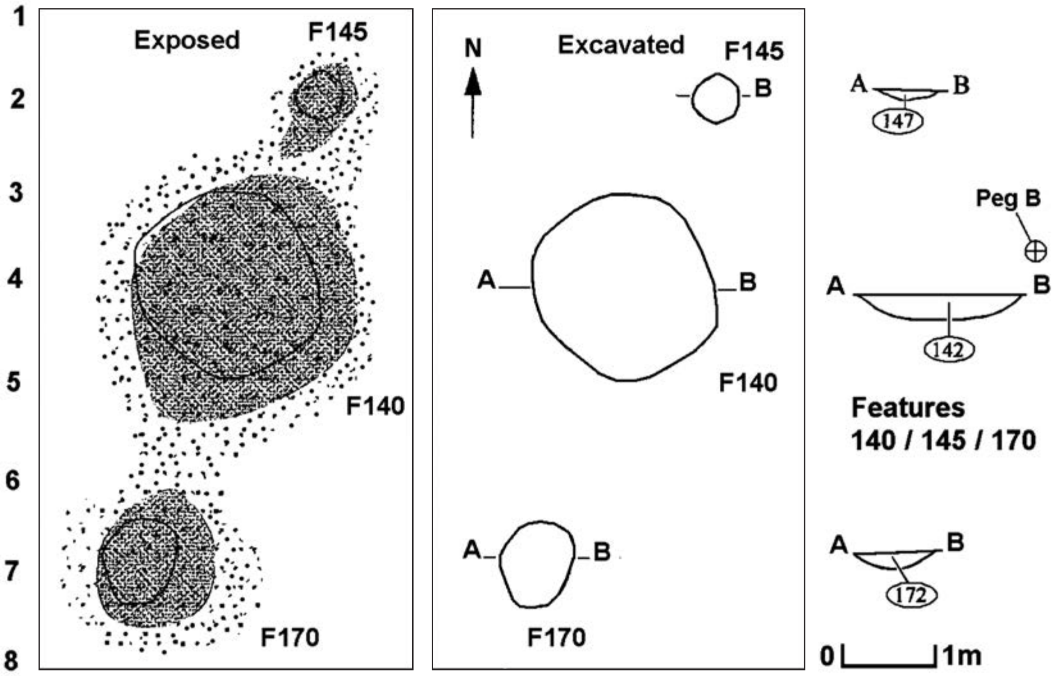

Fig. 10: Feature F140/145/170 as exposed and excavated.

Fabric C

Four dark soft featureless body sherds showed no trace of any temper.

Fabric D

Fragments of a large vessel with distinctive organic tempering were present in pit F280. Although its form could not be determined it size and thickness might be compared with certain Middle Iron Age jars and bowls displaying similar temper at the Hampshire hillfort of Danebury (Cunliffe 1984, (2) 261, 281 forms JC2 & BA1, fabric F).

Viewed collectively, all of these fabrics are generally at home amongst Middle Iron Age products of the South Wessex region. This includes the practice of organic tempering that, although rare, is evident at Danebury. Fine flint temper in a dark matrix occurs in Vectensian saucepan pots of the Middle Iron Age. Some 1.4km northwest of the cricket ground, saucepan pots of this kind have been found near the summit of Mount Joy Hill (Tomalin 1992: Mount Joy fabric C). Also in the same loose assemblage on this hilltop are saucepan pots tempered with fine comminuted shell (Mount Joy fabrics A & B). These may be counterparts to the eroded sherds of Newclose fabric B that contain tabular voids. Support for the dating of these sherds at Newclose comes from the same pit where small oxidised fragments of iron were also recovered.

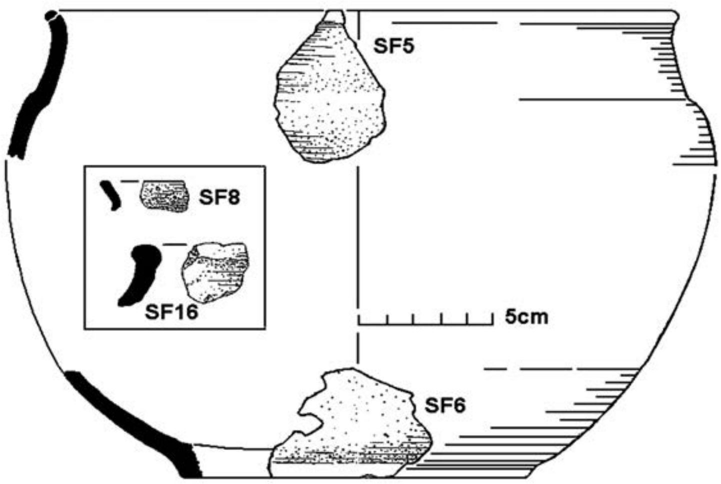

Fig. 11: Iron Age pottery from Feature F140/170 with conjectured reconstruction.

Iron fragments from pit F140

In pit F140 some small highly oxidised iron fragments were found to be securely stratified in fill 141. All were clustered in a loose mass that suggested a single item had fragmented over time. X-ray confirmed that the head end of this artefact contains a shaft that has been doubled around on itself, possibly to form the shank and pin of a fibula (fig. 12). Another fragment comprised a broken and apparently out-turned component that may have been the remains of the catch plate. While the X-ray supports this interpretation it also shows that corrosion is so advanced that this uncertainty is unlikely to be resolved by cleaning.

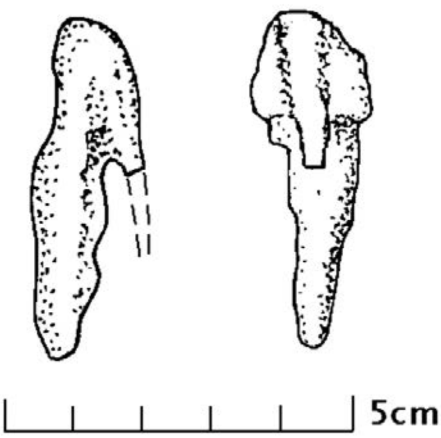

Fig. 12: Putative fragment of an iron fibula SF 39 from pit F140.

Minor sherds from the fluvio-colluvial channel on the valley-side

Four small eroded and well-rounded body sherds were recovered from the primary fill of the re-cut valley-side fluvio-colluvial channel exposed in sections 2, 3 and 4 (SF nos. 42 & 43 from context 603 and SF nos. 45 & 46 from context 605). All were too fragmentary to justify illustration. Only sherd SF 42 offered any significant indication of date. Although weathered and featureless, this sherd may be reasonably attributed, on the strength of its temper and firing, to the DBB1/BB1 Dorset potting tradition spanning the mid-1st century BC to the late 4th century AD.

Romano-British activity

Roman artefacts comprised seven sherds of pottery and six eroded fragments of ceramic tile. There were also two portions of cleaved and weathered Bembridge Limestone. The latter was of the type and thickness employed in Roman roofing. The distribution of these artefacts showed no more than a random scatter such as might arise from a contemporary Romano-British practice of manuring (fig. 13).

The intensity and thoroughness of the archaeological fieldwalk and the subsequent stripping was certainly sufficient to suggest that no Roman occupational activity had taken place on this site although Roman buildings may have been present not too far away. The nearest known structure employing standard Roman building material is situated 0.6km to the northwest near the Watergate Stream (HER 926).

Romano-British pottery

Just seven fragments of Roman pottery were recovered from the fieldwalk. A further sherd was recovered after archaeological stripping (fig. 14). Sherd SF 28 represents a shouldered bowl that conforms to Vectis form 7 (Tomalin 1987), yet its dark fabric and weak content of fine quartz sand seems best matched amongst the Durotrigian products of similar style from South Dorset. This bowl can be attributed to the 1st century BC and the 1st and early 2nd century AD.

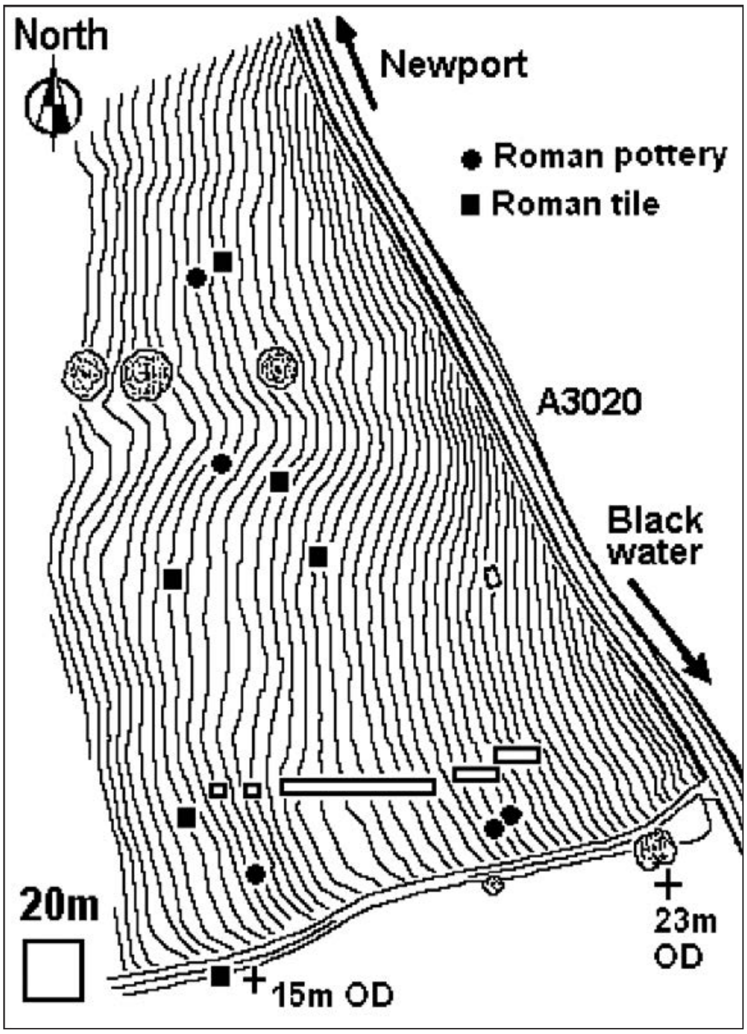

Fig. 13: Distribution of Roman ceramic artefacts.

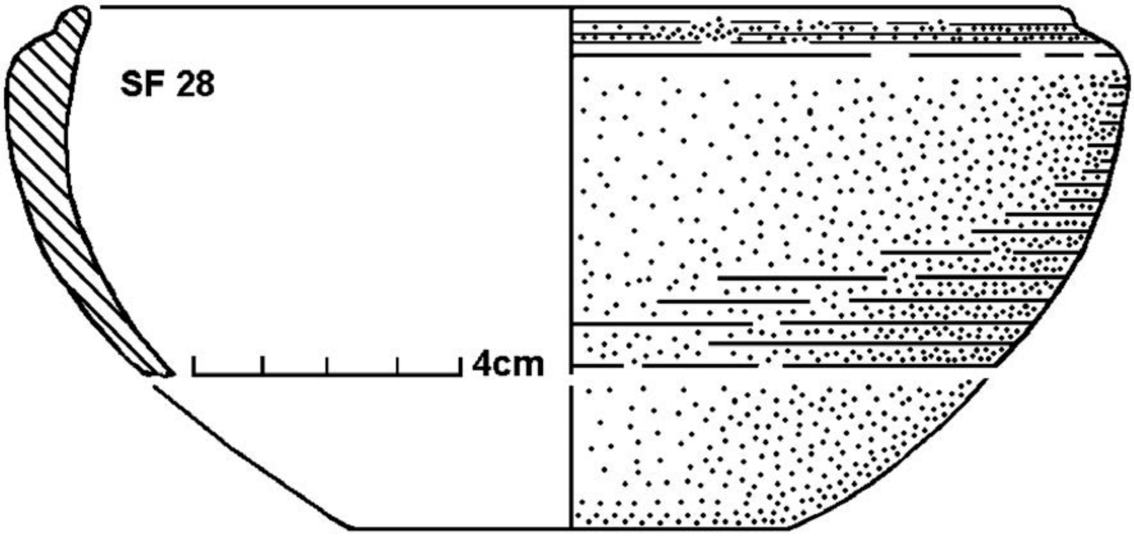

Fig. 14: Black burnished carinated bowl of Durotrigian style comparable with Vectis form 7.

Sherd SF 50 was a body sherd of a large storage jar resembling the grog tempered fabric of a similar large vessel found in a 4th century context in the villa of Rock, near Brighstone. The remaining sherds were all featureless body fragments of local Vectis Ware.

Romano-British ceramic building materials

Fired tile fragment SF54 was 2.4cm thick and bore traces of a perforation of the type that is sometimes used to permit nail-fixing of roof tegulae (Brodribb 1987, 10-11). Sherd SF 51 was a fragment of weakly combed box-tile and fragment SF 53 was attributed to a *pedalis*, *bessalis* or *lydion* tile although this thickness was below the usual standard of 4cm. Other tile fragments gathered during fieldwalking were indeterminate. None warranted illustration.

Saxo-Norman, medieval ceramics and early post-medieval ceramics

Ten items of medieval pottery were recovered during fieldwalking. Four sherds (SF nos. 74, 76, 77 and 79) displayed the form of local sagging-based cooking pots of Saxo-Norman style A date bracket of *circa* AD 900 to AD 1300 can be applied. While Hodges (1981) identifies the precursors of the sagging base form in the 8th and 9th century, there is no reason to believe that any of the Newclose sherds necessarily pre-date the Norman Conquest. Platt, Hurst and Coleman-Smith (1975) comment that these sagging-based vessels are notoriously difficult to date with any precision. The flat T-profile of the rim tip on sherd SF 77 may be more in keeping with 13th century version of this ware (cf. Platt *et al* 1975 (2) 79 fig. 148 no. 384). Sherd SF 79 provides confirmation that a sagging base is truly present while other sherds have been identified solely by their fabric.

Local glazed wares were represented by a neck fragment of a green jug of the West Sussex style of the late 13th century (SF 70). A single fragment of a Saintonge plain-ribbed green-glazed jug represents an import from France during the 13th or early 14th century (SF 73).

A fragment of a flat-sectioned handle belongs to a grog-tempered coarse-ware frying pan or dipping pan of Late-medieval or Tudor type (SF 80). A flange portion of a white-slipped panchion of redware fabric is probably a local product of Late Tudor or Stuart date (SF 75).

Medieval/post-medieval roof tiles

An interesting item is a crest fragment of roof ridge tile of medieval/post medieval coxcomb style (SF 71). The fabric shows a grey core that is virtually gritless yet contains a little extremely fine integral mica. A little orange oxidising occurs near the inner and outer surfaces. An external glaze of dark green vitreous wash has been generously applied to the upper surface of this tile.

Crested ridge tiles of this style are common enough from the 13th century onwards but no ready analogies for this dark green glaze seem forthcoming in medieval Southampton, where a number of lightly splashed amber-green examples have been reported (Dunning 1975, 188-96). In excavations at Carisbrooke Castle a few fragments of crested roof ridge tiles have been recovered from contexts ranging from medieval to 16th century times but these too are either unglazed or weakly glazed and they fail to provide appropriate analogies (Cleal in Young 2000, 164-7, 62).

It seems that ridge tiles painted with a generous thick dark green glaze of this kind may not appear until post-medieval times. In Dorset similar tiles are present at Hooke Court, Beaminster around the time of the Civil War (ref. UTR).

The post-medieval period

There was virtually no evidence for post-medieval activity on the field prior to the mid-late 18th century. The first hints were offered by three bronze coins of George III and a profuse scatter of fragments of blue and white transfer-printed plates and dishes. This tableware certainly post-dates the 1780s and there is no particular reason why it should not have been either acquired or discarded after 1800. The same can be said of the three well-worn coins.

Most of the stoneware fragments from the field probably belong to the 19th century. London or Home Counties Red Ware is well represented on the field where fragments of bushel pan/bread bins seem to predominate. This ware was in production in the 17th century and it is known to have persisted until the close of the 19th century.

The large body of domestic earthenwares and fine wares of eighteenth and nineteenth date amounted to 460 fragments, a description and interpretation of which are contained in the deposited archive.

Clay tobacco pipes

Sixty-seven fragments of clay tobacco pipe were recovered during the fieldwalk. 78% of these were plain fragments that were almost entirely attributable to the slender developed smokers' pipes of the 19th and early 20th century. The five fragments of pipe bowls could also be assigned to this late date. These bowls were tall and capacious with thin walls.

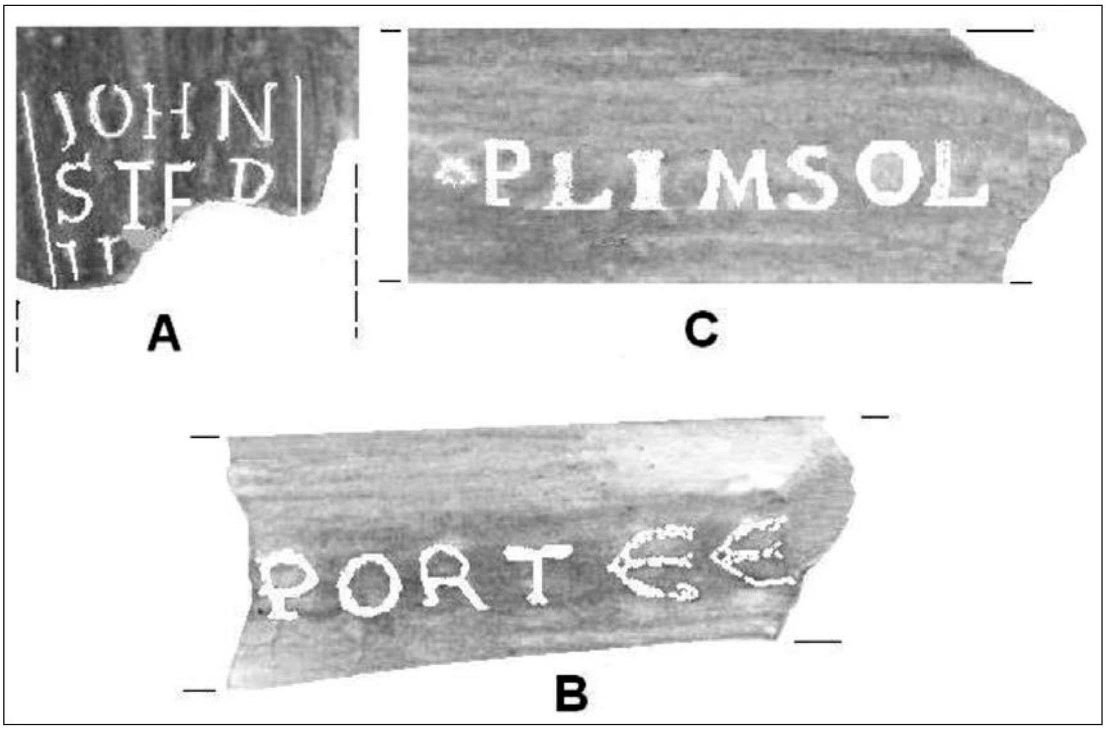

Fig. 15: Enhanced rubbings of stamped tobacco pipe stems from Newclose Cricket Field. A and C are impressed inscriptions. B is an embossed longitudinal inscription possibly attributable to a pipe manufacturer of [NEW]PORT.

Where fragments of pipe bowls showed fluting, vertical ribs, small acorns or an oak sprig, these designs could all be matched amongst the known products of Robert Cole whose clay pipe industry operated in Orchard Street, Newport, during the late 19th and early 20th century.

Stamped names were found on just three stem fragments (fig. 15). One of these bore the name *JOHN STEPH…* This is a transverse stamp on the stem of a pipe with the lettering arranged within an impressed rectangular tablet. This wording accords with the stamp of *John Stephens* whose production of clay tobacco pipes in Newport is attested in 1851 (Atkinson 1975, 345, fig. 276 no. 13).

A second pipe fragment bore the inscription …*PORT*<< abutting an embossed line of repetitive forked decorative motifs resembling 'E'. The latter name might be supposed to be Newport although no other stamped examples of the town's name seem to be known amongst pipes noted on the Island.

A third stem stamp bore the impressed name *PLIMSOL…* perhaps identifying a commemorative pipe dedicated to the Liberal shipping reformer Samuel Plimsoll of Bristol (1824-1898). His institution of the 'Plimsoll line' and the eradication of 'coffin ships' was nationally celebrated at the close of the 19th century.

Conclusions

The Pleistocene gravels of the Medina gap at Newclose and Great Pan

Since pioneer archaeological investigations in the 1920s, the river gravels of the Medina Gap have been recognised to be a notable source of Palaeolithic flint tools (Sherwin 1936). Early discoveries in hand-dug gravel workings at Great Pan Farm were reported by Hubert Poole in 1924. Poole's collection of palaeoliths from this site, deposited in Carisbrooke Castle Museum, were later re-examined by Shackley (1973 & 1975) who ascribed this flint industry to the *Mousterian of the Acheulian Tradition*. Their context was then identified as a beach sand (Shackley 1975, 102, fig. 8.8).

Shackley examined the patination and the relatively low level of abrasion on these tools, concluding that they were perhaps the product of a specific and short-lived occupation during Late Pleistocene times. Moreover, their similarity and spatial integrity within the gravel seemed consistent with a relatively low degree of disturbance by those natural processes that were capable of carrying them from their place of manufacture. Potentially, this may have been sited a relatively short distance upstream and to the south. Lying just 1.4km upstream, Newclose County Cricket Ground occupies precisely such a location.

Shackley's study of the original artefact assemblage was accompanied by two small trial trenches designed to re-examine the implement-bearing gravel deposits observed by Hubert Poole in the 1920s. Shackley's investigation uncovered some 2m of variegated sand and gravel on a bedrock surface at a general height of 6.3m OD. At this point these Pleistocene deposits rested on the Barton clays and sands (Shackley 1973, 545 fig. 2).

Since Shackley's investigation of 1973, there have followed further field investigations into the gravel deposits at Great Pan Farm (Schwenninger 2005; Pope 2005; Roberts *et al.* 2006; Wenban-Smith 2006). In 2005 fifteen test pits revealed the presence of three discernible gravel terraces in the vicinity of Hubert Poole's pit on the east side of the Medina river. The lowest of these (Terrace 1) ranged from 4m to 7.5m OD. This was equated with the 'implementiferous' horizon that Shackley had re-investigated in 1973.

Some 700m south-east of this position, test pit GTP14 revealed an organic deposit at a height of 3.7m OD. By extrapolation, this was equated with Terrace 1. An AMS sample obtained from this deposit produced a date of 38,700 ± 3,300 BP (Beta. A, GPF14RM1) (Schwenninger 2005). This can now be compared with the date of 30,300 ± 3000 BP (GL-08005) obtained from the fluvial gravel (NCG-1) at Newclose Cricket Ground.

Where the Newclose deposit and its silty lenses were followed down-slope to a height of 14m OD, Dr Lewis draws comparison with 'Terrace 2' at Great Pan Farm. The latter rests at a level of 11-16m OD. Given that the normal formation of river terraces proceeds downwards, we should expect Terrace 2 to pre-date Terrace 1 at Great Pan. This is not confirmed by the two absolute dates that are currently available to us. On the limited evidence offered by these two dates two possibilities might, at least, be contemplated.

In hypothesis 1, we might consider the equating of the dated organic deposit at GTP14 with Pan Terrace 1 to be flawed. The peat horizon in this deposit could be subsequent to an earlier phase of channel incision, before a rise in water table restored the Medina to a higher flood plain and the recommencement of gravel deposition. A palynological analysis of the peat in the channel at GTP14 suggests a coastal or near-coastal Pleistocene environment where seaweed and brackish or salinated water was present. Pope (2005) suggests a narrowly constricted tidal inlet in which seaweed-choking and the shifting of tidal pools were manipulated by the movement of the tides. It is also conceivable that this channel was formed subsequent to the deposition of Terrace 1, although this runs contrary to the evidence currently offered by the two absolute dates.

In hypothesis 2, we should consider a re-working of gravel deposit NCG-1 at Newclose. In his examination and dating of this gravel, Dr Lewis attributes this deposit to 'a high energy fluvial system capable of transporting coarse gravel bedload material. This, he adds, '*is typical of rivers in Britain during cold stages, where annual snow melt leads to a seasonally high discharge regime. At the eastern end of Section 1 a lens of sandy silt material (1040) is present. This probably represents localised colluvial deposition from the adjacent valley sides, extending over the floodplain surface and interdigitating with the fluvially deposited sediment of NCG-1*'. This sandy silt is equivalent to context 1240 with its OSL date of 33,000 ± 3000 BP (GL-08005).

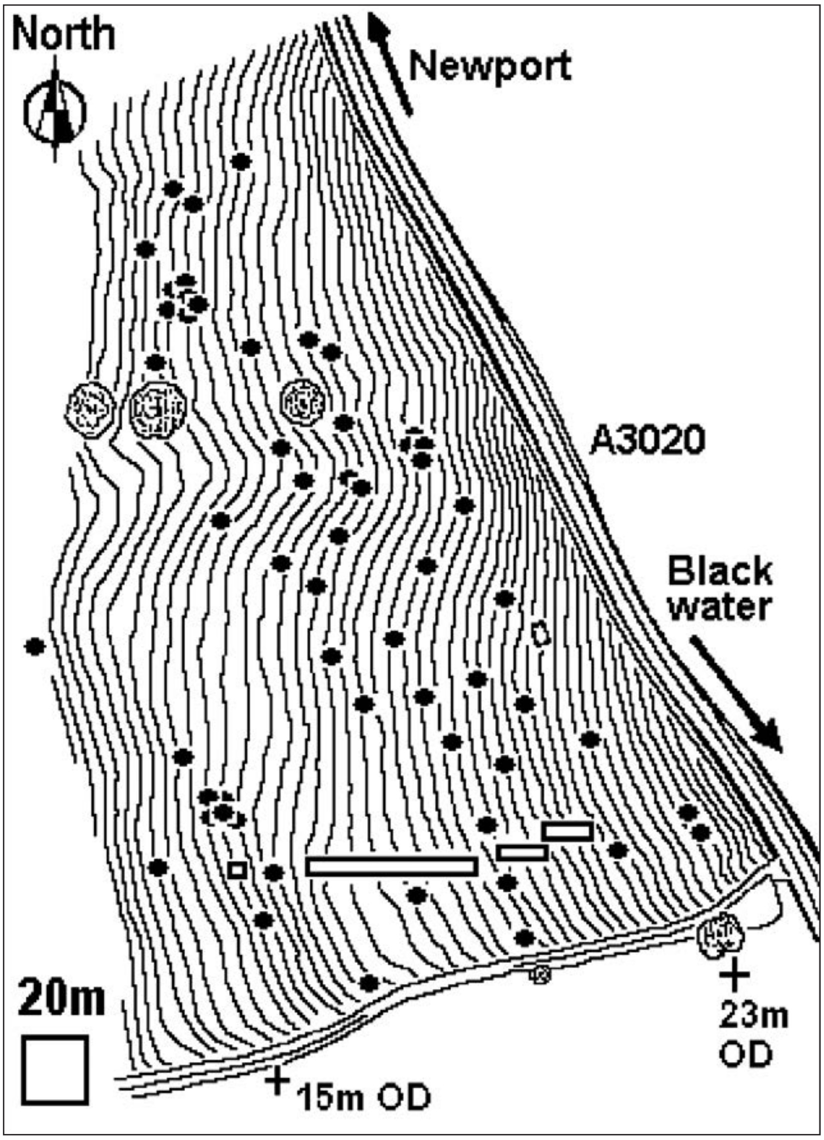

Fig.16: Distribution of clay tobacco pipe fragments recovered from thee fieldwalk.

This second explanation becomes all the more interesting when we consider that the fluvial gravel of NCG-1 is overlain by a train of colluvial gravel identified by Dr Lewis as NCG-2. This, he suggests, may be the result of '*downslope mass movement of sediment, probably (though not demonstrably in these sections) under cold climate conditions with enhanced mobility of sediments on low angled slopes. Within this unit, deposition of finer grained facies probably occurred as a result of sheetwash of fines downslope. NCG-2 therefore blankets and obscures the underlying fluvial sediments and terrace surface*'.

Where section 2 was cut at Newclose and where the gravel was machine-stripped to level the cricket ground, further lenses of similar fine-grained sediment could be traced in shallow disjointed channels leading down from the valley side. These were commonly contained within the fluvial gravel although it now appears that they cannot be attributed to its primary deposition.

In exceptionally wet winters, a process of periodic stream flushes, charged with fine sediment particles, can still be observed in the vicinity of the cricket ground. This has occurred when a perched water-table in an upslope declivity around Standen House has released episodic floodwater on to the road and the field now occupied by the cricket ground. In an aerial photograph dated 2004, a ripening cereal crop betrays the presence of past trains of fine colluvial material washed down-slope across the Newclose field (plate. 1, courtesy of Google Earth).

From this collective evidence we might conclude that the absolute date from context 1240 represents an event of lateral flushing and disturbance of NCG-1 gravel, subsequent to its deposition and no later than the accruing of overlying colluvial gravel (NCG-2). Potentially, this may offer us a *terminus ante quem* for NCG-1 and its Terrace 2 equivalent at Great Pan Farm. It now seems that Terrace 2 must predate 33,000 $\pm$ 3000 BP and that Terrace 1 and its implements must post-date whatever the true date of Terrace 2 may be. A more recent OSL date now suggests *c.* 50,000 BP for a further sample obtained in the vicinity of Great Pan Farm (Wenban-Smith & Loader, 2007, 14).

This leaves us with the organic sediments in test pit GTP14 as the only approach towards a date for the Great Pan Palaeolithic assemblage, yet caution has already been expressed concerning this particular sample (Wenban-Smith & Loader, *ibid*). We are also no nearer to locating the manufacturing source of these artefacts. At date around 50,000 BP for NCG-1 would place this gravel in the Mid-Devensian.

Current views on the Great Pan assemblage favour a date between 300,000 and 43,000 years BP for the manufacturing of the flint tools. A closer date of 60,000-40,000 has also been proffered (Wenban-Smith 2006). The broader date is based upon an accelerated mass spectrometry (AMS) measurement of an organic horizon uncovered in a geo-technic pit (GTP14) in Terrace 1. This pit was cut on the site of the old railway line at west of St Georges Road, Newport (SZ 50368 88456). The date applies to a dark brown silty clay immediately overlying a gravel deposit that is the postulated equivalent of the parent bed of the palaeoliths. The implements, however, were recovered from gravel some 500-700m north-west of the geo-technic pit.

At Newclose cricket ground, the chronostratigraphy of the gravel bench and hill-slope provides a potential *terminus post quem* of 33,000 $\pm$ 300 BP (Gl-08005) for the Pan palaeoliths where a gravel with silt lenses has been traced at a level that is some ten metres higher than the 'implement-bearing gravel' at Great Pan. At this point at the cricket ground, the observed gravel was still descending towards the valley floor. This left its lowest resting point undetermined.

Later prehistoric activity within the Medina Gap

It is known that the human activity on the floor of the Medina Gap was affecting the local woodland environment before the close of the Early Holocene. Just 1.1km south of the cricket ground, on the bank the Medina River at Gatcombe peat mire, a continuous palynological sequence has been investigated. This has provided an unbroken palaeobotanical record of the valley floor covering the past 9,000 years (Scaife 1980 & 2003). The pollen record contained within this peat mire attests a blanket of deciduous woodland covering the floor of the valley during the Atlantic climatic phase. This appears to have been subject to some minor human disturbance during the Late Mesolithic period. These minor interventions were followed by selective polling of trees between circa 3760 and 3510 cal. BC (SRR-1338) (Scaife 1980). These events are accompanied by the first appearance of cereal pollen from Neolithic clearances somewhere in this vicinity.

The pollen record of Mesolithic and Early Neolithic interventions in the woodland of the Medina corridor is complemented by scatters of contemporary flint artefacts at a number of locations adjacent to the Gatcombe peat mire (Tomalin & Scaife 1979; Dunn 2012). Some of these locations lie close to the valley floor while others occupy perched positions on the valley side. From ploughed land just above the western margin of the mire come scatters of both Mesolithic and Neolithic flint tools, flint waste and a tranchet axe (Tomalin & Scaife 1979; HER/PRN 919). Somewhat higher, at Hungry Hill, a further scatter of Mesolithic flint waste and microliths has been recorded (Poole 1936; HER/PRN 508). Tranchet axes of Mesolithic character have also been recovered from the valley floor at Gatcombe Mill and Blackwater (HER/PRN 510 & HER/PRN 929; fig. 17). A caveat must be added that the use of these particular tools can persist during the Neolithic period.

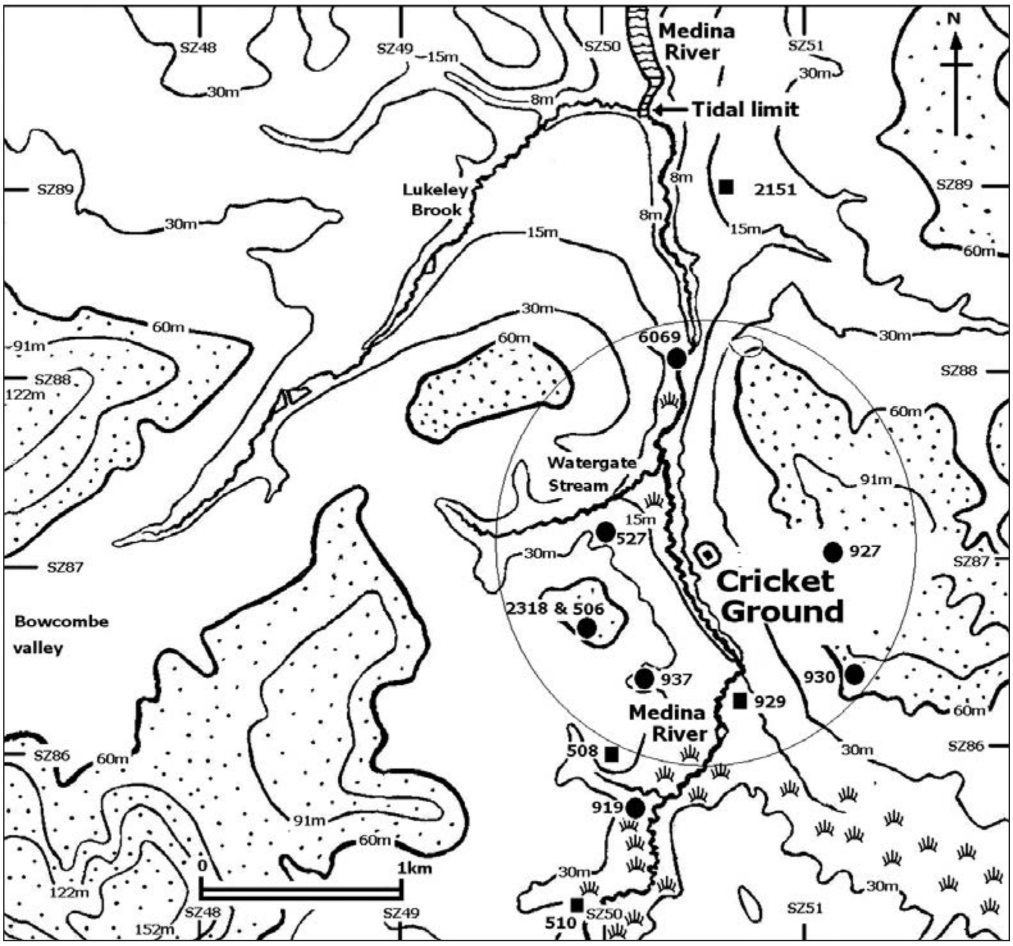

Fig. 17: Neolithic sites within 1km of Newclose Cricket Field. Beyond this catchment additional sites of Mesolithic and Neolithic date are only shown if cited in text. Each site is identified by its PRN/HER number.

East of the river, at Blackwater Shute, extensive scatters of Mesolithic and Neolithic flint tools and waste have been found strewn across the ploughed Greensand spur that divides the Medina and Birchmore valleys (Dunn 2012). Where the Neolithic lithic material here includes a notable incidence of flint sickles and imported polished stone axes, these are the tools to impose a sustained impact on the natural environment.

At Blackwater Corner another scatter of Neolithic flintwork is perched on the valley side of the Medina Gap (HER/PRN 930). The occurrence of these flint scatters at relatively high locations (50m & 65m OD respectively) suggests that the upland margins of the Medina Gap or corridor may have been favoured for Neolithic settlement rather than the damp and wooded floor of the valley. The presence of withy beds and birch place-names (Birchfield & Birchmore) suggests that the survival of natural secondary woodland on the floor of this part of the valley may have persisted well into historic times. Nevertheless, the pollen record at Gatcombe peat mire demonstrates that localised Neolithic tree-clearance was pursued on or near the floor of the valley during and after the 4th millennium BC. Similarly, the lithic scatter at HER/PRN 919 attests the production and discard of flint tools close to the margin of the mire.

Later prehistoric lithic artefacts recovered from the Cricket field indicate modest Mesolithic, Neolithic and Bronze Age activity. All appear to show a predilection for a perched position on a minor interfluve on the valley side. Here there is little evidence of tool production with just three cores, three core rejuvenation flakes and two hammerstones being attributed to Neolithic activity. The quantity of flint debitage is similarly desultory yet there is a perceptible scatter, and some discernable clustering, of complete tools.

This evidence hints at intermittent visits by human groups using this location for short periods. The fact that Mesolithic, Neolithic and Bronze Age activity is present suggests that visits to this site may have been prompted by a particular natural asset. At this location the Medina River offers a particularly convenient crossing point for animals and people following the east-west course of the Island's central chalklands. For pastoral communities this location could be a particularly attractive crossing point**.**

The Medina Gap in medieval times

A few plough-scattered fragments of Saxo-Norman sagging-based cooking pots could pre-date the Norman Conquest but the same ware is equally common at least until the close of the 12th century.

Domesday provides evidence of three particular settlements in the Medina Gap in the year 1086. The most northerly settlement is *Pan*, which is rated at 1 hide of land and 4 ploughs (DB, IW, 9,5). There are 4 villagers and 2 acres of meadow. There is also woodland that is without pasturage.

The principal settlement in the valley gap is *Shide*. It seems that before the Conquest this was held jointly by the King and by *Ketel*. This portion then answered for 1½ hides and land for 4 ploughs. There were 5 villagers and 8 smallholders with 3 ploughs. There was also 1 slave; 4 mills valued at 12, 6d; 4 acres of meadow and woodland for fencing. The total value of these properties was £4. (DB, IW, 1,10).

A second entry (DB, IW, 2, 21) records 1 hide of land held by *William son of Stur* and formerly held by *Ednoth*. There is land for 3 ploughs and 15 smallholders and 4 slaves. A mill at 10s; 2 acres of meadow and woodland for fencing is cited. A further entry records property at Shide held by *Jocelyn son of Azor* (DB, IW, 8,6). He receives income from 1½ hides of land for 4 ploughs; 3 villagers and 2 smallholdings; 3 slaves; 2 mills (at 5s) and 2 acres of meadow.

Standen is also cited in Domesday and is rated at 1 virgate of land and 2 ploughs (DB, IW, 7,3). Munby (1982, IoW7.3) specifically ascribes this entry to West Standen. This is clearly the smallest of the Medina Gap settlements and, seemingly, it lies closest to the land that is now occupied by the cricket field.

The Domesday entries for these three settlements are helpful in a number of ways. Firstly they show the relative sizes of these communities. They also reveal the importance and growth of settlement where the Isle of Wight Downland Way meets the Medina river-crossing at Shide.

The Domesday valuations for Pan show a devaluation of 33% since the time of King Edward the Confessor (TRE). This may reflect localised depopulation after the loss of life at the Battle of Hastings. There are other examples elsewhere in the Island where the land reverted to waste. There are also hints of a temporary reversion at West Standen where the value falls by 50% before climbing significantly during the two decades after the Conquest.

It is interesting to see that apart from the sparse scatter of Saxo-Norman cooking-pot sherds on the cricket field there is no archaeological reflection of events at West Standen where human endeavours appear to have been increasing in the last quarter of the 11th century.

Settlement		***Value TRE***	***Value 1086***
Pan		£4	£3
Shide	King William.	£4	£4
"	William	40s	60s
"	Jocelyn	50s	50s
(West) Standen		30s then 15s	40s + 10s

Names of settlements cited in the Medina Gap at and after Domesday

Shide. *Side* and *Scida* (1086). Probably a planked bridge. Bridge is known to be in existence by 1295 (Kokeritz 1940, 179-80). This will have served the 'Downland Way'.

Standen. *Standone* 1086, *Westaundone* 1271. Old English *Stan Dun* meaning Stony Down. This is an appropriate description of the gravel-capped down that has since been named St Georges Down (Kokeritz 1940, 21-2).

Pan. *Lepene* 1086, *Penna* 1204, *la Penne* 1217, Pann 1295. (Kokeritz 1940, 245-7). Old English pen(n) – enclosure.

Birchmoor. *Berchemere* 1299, *Byrchesmour* 1409. (Kokeritz, 1940, 8).

Some geographic considerations

Due to its median position within the Isle of Wight, the river Medina has long offered an important natural boundary dividing the island into its two principal territorial units, or *hundreds*, comprising the *East Medine* and *West Medine* (Worsley 1781; Page 1911; Kokeritz 1940). Arguably, recognition of this natural boundary could stem from Roman or even pre-Roman times. It is certainly reinforced by the configuration of certain mother parish boundaries of the island and it also appears to be respected by a principal tithing boundary. The latter was used in medieval and later times for the mustering of local militia (Russell 1981, map 13; Thompson & Tomalin 2011, 107). The importance of this river boundary may possibly account for the absence of a single principal manorial settlement exerting full control over the entire floor of this part of the valley.

Differing patterns of human settlement are to be found on the two sides of this river. On the east flank of the valley, prosperity is displayed in the mid-18th century when the elegant brick residence, known as Standen House, was erected by the Roberts family (IWHER, PRN 10665). It seems possible that this handsome Georgian building represents a minor relocation from a medieval manorial settlement at West Standen (PRN 10663). The two groups of buildings are no more than 300m apart. Not long after its construction, Standen House seems to have claimed particular status as a country residence when parkland was laid between the house and the east bank of the river. This is clearly shown on John Andrews' map of 1769.

On the west side of the valley, where the Watergate stream joins with the Medina River, there is evidence of a long history of human settlement. Close to the confluence of these watercourses are Marvell Farm, Watergate Farm, and Newclose Farm. The first, and possibly the second, of these place-names mark medieval settlements. The name *Mirifield* (Marvell in 1608) is applied to this spot in the 13th century along with the name *Quedampton*. The name *Quydhampton Hall* is cited in 1477 (Kokeritz 1940, 102).

The third name, Newclose, as its etymology implies, denotes new grazing, presumably for sheep. Use of this name cannot be confirmed before 1781 (Kokeritz 1940, 110). The siting of all of these settlements suggest that the valley floor close to the Watergate feeder stream was probably better suited to agriculture and grazing rather than the marsh-bound banks of the river Medina**.**

An overview of medieval and post-medieval activity in the Medina Gap shows a discernable preference for settlement on the west side of this valley rather than the east. The Island's predominant incidence of strong south-westerly winds may well have been a principal controlling factor. The same preference can be detected in the distribution of Roman finds in the valley (fig. 18). Investigations on the cricket ground site confirm that human settlement on this eastern bank of the Medina was neither common nor persistent, yet, intermittently, it had drawn human activity at certain times in prehistory and history.

The archaeology of the site in its local setting

It seems that the valley of the Medina River in the Newport-Blackwater gap was periodically occupied in Neolithic and later prehistoric times. In terms of past land-use the Neolithic may have been its 'finest hour'.

At Newclose Field there is little evidence of ensuing human activity until the late 1st millennium BC. The fluvio-colluvial channel in the valley-side contained a few eroded sherds of Middle to Late Iron Age date. These come from the primary fill of a naturally re-cut channel that could be the result of excessive downwash and gullying in the wake of an episode of forest clearance on the valley-side.

There are indistinct indications of Roman building activity in the vicinity of Newclose. When human settlement in and around the Medina Gap increased in Roman and post-Roman times it would seem reasonable to expect to see some supportive agricultural interests spreading southwards along the floor of this valley. The Roman villa on the southern edge of Newport seems to mark one such event; the manor at Standen Elms another (fig, 18). Later, a modest trail of post-medieval mills appears along the Medina stream from Gatcombe, via Blackwater, to Marvel, Shide, and Pan. While the power of the river certainly had its uses, there still persisted old withy-beds and alder carr woodland along its corridor between the chalk upland. At Gatcombe mire there is clear pollen evidence to show that some of this habitat has remained undisturbed for the past eight thousand years (Scaife 1980 & 2003). It seems that later populations were unable to thrive where the river lacked good grazing and water meadows. This may account for the relative modesty of archaeological remains on the cricket ground site.

Viewed at a macro scale, it seems that the siting of the medieval town of Newport has drawn upon a long-standing geographic advantage offered by its riverine position. The head of navigation is surely a principal factor but a hinterland of supportive human activity was also required.

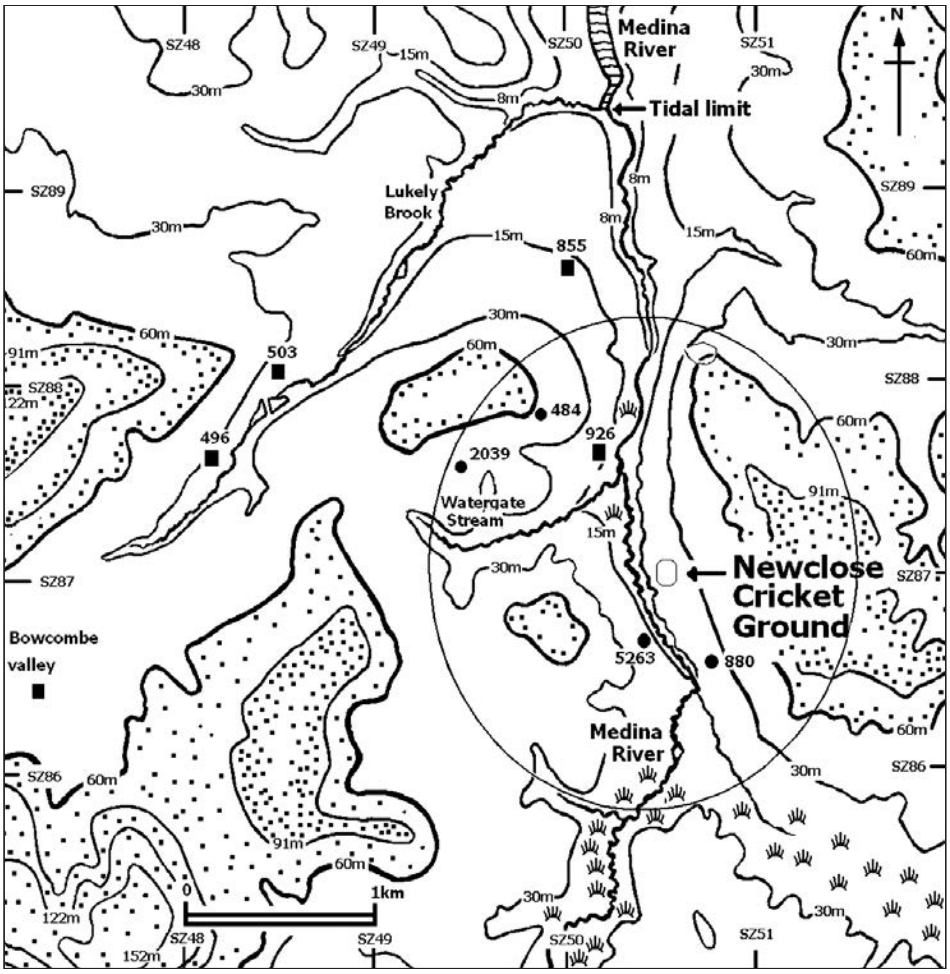

Fig. 18: Roman sites and find-spots within 1 km of Newclose Cricket Ground. Neighbouring Roman buildings beyond this zone are also shown.

After human settlement had grown in the Newport area, during and after Roman times, it would seem reasonable to expect to see some supportive agricultural activity spreading southwards along the floor of the Medina valley. The Roman villa on the southern edge of Newport seems to mark one such event, the manor at Standen Elms another.

A closer examination suggests that southward expansion of this kind has been negligible. Isle of Wight history shows that settlement in the Newport area has long been concentrated to the west of the town, along the valley of the Lukely Brook. Here, it seems, the Chalk and Greensand terrain was more agriculturally rewarding. Important advantages of the Lukely/Bowcombe valley were surely the southeasterly aspect of the chalkland hill-slope and the rich alluvial pedology of the valley floor. Such were the attractions of this location that the central settlement of the Island was surely established here in Roman and Saxon times.

The archaeology of the site in its regional setting

When viewed in a regional context, the relative dearth of historic settlement in the Medina corridor finds ready analogies elsewhere in the southern English chalklands. It seems that the valley floors in the chalkland gaps of the Cuckmere, the Sussex Ouse, the Adur and the Arun were, for the most part, sparsely populated. Where medieval communities eventually developed in such valleys it appears that these were judiciously sited at bridging points. On the Medina River, this role was fulfilled by the bridges at Shide and Newport.

In the chalkland gaps cut by the Sussex rivers there is clearly a difference of scale. In examples like the Arun Gap it is historically attested that the behaviour of seasonal floods was a powerful disincentive to settlement on the floodplain. At Arundel, medieval habitation was safely perched on the valley-side. In the chalk valleys of less mature rivers, however, where flow rates were lower, attractions for Saxon and medieval settlement could be more appealing. A Hampshire example is the Meon valley where a regular string of Saxo-medieval villages follows the river downstream from the chalk heartland of the county (Weldon Finn 1962, 313). Here might be found that critical combination of good chalk plough-land and high-ranging sheep-pasture. To these could be added the water meadows that might promote the products of the dairy.

In Dorset we find a similar pattern of settlement in the chalkland courses of the Stour and the Piddle (Darby 1967, 93). These are the models that, combined with the attributes of aspect and geology, help to explain why historic settlement in the Lukely/Bowcombe valley took precedence over the Medina Gap. It seems that the archaeology of Newclose Cricket Ground is an inevitable manifestation of a pattern of human land-use that was ever geographically determined.

Acknowledgements

Excavations at Newclose were carried out as a result of archaeological planning conditions applied to the construction of a new cricket ground and pavilion. The work was commissioned by Newclose Cricket Club, with particular support and encouragement given by Brian Gardiner. I am grateful to Planning Archaeologist Owen Cambridge for his advice on the archaeological approach to this site and to Professor Rob Scaife and Dr Simon Lewis for their on-site inspections and their examinations and interpretation of palaeoenvironmental and chronometric evidence. Further reports by these specialists are contained within the site archive.

The fieldwalk survey was carried out by members of the Isle of Wight Natural History and Archaeological Society, assisted by Alan Brading. Post-strip excavation, sampling and recording was carried out by Jackie Hart, Mike Cahill and Jessie Booth all of whom provided constant support in a variety of challenging conditions. Assistance with planning and contouring of the site was provided by Paul Macaire Associates. Flotation of plant macrofossils was carried out by Bob Bailey. Metal-detection of machine-stripped soil was carried out by Bob Bailey and Peter Philips. I am grateful to John Dunn for the opportunity to examine and discuss the lithic material that he gathered from Blackwater Shute. This has since been reported in volume 26 of Wight Studies.

Abbreviations in text

AMS	Accelerated mass spectrometry. (An absolute dating method applied to ancient organic sediments).
BB1	Romano-British black-burnished ware. Manufactured on the margins of Poole Harbour.
DB.	Domesday Book. Hampshire & Isle of Wight.
HER	Historic Environment Record. (Isle of Wight Council database – see also PRN).
Mhi	Maximum horizontal intercepts. (A measurement of grain size drawn from longest and widest points).
NCG	Newclose Cricket Ground.
OD	Ordnance Datum.
OSL	Optical stimulated luminescence. (An absolute dating method for Quaternary sand/silt deposits).
PRN	Primary record number in the Historic Environment Record (HER) of the Isle of Wight Council.
SBCP	Sagging-based cooking pot. (Saxo-Norman or Early medieval).
TRE	Tempus Rex Edward. A standard Domesday entry relating to the time of Edward the Confessor (AD 1065).
UTR	unofficialtonyrobinsonwebsite.co.uk/media/timeteam/2k7/hooke/DSCF07833.jpg.

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Author: David. J. Tomalin, 4 East Appleford Cottages, Bleak Down, Rookley, Isle of Wight, PO38 3LA.

ICHNOLOGICAL EVIDENCE FOR LARGE PREDATORY DINOSAURS IN THE WESSEX FORMATION (WEALDEN GROUP, EARLY CRETACEOUS) OF THE ISLE OF WIGHT

Dr Jeremy Lockwood

Abstract

Theropod footprints from the Wessex Formation are briefly reviewed and a particularly large example discovered on the south-west coast of the Isle of Wight is described. Footprint lengths ranged from 10-50cms (modal group 30-40cms) suggesting the most frequent hip height for theropods was 1.5m and the largest 2.5m. The distribution is compared with data on ornithopod prints and the implications for our understanding of the growth and size of the Island's predatory dinosaurs (Baryonyx sp., Neovenator salerii and Eotyrannus lengii) are discussed.

Introduction

The Wessex Formation (Wealden Group) on the Isle of Wight can be described ichnologically as a category 3a deposit (Lockley 1991, 33) i.e. footprints and bones occur in about equal proportions and the footprints are generally consistent with known skeletal remains. The bulk of exposed footprints are preserved as natural casts of footprints (convex hyporeliefs) which are exhumed by marine erosion and cliff falls and found as blocks of sandstone on the foreshore. The majority of large prints at Hanover Point (Grid Reference SZ 370849-385834) show characteristics of the ichnogenus *Caririichnium* (Lockwood *et al*. 2014, 718), suggesting an ornithopod track maker, (the prefix ichno- indicates that a genus or species name refers to a trace fossil). On the Island they have, with some justification, been assigned to 'Iguanodon', and historically were some of the first to be described (Beckles 1851, 117; Mantell 1854, 238). Theropod tracks are less common in the Wessex Formation, presumably due to predator-prey ratios limiting their population numbers. This is mirrored in the body fossil record of larger theropods, where articulated material is rare, but includes partial specimens of the spinosaurid *Baryonyx sp*., the tyrannosauroid *Eotyrannus lengii* and a rather more complete skeleton of the carcharodontosaurid *Neovenator salerii*. This report reviews theropod tracks in the Wessex Formation and describes an unusually large and well preserved specimen found in the Chilton Chine Sandstone Member in January 2016.

> Theropods were largely predatory dinosaurs while ornithopods formed the major group of herbivores. In the Wealden the commonest ornithopod was the Iguanodon *Mantellisaurus atherfieldensis*. Both groups produced tridactyl (three-toed) foot prints. The middle digit is referred to as III and the two lateral digits as II and IV. Occasionally in theropods the hallux, equivalent to the big toe (digit I), is seen pointing backwards as in today's birds. Digit V was essentially absent in theropods.

Geological setting

The Early Cretaceous rocks of the Wessex Formation underlie the Vectis Formation as part of the Wealden Group with the oldest units situated just above the Hauterivian– Barremian boundary (Allen & Wimbledon 1991, 511). Lack of volcanic ash and fossils that provide reliable indicators for biostratigraphic correlation means that the dating of the deposits is imprecise. However, work on fossil pollens and spores suggests that the exposed Wessex Formation of the Wealden Group on the Isle of Wight is entirely Barremian (Hughes & McDougall 1990), while carbon-isotope stratigraphy places local plant remains, known as 'the Pine Raft' (Fig. 1), at approximately 125 Ma (Robinson & Hesselbo 2004, 142). The Wessex is principally made up of varicoloured mudstones and interbedded sandstones originating in floodplain, river channel and point bar deposits (Sweetman 2011, 56). The sandstone beds, which occur throughout the succession, were laid down as point bar, levee and channel infills in meandering river systems or in times of flood as crevasse splay events (Insole *et al*. 1998, 4). These latter events have resulted in an important source of footcasts on the Island. The palaeoenvironment is interpreted as a sequence of alluvial meander plains which overran the Wessex Sub-basin (Allen 1998, 201), together with seasonally ephemeral lakes and ponds (Martill & Naish 2001,

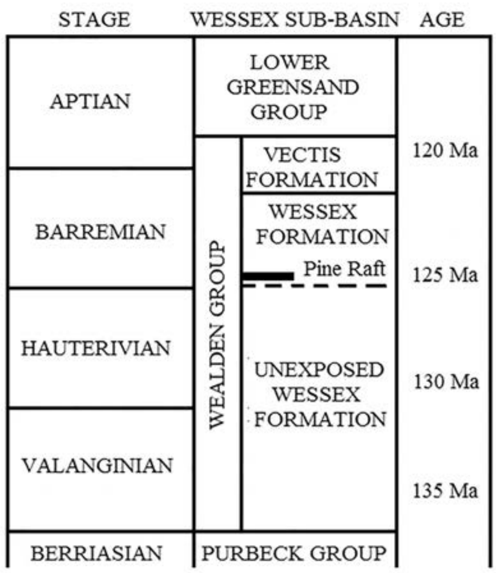

Fig. 1 Generalised Stratigraphical Log after Allen & Wimbledon (1991)

40). The climate was variable 'Mediterranean' and the differentiated soils show swelling and shrinkage features typical of modern, warm, semi-arid areas (Allen 1998, 208). The uneven ring structure in the locally found fossil conifer *Pseudofrenelopsis paraceramosa* also indicates a probable annual change from hot-drier to cool-wetter weather of a Mediterranean type rather than monsoonal (Francis 1987). Higher ground to the north had forested areas of fir trees, with cycads and tree ferns also present. Forest fires and floods were common, washing plant debris into the basin. High-sinuosity rivers in the basin provided for a rich riparian ecosystem (Sweetman 2011, 59) and an excellent environment for the preservation of dinoturbation as evidenced by today's footprint record which extends through numerous horizons.

Carbon-isotope stratigraphy – The relative abundances of the two stable isotopes of carbon, ^{12}C and ^{13}C, tend to vary over time due to changes in the balance of fluxes of the carbon cycle. These isotopes are incorporated into both carbonate minerals and organic matter. Measurement of the isotope compositions in plant fossils and carbonate minerals can then be used to provide stratigraphic correlation.
Point Bar – A crescent shaped feature of sediment deposition on the inside bend of a meandering river.
Levee – Natural levees are elongate ridges of mud and/or silt that occur on river floodplains formed by sediment deposition immediately adjacent to the river banks during times of flood.
Crevasse Splay - Occurs when a river breaks its levee (bank) and floods a wide area depositing sediment.

Distinguishing theropod from ornithopod footprints

The usual features differentiating theropod from ornithopod footprints may be summarised as:

- Segmentation of the digital impressions due to phalangeal pads.
- A more acute angle of divarication of digits II and IV (Lockley 1991, 47).
- A long digit III compared to the lateral digits, i.e. greater mesaxony (Lockley 2009, 419).
- Slender digits which are distally acuminate and may show claw marks.
- A curved digit III and sometimes curved lateral digits (Thulborn 1990, 221).
- Length greater than the width, usually with a ratio above 1.25 (Moratalla *et al*. 1988, 404).

However many of these defining characteristics are based on morphologies which can usually only be seen distinctly in archetypal small Jurassic ichnogenera such as *Grallator* Hitchcock 1858 (see Fig.2A) and *Anchisauripus* Lull 1904. Unfortunately some of these factors do not scale isometrically and can be problematical when trying to separate larger ornithopod and theropod footprints. Digital divarication can vary widely in a single trackway, claw marks are often absent and as size increases segmentation becomes less pronounced (this is especially notable in the Cretaceous, where marked segmentation is unusual) and the degree of mesaxony is reduced. Substrate consistency and gait are also important e.g. collapse of substrate walls or very shallow impressions can simulate narrow digits. Morphological convergence in large tridactyl prints and preconceived ideas based on Jurassic ichnogenera have both been cited as a cause of diagnostic difficulties in Cretaceous assemblages (Lockley *et al*. 2011, 172; Castanera *et al*. 2013, 1; Moratalla *et al*. 1988, 396). Thulborn & Wade (1984, 434) also felt that theropod prints could be separated into those with longer gracile digits and those with shorter more robust ones. They attributed the former to dinosaurs such as *Allosaurus* and *Megalosaurus*, and the latter to tyrannosaurids. Furthermore in the Wessex Formation *Valdosaurus canaliculatus* Galton 1977, a dryosaurid with long narrow digits, may have produced theropod-like prints adding to the confusion (osteometric data does however make it unlikely that these prints would have exceeded 25cms).

Moratalla *et al*. (1988) used multivariate analysis to identify measurements possessing high discriminatory value in determining the theropod or ornithopod origins of footprints. For example if foot length (FL):width ratio >1.25 the chance of the print being theropod is 80%. A series of nine measurements collectively provide a useful tool although there are still diagnostic problems with large prints and Moratalla *et al*. (1988, 404) suggested that measurements were complemented with non-metrical observations such as claw marks. This report accepts the current diagnostic difficulties, but finding footprints that meet all of the above criteria would have excluded most specimens. The 'Iguanodon' tracks on the Isle of Wight have distinctive padded, rounded and blunt ended toes which are of similar sizes but weakly mesaxonic and the pragmatic approach was taken of considering tridactyl footprints with narrow tapering digits and pronounced mesaxony to be theropodal in origin.

Specimens

All Wessex Formation footprints in the collections at Dinosaur Isle Museum exhibiting theropod morphology were examined and photographed. Also included were photographs of foot casts and prints from the Isle of Wight collected by the author over a ten year period. There were some borderline examples especially with larger prints but only typical theropod prints were selected. Eight theropod tracks recorded at Chilton Chine (Grid Reference SZ 408822) on the south coast of the Island by William Blows (Pond *et al*. 2014, 748) were included in the data calculations, giving a sample size of 46. One specimen (Fig. 2. LL, Fig. 3. C) has a FL of nearly 70cms so is exceptionally large (by comparison *Tyrannosaurus rex* foot lengths = 86cms (Lockley & Hunt 1994, 213) and 72cms (Manning *et al*. 2008, 645)) and has narrow pads on the surviving lateral digit and digit III. Despite some characteristic large ornithopod features it possesses considerable mesaxony and a fairly narrow digit III making it atypical; however distortion due to substrate collapse or dragging of digit III may account for the appearance and it has not been included in the analysis. Other specimens exhibited FLs ranging from 10 – 50cms.

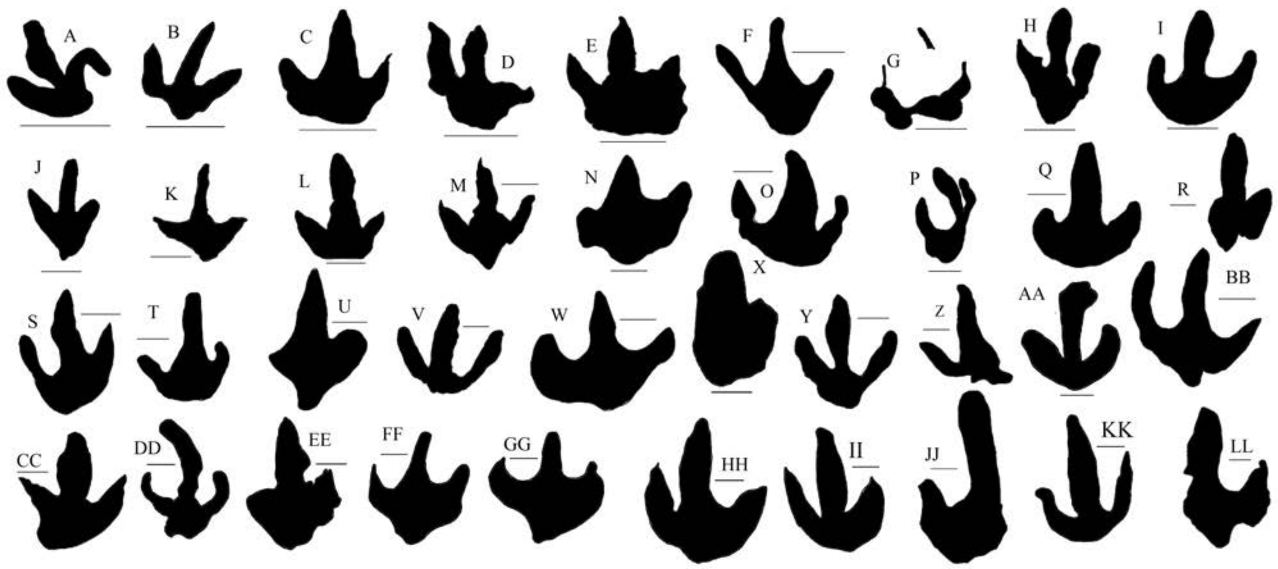

Figure 2. Outlines of probable theropod foot casts from the Wessex Formation. Placed in order of increasing FL, scale bars 10cms. A. IWCMS:2011.31 B. MIWG:5768 C.T. Photographed at Yaverland. D.F.G.I.J.L.O.Q.U.W.Y.Z. AA.EE.FF.GG.HH.II.JJ.LL Photographed at Hanover Point. E.V.BB.CC. Photographed at Chilton Chine. H. IWCMS:2014.22 K. Fig. 6. (Radley 1994, 206). M. MIWG:5348 N. MIWG:unaccessioned. P. IWCMS:1995.60 R. IWCMS:1996.160 S. MIWG:2010.9 X. IWCMS:1995.61. DD. IWCMS:2000.398. KK. IWCMS:2016.273.

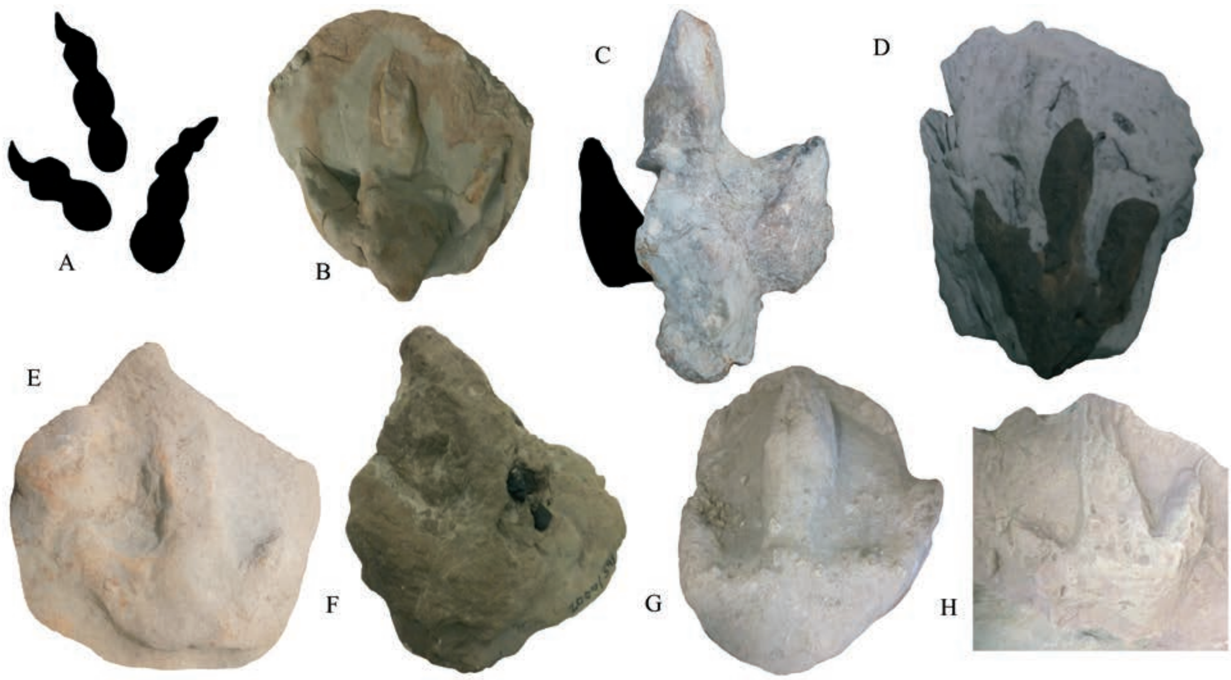

Figure 3. A. Typical example of ichnogenus *Grallator* from the Jurassic – not represented on the Isle of Wight. B. MIWG:5348 FL 29cms showing claw marks. C. Possible very large theropod foot cast from Hanover Point FL 67cms with left lateral digit reconstructed. D. IWCMS:2014.22 FL 22cms Yaverland E. Hanover Point FL 27cms F. IWCMS:2000.398 FL 40cms note curved digit III. G. Sudmoor Point FL 23cms G. Wessex Formation FL 15cms.

Chilton Chine Specimen IWCMS:2016.273 (Fig. 4 A and B)

A tridactyl natural cast of footprint on the underside of a block of Chilton Chine Sandstone, approximately 100m north-west of the chine. The sandstone had originally overlain a plant debris bed which formed the footprint substrate. FL = 50.5cm measured from the tip of digit III to the point where the heel deflects upwards. Digit III = 34cms, Ratio of FL/width = 1.3. The track parameters met 8 out of 9 of the Moratalla *et al*. (1988, 405) threshold values for probability of being theropod. The heel curves around the block preserving some of the metatarsal impression and lacking a distinct heel. The foot shows strong mesaxony with narrow tapered digits. The digits are forward facing with a low angle of divarication. The left lateral digit is curved and distally an impression may represent a claw pressing sideways into the substrate. No segmentation is present except a possible hint on the left lateral digit. Fig. 4 E (Fig. 2 V.) FL=34cms and Fig. 2 BB. FL=37cms were both found on the same surface and within four meters of IWCMS:2016.273, linking different animals in space if not exact time.

Figure 4. IWCMS: 2016.273 Natural cast of a footprint at Chilton Chine.
A. Inferior view B. Lateral view. C, D. Foot print outlined in yellow. E. A smaller print from the same surface.

Results and Discussion

As variation of footprint morphology is multifactorial, it is not possible to infer that each shape represents a different individual. This means that inferred censuses based on tracks need to be interpreted with caution. Nevertheless, this database based on well preserved (non-distorted) tracks collected over a wide area and time scale probably serves as a proxy census of individuals and foot size variation.

Theropod footprint lengths ranged from 10 – 50cms (Mean = 29.2cms Standard Deviation 9.27 Median = 32cms) n=46. The modal size range was 30-40cms (Table 1) and large theropod prints (i.e. > 25cms) comprised 76% of the sample. Twenty of the theropod prints were found at Hanover Point and data from this study were compared to data on ornithopod footprints also from Hanover Point (Lockwood *et al*. 2014) (Chart 1). Ornithopod footprint length ranged from 14-68cms (Mean = 50.2cms Standard Deviation 10.3) modal size range was 50-60cms. n=55.

FL range cms	Number This study	Number Blow's study	Estimated h (m)
0-10	0	0	0 - 0.45
10-20	4	0	0.45 - 0.9
20-30	8	5	0.9 - 1.47
30-40	17	2	1.47 - 1.96
40-50	7	1	1.96 - 2.45
50-60	1	0	2.45 - 2.94

Table 1. Theropod FL distribution and estimated h. Data from this study and Blows (Pond *et al.* 2014, 748)

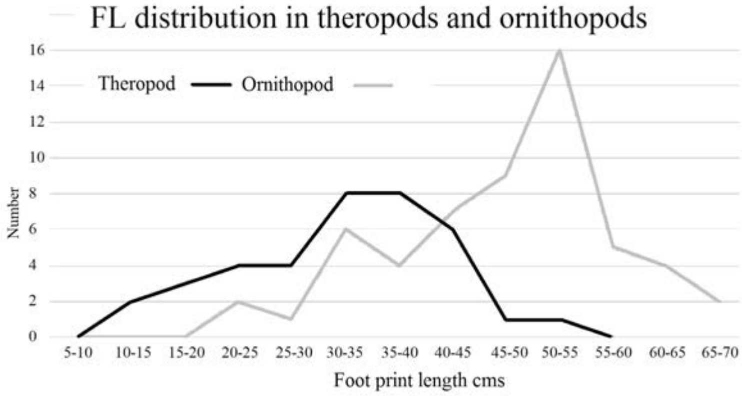

Chart 1. Wessex ornithopod and theropod FL distribution. Ornithopod data Lockwood *et al.* (2014.711)

Both groups showed considerable variation about the mean although this was more marked in the theropod data. Chart 1 shows that ornithopod footprints also differed in having the highest frequency among larger examples. Dinosaurs are thought to have grown relatively rapidly (Myhrvold 2013, 19; Padian *et al*. 2001, 405), leading to predominantly adult sized populations. Cooper *et al*. (2008) using histological techniques also argued that Hadrosaur growth rates in the Late Cretaceous were faster than contemporary predatory dinosaurs in order to maximize on the protective advantage of large size. The differences in foot length distribution curves for ornithopod and theropod prints suggest a similar pattern was occurring in the Early Cretaceous Wealden and implies that the modal group of Iguanodonts were close to attaining somatic maturity.

To understand the theropod distribution we need to compare h (calculated from FL) with estimated hip height from skeletal reconstructions of body fossils. When extrapolating from footprint length to dinosaur size, hip-height (h) is usually used as a proxy for the animal's size. Thulborn (1990, 247) using osteometric data calculated the ratios of FL:h and found that in large theropods (FL>25cm) h = 4.9FL, and for smaller animals (FL < 25cm) h = 4.5FL. The different formulae compensate for negative allometric growth in foot-size. The mean h for the theropod sample was 1.5m and maximum (IWCMS: 2016.273) 2.5m.

Determining the hip height of a dinosaur from its foot length is not an exact science. The ratio may vary between species, it can be affected by ontogeny as juveniles usually have proportionately bigger feet than adults and the gait and speed of the dinosaur may also be important. Thulborn (1989, 42) measured a number of specimens and arrived at the 'rule of thumb' formulae described above. Ideally we should verify the ratios using real specimens when available and in the cases of *Neovenator* and *Baryonyx* the formula closely matches actual measurements.

Eotyrannus lengii Hutt *et al*. 2001 (IWCMS:1997.550). The hind limb of the type specimen preserves the proximal tibia, some metatarsals and a partial tarsus. Based on the reconstruction by Hartmann (2013) h = 1.4m. However in all of the vertebrae in *Eotyrannus lengii* the neuropophyses (neural arches) had separated from the centra (Hutt *et al*. 2001, 232) indicating a juvenile status.

Neovenator salerii Hutt *et al*. 1996 (MIWG:6348) (NHMUK R10001) has an almost complete hind limb. Adding the lengths of femur, tibia and metatarsal III, h = 1.75m and by direct measurement of the assembled skeleton (mid-acetabulum to the ground) h = 1.78m. The *Neovenator* holotype at 7.6m in length has fully fused vertebrae but isolated and fragmentary remains have led to suggestions that it may be a sub-adult. Holtz *et al*. (2004) calculated a length in excess of 10m based on a pedal phalanx II (MIWG:4199). Dinosaur Isle Museum holds three specimens of theropod (? *Neovenator sp*.) limb bones from the Wessex Formation: MIWG:7049 a proximal tibia; IWCMS:2010.37 a distal tibia and IWCMS:2000.1108 a distal metatarsal II or IV. The dimensions of these are all within 10% of the holotype suggesting that its size was probably characteristic of the species. However the validity of scaling bones (other than perhaps complete long hind limb bones) is at best uncertain and in all of these isolated specimens a specific identification of *Neovenator salerii* could not be made with complete confidence.

Baryonyx walkeri Charig & Milner 1986 (NHMUK R9951) No Isle of Wight specimen is complete enough to attempt a restoration but based on Hartmann's (2004) reconstruction of the Surrey type specimen h=2.4m. Some skull and vertebral elements appear to have failed to co-ossify although the sternal bones have fused, indicating a probable sub-adult state (Charig & Milner 1997, 42). Undescribed skull material from an Isle of Wight baryonychid indicates an animal that was at least as big as its Surrey counterpart.

MIWG:6350 A theropod, as yet unnamed, based on partial pubes and a distal femur. h ≈ 1.6m.

Very small theropods are known from fragmentary body fossils and their prints should be relatively easy to recognise. Their low numbers imply that very small or very young animals were either uncommon or their prints were subject to negative preservation bias.

The most frequent hip-height (from FL) range of 1.47 – 1.96m suggests that theropods of similar sizes to the holotype specimens of *Neovenator*, *Eotyrannus* and (unnamed) MIWG:6350 were by far and away the commonest to roam the Wealden floodplains. IWCMS:2016.273 shows that larger animals with a hip height of 2.5m existed, which equates with the *Baryonyx walkeri* holotype size, but could also represent a more mature *Neovenator* or *Eotyrannus.* The juvenile status of *Eotyrannus* and possible sub-adult status of *Neovenator* makes this plausible but it would necessitate increasing the size of the holotypes by nearly 50%. Erickson *et al*. (2004, 774) showed that maximum growth rates in Tyrannosauridae occurred in their early teens with a spurt of up to 30% increase in h (usually less) over approximately a four year period before entering an asymptotic slowing phase. The juvenile *Eotyrannus* holotype could represent an animal just before this growth spurt, however a 50% increase in h would be highly unusual.

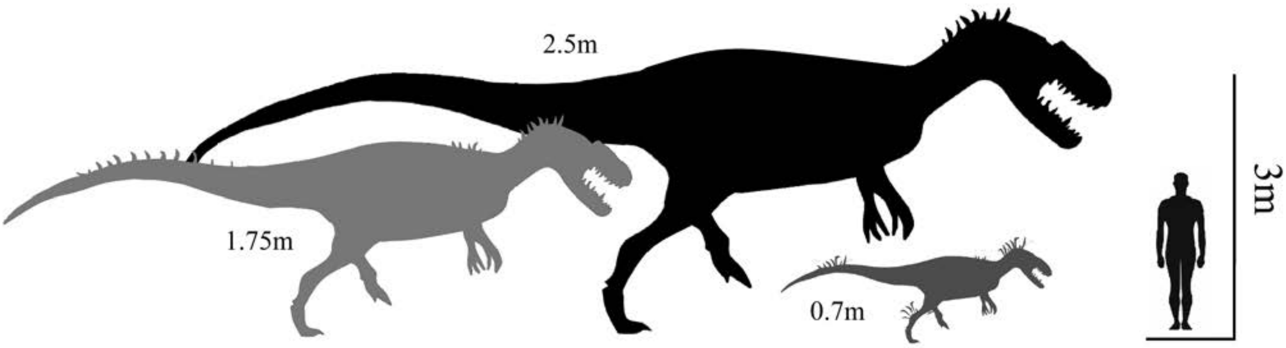

Figure 5. The range of theropod sizes in the Wessex Formation based on foot print evidence.
Scale 3m and figures indicate values of h.
The holotype of *Neovenator salerii* is represented by the animal with a hip height of 1.75m.

There are several reasons which could explain the low number of large theropod footprints recorded in the Wessex Formation. Small numbers of very large animals would be a consequence of 'living fast and dying young'. Maybe due to the dangerous and precarious nature of their lifestyles they often achieved sexual maturity but rarely survived to reach somatic maturity. Currie (1998, 272) noted a wide variation in the individual sizes of a group of nine Tyrannosaurids (*Albertosaurus sarcophagus*) in what appeared to be a catastrophic death assemblage in the Horseshoe Canyon Formation (Campanian-Maastrichtian) in Alberta, Canada. This was cited as a possible indication of gregarious behaviour between animals spanning the age spectrum from adolescence to senility. The estimated femoral lengths ranged from 0.5 to1.0m but the majority were in the mid-range (mean 0.78m median 6.9m). Gates (2005, 366) also found in a Late Jurassic suspected drought-induced death assemblage that 85% of theropods (*Allosaurus fragilis*) were sub-adult while other genera including Sauropoda, Thyreophora and Ornithopoda were all adults. This model of a wide age/size distribution in theropod groups would be consistent with the footprint evidence in the Wessex Formation.

Other factors affecting the footprint record could be intergeneric size variation, mobility and preferred habitat. *Baryonyx* may have been uncommon or bigger and more sedentary (big animals tend to be less active), thereby creating fewer foot prints, while smaller animals covered huge areas searching for prey or carrion and left disproportionately large numbers of tracks.

The lack of theropod prints over 50cms could result from wrongly diagnosing large tridactyl prints as ornithopod due to convergent morphologies. IWCMS:2016.273 (Fig. 4 A.B.) possesses many classical theropod characters and suggests that this was not the case for all prints of this size. Also the outlines in Fig. 2 seem to fall into two broad groups, a robust group with a large base/heel, often with relatively short lateral digits (e.g. Fig. 2 C,L,Q,U,CC,HH) and a more gracile group with longer often curved digits (e.g. Fig. 2 B,V, BB, DD, KK). Up to a FL of 50cm there are no obvious trends between appearances and size. It could be that the groups represent different species as suggested by Thulborn & Wade (1984, 434). Prints similar to Fig. 3 C are of interest as if theropodal the hip-height would have been a staggering 3.4m. Among known species only *Baryonyx* with an estimated sub-adult hip height of 2.5m could possibly be considered as a contender. However there is no absolute evidence from body fossils or ichnites to support the existence of such large creatures on the Island.

Overall the ichnological evidence complements skeletal fossils in suggesting a diverse community of predatory dinosaurs amongst the Isle of Wight Wealden fauna. The range extended from small to very large but was dominated by medium to medium-large animals. The size spectrum may reflect a mixture of different species possibly with a baryonychid at the apex, but could also suggest monospecific populations with a wide age/size distribution. The latter would predict that theropods in the Wessex generally had short life spans with high juvenile/sub-adult mortalities, only occasionally reaching full somatic maturity.

'Tracks', said Piglet. 'Paw marks.' He gave a little squeak of excitement. 'Oh, Pooh! Do you think it's a-a-a Woozle?' 'It may be', said Pooh. 'Sometimes it is and sometimes it isn't. You never can tell with paw marks.' A. A. Milne, *Winnie-the-Pooh* (1926). Quoted by Thulborn (1990, 105) on 'Identifying the trackmaker'.

Abbreviations: MIWG. The Museum of the Isle of Wight Geology; IWCMS. Isle of Wight County Museum Service; NHMUK. The Natural History Museum, United Kingdom; h. hip height; FL. foot length.

Acknowledgements

My grateful thanks to Alex Peaker, Peter Pusey and Shaun Smith (Dinosaur Isle) for help and assistance with specimens, Steve Hutt for valuable advice and Dr Martin Munt (Natural History Museum, London) for detailed comments.

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Author: Dr Jeremy Lockwood, Ocean and Earth Science, National Oceanography Centre, University of Southampton, Southampton. SO14 3ZH, UK.
jlockwood156@aol.com

NOTABLE MOTH RECORDS ON THE ISLE OF WIGHT 2015

Iain Outlaw

Precisely how weather conditions affect moth populations is difficult to predict. Compared to the 30 year mean, 2015 rainfall was mainly 'average', although August was very wet. During the summer months temperatures on the Island were marginally low. With moth numbers highest during the summer it could be expected that the relatively cool and wet conditions during that period would have adversely affected the moth population, but in fact 2015 proved to be exceptionally good for moth recording. Unusually mild conditions in the middle of December resulted from a warm and moist air mass moving north from Africa. Mean December temperatures in southern counties were 5-6°C higher than average and the warm air brought with it an exceptional moth immigration, producing a thrilling end to the season.

More than 16,000 records of some 880 moth species were received, thanks to considerable time and effort from a dedicated group of recorders and supplemented by some excellent records from visitors to the county. This resulted in no fewer than 18 species new to VC10 with one further record pending confirmation. The list of confirmed new county records includes five macro moths and 13 micro moth species. A wide range of rarely recorded species was also encountered and some success was had with searches for target species.

New VC records

16.022 ***Cedestis subfasciella*** (Stephens, 1834). A locally distributed species of pine woodland where the larvae mine the needles of Scots Pine (*Pinus sylvestris*). One came to light at Cranmore SSSI on 05 June. Voucher retained.

30.003 ***Pseudatemelia josephinae*** (Toll, 1956). One to light at Briddlesford Copse on 23 June. Voucher retained and identity confirmed following examination of genitalia.

35.009 ***Syncopacma polychromella*** (Rebel, 1902). An extraordinary influx in mid-December saw at least 69 recorded in the UK including 20 in Hampshire and seven on the Isle of Wight. The first was taken at Moons Hill, Totland, on 17 December with further singles at the same site on 18 and 19 December. One came to actinic light at Tennyson Down on 19 December. Two were recorded at Shanklin on 19 December with the last one at Plaish on 27 December.

35.025 ***Dichomeris alacella*** (Zeller, 1839). A Nationally scarce (Nb) species whose larvae feed on various lichens. One came to MV on the Freshwater Causeway section of Afton Marsh SSSI on 25 July.

37.028 ***Coleophora juncicolella*** Larvae were found in heather sweepings taken at Headon Warren on 02 May.

37.039 ***Coleophora hemerobiella*** (Stainton, 1851). One of the more distinctive *coleophora*, an obvious black spot is usually visible at around three-quarters on a grey forewing. Locally distributed, the larvae feed on a number of deciduous trees and shrubs. One was recorded from The Needles on 10 July.

49.280 ***Gypsonoma oppressana*** (Treitschke, 1835). Nationally scarce (Nb), the larvae feed on the buds of White Poplar (*Populus alba*) and Black-poplar (*Populus nigra*). One to light at Freshwater Fruit Farm on 11 July.

49.123 ***Aethes beatricella*** (Walsingham, 1898). An uncommon species whose larvae feed on Hemlock (*Conium maculatum*), one was trapped at Wheeler's Bay, Ventnor, on 08 June.

49.187 ***Endothenia oblongana*** (Haworth, 1811). Local but possibly increasing in Hampshire, the first for the Island was recorded at Moons Hill, Totland, on 13 July. The larvae feed on Ribwort Plantain (*Plantago lanceolata*).

49.332 ***Cydia coniferana*** (Saxesen, 1840). A Nationally scarce (Nb) species, the larvae feed within the bark of Scots Pine (*Pinus sylvestris*). One came to light at Shanklin on 14 July. Voucher retained.

52.008 Red-tipped Clearwing (*Synanthedon formicaeformis*) (Esper, 1782). One came to a pheromone lure at Afton Marsh SSSI on 13 June.

53.002 Triangle (*Heterogenea asella*) ([Denis & Schiffermüller], 1775). This Red Data Book species is found in Oak and Beech woodland and is rare throughout its range. The first record for the Island was of three to MV at Parkhurst Forest on 07 August. Two days later, two more were found at Briddlesford Copse. These are particularly exciting finds but need to be followed up with further surveys.

63.041 *Agrotera nemoralis* (Scopoli, 1763). As a breeding species this crambid is probably restricted to one woodland in Kent with other UK records representing immigrants. The larvae feed primarily on Hornbeam (*Carpinus betulus*) and Hazel (*Corylus avellana*), but occasionally on Birch and Chestnut. It was searched for without success at Hurst Copse but one came to an actinic light at Borthwood Copse on 21 June.

63.082 *Crambus silvella* (Hübner, [1813]). The nearest population is found on damp heathland and bogs in the New Forest. The first record for the Island was one to light at Moons Hill, Totland, on 10 August.

63.119 *Musotima nitidalis* (Walker, [1866]). An adventive species native to New Zealand, it was first recorded in Dorset in 2009 but has since been recorded from a number of other counties. One came to MV at Moons Hill, Totland, on 22 October.

72.008 Black V Moth (*Arctornis l-nigrum*) (Müller, 1764). There are just three previous UK immigrant records for this species, all were during July; from VC19 (North Essex) in 1904, VC13 (West Sussex) in 1946, and VC16 (West Kent) in 2006. One came to MV at Moons Hill, Totland, on 04 July.

73.041 Marsh Dagger (*Acronicta strigosa*) ([Denis & Schiffermüller], 1775). There have been just four UK immigrant records since the resident Cambridgeshire population died out in the 1930s. The four immigrant records all occurred during July; from VC13 (West Sussex) there were two in 2010, VC14 (East Sussex) in 1996, and VC15 (East Kent) in 2013. The fifth UK record was one to light at Bonchurch on 02 August.

73.059 Toadflax Brocade (*Calophasia lunula*) (Hufnagel, 1766). This rare Red Data Book species is found in coastal locations of southeast England but it does appear to be expanding its range. One came to MV at Wheeler's Bay, Ventnor, on 08 August.

Possible *Barea asbolaea* sent to BMNH for opinion.

28.028 *Barea asbolaea* (Meyrick, 1884). A putative *asbolaea* was taken at Parkhurst Forest in 2014 but the specimen was not retained. Returning to the same trap site another candidate was trapped at MV on 09 July. The specimen was sent to Martin Honey at BMNH for verification.

A selection of other noteworthy records from 2015 includes the following:

03.003 Map-winged Swift (*Korscheltellus fusconebulosa*) (De Geer, 1778). The first since 1903 and only the fourth county record when one was taken at Luccombe Down on 07 June. The larvae feed on Bracken (*Pteridium aquilinum*) and overwinter twice.

12.021 *Nemapogon clematella* (Fabricius, 1781). One was netted after it was seen flying through the garden in the late afternoon. It may have been disturbed during clearing rotten and fallen Hazel in the same garden that morning, at Shanklin, on 08 October. This is only second county record and the first imago to be recorded with the other report referring to larval feeding sign.

35.006 *Syncopacma vinella* (Bankes, 1898). Following the rediscovery of this species, further surveys were conducted in an area close to the known sites and where the larval foodplant, Dyer's Greenweed, is present. The effort was rewarded when three adults were recorded on 17 July.

63.103 *Catoptria verellus* (Zincken, 1817). It was a good year for this rare immigrant with four singles taken. One at Shanklin on 30 June, singles at Totland on 04 July and 06 July, with the last at Shanklin on 07 July.

63.120 *Schoenobius gigantella* ([Denis & Schiffermüller], 1775). With only one other record since 1908, three from 2015 was exceptional. One was taken at the RSPB Bembridge Lagoons reserve on 26 May, one at Afton Marsh on 25 July, with four more from that site on 17 August.

70.020 Sub-angled Wave (*Scopula nigropunctata*) (Hufnagel, 1767). The second county record with one to light at Totland on 02 August. The same recorder took the only other specimen, at Freshwater, in 1994.

70.201 Barred Tooth-striped (*Trichopteryx polycommata*) ([Denis & Schiffermüller], 1775). This is a Nationally scarce (Na) species with only two previous county records and was the subject of targeted torchlight searches and trapping. None were found during the torchlight surveys but one came to MV at St. Catherine's Point on 14 April and three to an actinic light at Tennyson Down on 15 April.

72.079 Rosy Underwing (*Catocala electa*) (Vieweg, 1790). A rare immigrant, the second county record was from the same site as the 2009 individual. One to MV at Moons Hill, Totland, on 28 August.

73.074 Bordered Straw (*Heliothis peltigera*) ([Denis & Schiffermüller], 1775). This is a reasonably common immigrant and 2015 proved to be a good year. Moth trapping produced 73 records of 187 individuals but many more were seen and photographed, particularly along the coast at Compton. The peak arrival was in the first week of June and was in sufficient numbers to produce a locally-bred generation.

73.106 Orache Moth (*Trachea atriplicis*) (Linnaeus, 1758). There have been 15 previous records of this rare immigrant. One was taken by a visiting recorder at St. Catherine's Lighthouse on 10 July.

73.159 Small Clouded Brindle (*Apamea unanimis*) (Hübner, [1813]). This is a very scarce species on the Island but was recorded at two locations in 2015. Different singles were recorded at Shanklin on 13 June and 14 June with another at Parkhurst Forest on 09 July.

73.178 Beautiful Gothic (*Leucochlaena oditis*) (Hübner, [1822]). Numbers were significantly down this year with a total of just nine individuals recorded, seven from survey work and two incidental records. A total of 63 was recorded in 2014.

73.275 White Colon (*Sideridis turbida*) (Esper, 1790). The third for the Island came to MV at St. Helens Duver during trapping for the BioBlitz event, 27 May.

73.330 Radford's Flame Shoulder (*Ochropleura leucogaster*) (Freyer, [1831]). The second county record was taken at Moons Hill, Totland, on 02 November. Exhibited at BENHS.

73.354 Square-spotted Clay (*Xestia stigmatica*) (Hübner, [1813]). One taken at Totland on 07 August was only the second county record and the first since 1949.

An extraordinary array of interesting species turned up in 2015. There were disappointments such as the low numbers of Beautiful Gothic recorded and the failure to record Olive Crescent following the six seen the year before. However those disappointments were outweighed by an exceptional sequence of exciting finds. Some of those finds, particularly those of **Triangle**, raise questions regarding the extent of any resident population and it is important that follow-up surveys are conducted during 2016. This year is also the final year for contributions towards the forthcoming Atlas of Macro Moths. There are still many gaps to be addressed, both geographical and for individual species, so if anyone would like to contribute then please get in touch.

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Acknowledgements

Records were received from more than 50 contributors but I would like to extend particular thanks to Sam Knill-Jones, Rob Wilson, Andy Butler, Sue Davies, Cath and Ian Fletcher, James Halsey, Stephen Plummer, Fred Woodworth, Ian Merrifield, Margaret Burnhill, Phil Barden and Dr. Julian Clarke for records used in this account. I would also like to thank the National Trust, the People's Trust for Endangered Species and the Royal Society for the Protection of Birds for allowing access to their estates.

Author: Iain Outlaw, 36 Hungerberry Close, Shanklin, Isle of Wight, PO37 6LX.
zoothera@live.co.uk

Agrotera nemoralis (Iain Outlaw)

Acronicta stigosa (James Halsey)

Synanthedon formicaeformis (Stephen Plummer)

Calophasia lunula (Andy Butler)

Proc. Isle of Wight Nat. Hist. Archaeol. Soc. ***30*** *(pub 2016)*

A denuded cliff-top enclosure and a Neolithic mortuary enclosure on Tennyson Down, Isle of Wight: an assessment of lidar evidence and speculation on a perceived causewayed enclosure and its setting

David Tomalin & David Marshall

This account sets on record current evidence of a hilltop enclosure adjoining the summit of Tennyson Down (SZ.325 853). Positioned on a cliff-edge, at a height of 147m, this ancient structure is set near the westerly tip of Wight, just 3km short of the Needles (fig. 1). When first seen from the air in 1976 it was considered to be a highly eroded and indeterminate earthwork. In 1999, the site was examined by Rebecca Loader and Frank Basford during a coastal archaeological audit commissioned by English Heritage (Loader & Basford 1999).

In September 2012 this low and subtle earthwork was scanned by lidar during a coastal survey commissioned by the Environment Agency. This survey sought current geomorphological data pertinent to the management and protection of the Island's coast; it also revealed further detail of the configuration of this cliff-top enclosure.

In 2014 the geophysical team of the Isle of Wight Natural History and Archaeological Society conducted a preliminary magnetometer and resistivity survey of this site. This was carried out during wet and unpromising conditions. Results were unhelpful and circumstances prevented a prompt return. This report offers a commentary on the imagery and information that has been assembled during and after this date.

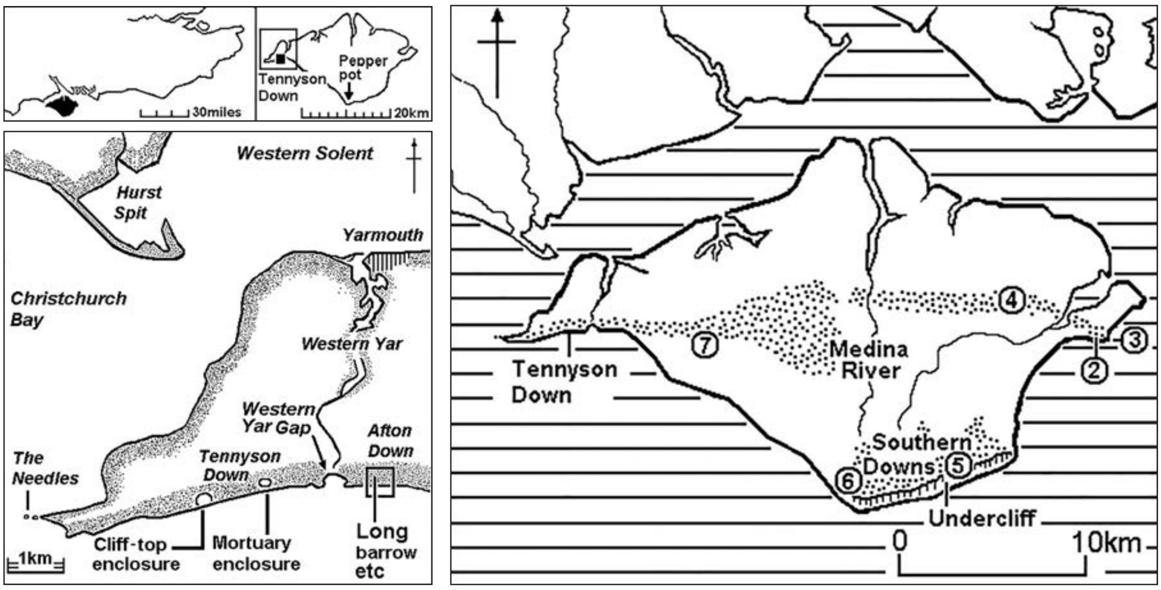


Fig. 1: The location of the Tennyson Down cliff-top enclosure and associated ancient monuments cited in this text. 2- Bembridge Down & Redcliff; 3- Culver Cliff; 4- Ashey Down, Middle West Down & Eaglehead Combe; 5- Lowtherville; 6- St Catherine's Down; 7- Castle Hill. The island's chalk outcrop is stippled.

A univallate earthwork

The Chalk cliffs of Tennyson Down are the highest on the Isle of Wight. A few metres east of their summit, a low denuded rampart bank and a weakly defined outer ditch enclose an area of approximately 1.3 hectares. Where this enclosure is now cut by the cliff, a conjectured restoration of its circuit suggests that it was once, perhaps, an irregular nine-sided polygon enclosing an area of some 1.8 hectares. If, by analogy, we postulate a construction date around the mid-fourth millennium BC, then it seems that the cliff may have advanced some 90m into the conjectured configuration of the monument after first removing any additional marginal chalkland fronting the presumed course of the southern rampart.

Some univallate enclosures of comparable dimensions are to be found on the high chalk downland of West Sussex where those at Bury Hill, Halnaker Hill, Court Hill, and Barkhale offer particularly interesting comparison (Healy *et al*. 2011, 240, 242, 248 & 249). These are all Early Neolithic causewayed enclosures with respective capacities of 1.0, 1.7, 2.0, and 2.8 hectares. All are perched high on chalk downland where they are set at respective heights of 150m, 125m, 180m and 200m OD. Like the enclosure on Tennyson Down, each occupies a prominent position commanding a far-ranging view.

The question of causeways

On the ground at Tennyson Down, only one clear gap can be seen in the ditch and rampart of this cliff-edge monument (fig. 2a, A5). This breach is set in the northwest sector of the circuit where the rampart climbs towards the summit of the hill. A smaller gap or causeway (A 17) may be recognised on the eastern rampart, close to where the bank meets the cliff. Here, a corresponding break in the weakly discernable bank is less certain. This gap opens to a long steady gradient that offers the most convenient approach to the site. Elsewhere, the course of the ditch is difficult to discern, especially where its northern course passes through rough ground disturbed by scrub. On the western rim of the enclosure, the rampart is better preserved and here greater manipulation of the lidar data intimates the presence of at least five more interruptions in the ditch (fig 2b, A1–4 & A6).

Viewed on the ground, most of these breaks in the ditch circuit are weak and ambiguous and show no convincing concordance with any clear break in the rampart. At A7 the break is more substantial and here more positive evidence of a causeway is intimated by what appears to be fragments of upturned chalk bedrock amongst the disturbed scrub. From shadow manipulation of the lidar data, some nineteen potential breaks are suspected in the ditch but, on the ground, many are almost impossible to trace where the relief of the monument is weak and obscured by old scrub. Hopefully, this will be resolved by future geophysical survey.

At the Neolithic enclosures on the West Sussex Chalk, at Court Hill and Halnaker Hill, it is evident that an unbroken length of rampart can sometimes bar an apparent entrance or 'causeway' otherwise offered by a break in the ditch. On Tennyson Down, this possibility still awaits resolution.

On Bury Hill, near Arundel, we find an unusual Neolithic ditched and embanked enclosure that has yet to reveal any causeways (Bedwin 1981; Healy *et al*. 2011, 239–242, fig. 5.23). With an internal area of approximately 1 hectare, this Early Neolithic site offers an interesting comparison with Tennyson Down where the lidar evidence for causeways now requires physical confirmation. This Sussex enclosure displays just a single entrance and no other interruptions in either its ditch or its bank. Like Tennyson Down, the entrance here gives access to the upper portion of the monument. 'Bowl pottery' from the ditch at this site is consistent with an Early Neolithic date. This is supported by four radiocarbon dates that suggest construction during the thirty-seventh or thirty-sixth century BC (Healey *et al*. 2011, 239–242). Despite fifteen small cross sections through the ditch circuit, archaeological investigation has yet to find causeways at Bury Hill.

On the West Sussex Chalk near Singleton, the enclosure at Court Hill shows a further economy in the provision of causeways. Here, the univallate circuit is broken by just six interruptions, spaced at highly irregular intervals. With long lengths of the rampart and ditch left uninterrupted, this monument offers a further comparison with the configuration we currently perceive on Tennyson Down.

The Lidar images at Tennyson Down

The images presented in this account have been kindly provided by the Environment Agency. They have been formulated from point data taken at 1metre intervals and processed as a standard slope profile. The features described here are all identified in figures 2a/b & 3 (A-H).

In figure 2a, the lidar image shows a large irregular sub-circular configuration some 170 metres in diameter (feature A). It is estimated that some 28% of the southern section of the enclosure may have been lost to cliff erosion. Two incipient crevasses, parallel to the cliff edge, show that processes of fissuring and periodic cliff-fall continue (figs. 2a & 3, F1 & F2).

Where an area of scrub and gorse has covered the northern slope of the down, it is pleasing to see that recent clearance by the National Trust has made this area more accessible. In the field, it is possible to perceive some breaks in the bank of this enclosure while others are only apparent on the lidar image (figs. 2 & 3). Some may be the result of sheep and walkers following favoured routes across the down.

Two areas of disturbance on the west side of the enclosure may be associated with construction of the Tennyson monument in 1897 (fig. 2a, D & E). This magnificent granite cross has since become a favoured location for visitors and their picnics. The embanked feature (C), occupied by the cross, may be the site of a beacon shown on the 1863 1st edition 6" Ordnance Survey sheet.

A north-south linear feature within the enclosure (fig. 2a, G1) and another just east of its boundary (G2) are remnants of anti-glider trenches. Constructed during the Second World War, these can be seen as freshly dug chalk on a Luftewaffe photograph of 1942 and an RAF view dated 1945 (IWHER & Google Earth 1945 view).

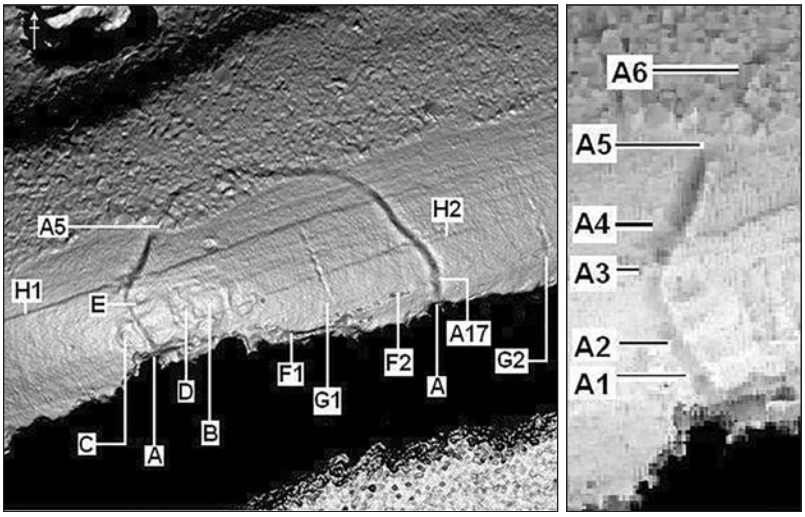


Fig. 2a: Lidar image of the Tennyson Down hill-slope enclosure showing topographical features cited in this text. A- enclosure circuit with perceived entrances A5 & A17; B- inner rectilinear enclosure - for beacon? C- mound occupied by Tennyson monument (former beacon?); D & E- beacon earthworks? F1–2 Fissures marking incipient ground failure; G1–2 anti-glider ditches, WWII; H1–2 lynchets or possible strata ridges following the strike of the Chalk.

Fig. 2b: Manipulated lidar view showing perceptible breaks or causeways in the ditch on the west rim of the enclosure.

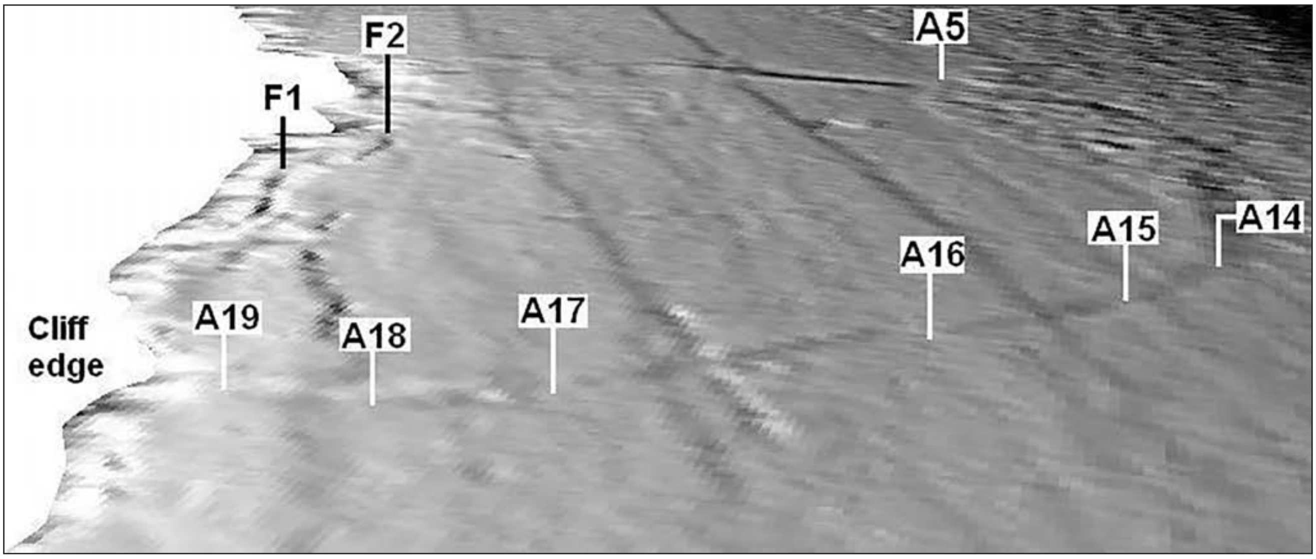


Fig. 3: Oblique lidar view of the Tennyson Down hilltop enclosure from the east, showing the cliff-edge tracked by incipient ground failure fissures (F1 & F2). Perceived interruptions in the ditch include a discernible gap in both bank and the ditch at A5 and A17. Some other perceived gaps in the eastern ditch are also labelled.

Beacon earthworks and their counterpart

Inside the west edge of the enclosure, the lidar image shows a small square feature some 30m wide (fig. 2a, B). This can be compared with a similar square embanked enclosure perched on another chalk hilltop some 18.5 kilometres to the southeast, and set adjacent to the 'Pepper pot' on St Catherine's Down (fig. 1, location 6). Here, on an Elizabethan map, held by Carisbrooke Castle Museum, we find two tall pyramidal wood-stacks, each retained within its own enclosure (fig. 3; Dunning 1951, pl. 2). In fig. 4 we show a clarified version redrawn by Percy Stone in 1891 (Stone (2) 30). A photograph of the original map appears in the 1951 edition of these Proceedings (Dunning *ibid*.).

Where both Tennyson Down and St. Catherine's Down were once capped with Tudor signal beacons, it seems that square embanked fuel enclosures may then have been standardised military installations on these two hilltops (Margham 2015, 36). An estimate made from the aerial photograph suggests the St Catherine's enclosure to have been some 16m square (fig. 4, A). It seems, from the photograph, that the second enclosure depicted in 1566, may now be occupied by the uncompleted eighteenth century lighthouse, commonly known as the 'salt cellar' or 'salt pot' (fig. 4 right, B). Whether the stacked pyramids shown on St Catherine's Down were bonfires ready to be lit is uncertain because contemporary illustrations of Dorset's coastal beacons and the four depicted on John Speed's map of the Isle of Wight (1611) all show a standard laddered mast topped by a brazier.

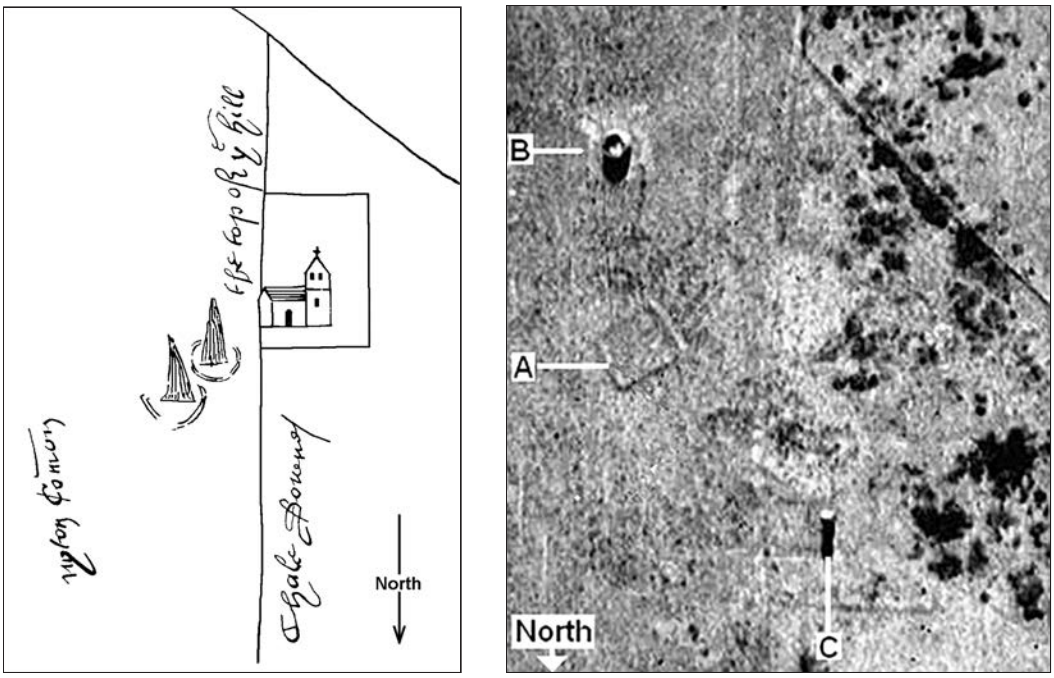


Fig. 4, left: Copy of a manuscript map, of 1566, depicting St Catherine's Oratory and the parish boundary set between Niton Common and Chale Down. Two Elizabethan beacon stacks are set within sub-rectangular enclosures. This arrangement resembles the rectilinear earthwork (B) on the summit of Tennyson Down. (After Percy Stone, 1891, with north to the bottom of the map.) Right: One of the Elizabethan beacon enclosures (A) was still visible on St Catherine's Down in 1947. It has since been lost to ploughing. The second enclosure (B) may now be occupied by the stump of the eighteenth century 'salt pot' lighthouse. The medieval oratory tower, or' Pepper Pot', is sited at C.

The hill-slope siting

While the enclosure on Tennyson Down remains undated, it is interesting to note that its sloped position barely touches the summit. This may be compared with a number of Neolithic causewayed enclosures where the true crown of the hill has remained unenclosed. In the Sussex examples at Bury Hill, Court Hill, Offham Mill and Barkhale it has been the upper hill-slope that has accommodated the enclosure. Where a principal entrance can be recognised in these monuments, it is only at Court Hill that we detect a regard for access to or from the high point. At Tennyson Down we see no major entrance at this particular spot.

In other Sussex examples, where the crown of the hill is truly embraced, we may observe direct axial access across the summit at The Trundle, Combe Hill and Halnaker Hill. On the chalklands of Wessex we encounter a similar twofold division into hilltop and hill-slope settings. From this, we might conclude that these enclosures were either designed in an idiosyncratic manner, or they were placed in their chalkland landscapes with different functions in mind.

Viewed in its local coastal environment, the hill-slope siting we see at Tennyson Down might be compared with that of an undated rectilinear enclosure in the Island parish of Mottistone (fig. 1, 7). The latter occupies the eastern slope of Castle Hill, a Greensand prominence just 200m east of the sub-megalithic long barrow known as the Long Stone. At both enclosures it seems that this position could offer welcome shelter against the unforgiving severities, the Island's predominant southwesterly winds.

In the case of Tennyson Down, it has been inclement aeolian conditions that may have impaired soil development on this high chalk surface, while its stunted short-turf grassland may, perhaps, reflect an ancient habitat that was similarly devoid of woodland cover when the coastal fringe endured exposed conditions during middle Holocene or early Neolithic times.

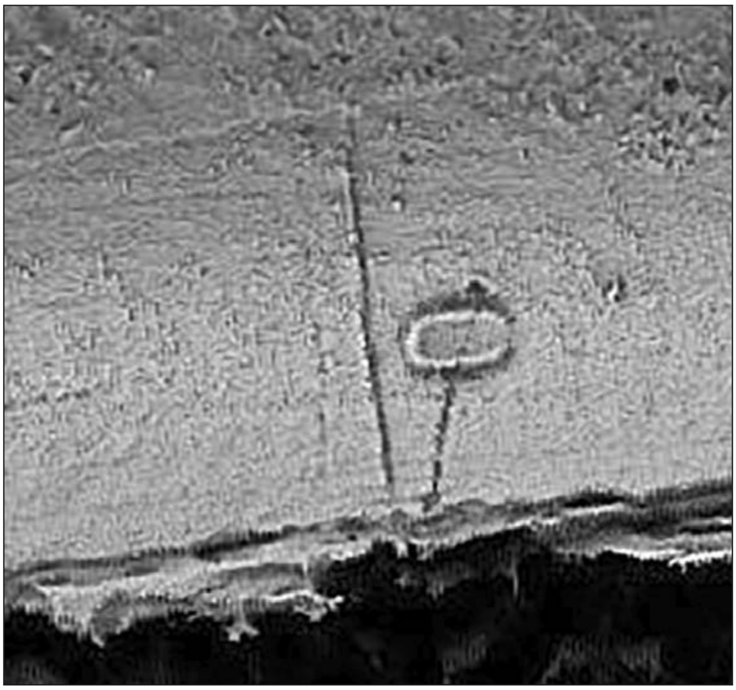
Where the present flora of this high, exposed habitat remains unusual, a close botanical analogue is to be found high on the crest of Beachy Head (Lousley 2012, 74). The past environs of the Tennyson Down enclosure can be seen as a high, waterless, coastal chalkland that might meet few, if any, of the subsistence needs of an early agricultural community. Palaeoecological studies of Neolithic Wight have reconstructed a mosaic of mixed deciduous woodland coupled with some more open glades (Scaife 1980, 1988, 2003). Similarly, across other areas of high chalkland in Wessex (Whittle *et al*. 1993, 228; Allen 2000, 46-7), we see a fertile arboreal environment that Nature might never achieve on the exceptionally wind-buffeted cliff-top we find at Tennyson Down.

The Tennyson Down mortuary enclosure

Since the initial aerial photograph was taken in 1976, the possibility of a causewayed enclosure on Tennyson Down has become something of a beckoning siren. Particularly intriguing has been the presence of a Neolithic mortuary enclosure sited down-slope and some 920m east of the hilltop rampart (SZ 336 855; RCHME 1979 xxxv, fig. 21). The condition of this monument, with its thin turf mantle and its shallow degraded profile, closely resembles the severely denuded topography we see at the cliff-top enclosure. A cross-section through this structure, observed in an old military slit trench of World War II (WW II), reveals that solution and geo-chemical degradation has completely removed the Neolithic soil profile and has since penetrated the bedrock. The course of the slit trench can be clearly seen in figs. 5a & 6.

Where the slit trench cuts the northeast corner of the enclosure, the profile of the ditch is shallow and irregular (fig. 6, section C–D). Here, perhaps, digging may have been desultory where a lesser thickness of rampart was required. This we also see in the chalk-cut mortuary enclosure on Normanton Down where the monument builders opted for short causeways at the corners of their monument (Vatcher 1961, 162, fig 2). In the mortuary enclosure beneath Dorset's 'Wor Barrow' General Pitt-River encountered a similar arrangement. Both of these monuments also included other causeways (Vatcher *ibid*, 167, fig 5). At Tennyson Down, luxuriant plant growth in intermittent segments of the mortuary ditch hint at a further example of causewayed construction (fig. 6).

Where the slit trench cuts through the south ditch, it is evident that the Neolithic workforce had quarried into hard chalk bedrock to create a straight-sided cutting some three metres wide (fig. 6). In chalk-cut ditches of this kind it is common to find that seasonal weathering soon degrades the upper face until successive collapses create a splayed or funnel-shaped profile. In the experimental earthwork on the Wiltshire Chalk, at Overton Down, this process of weathering and natural splaying was well advanced after just four years (Jewell & Dimbleby 1966, 314, fig. 1).



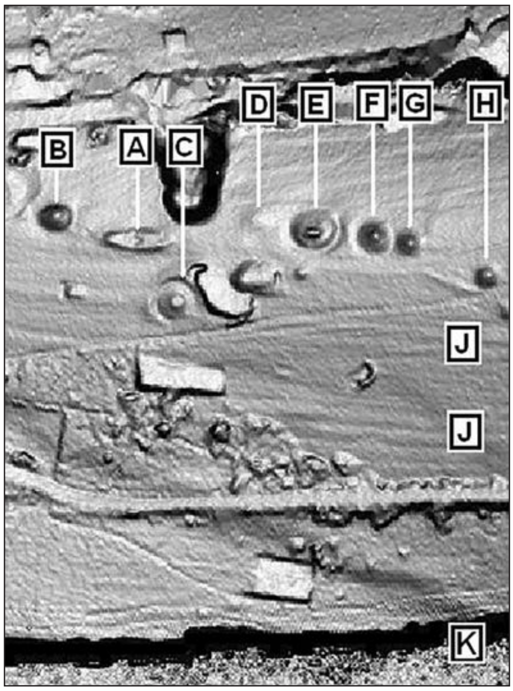


Fig 5a, left: Lidar image of the mortuary enclosure on the east slope of Tennyson Down. The monument has been diagonally cut by a military slit trench. The dark shadow masks the sheer of the chalk cliff.
Fig.5b, right: Surrounded by tee-greens and bunkers, the Afton Down long barrow (A) is attended by an entourage of Early Bronze Age round barrows (B–H). From the hillcrest to the cliff-edge (K), the south face of the down is also scored with historic cultivation strips (J).
(Lidar views by courtesy of the Environment Agency with image manipulation by David Marshall).

At the mortuary enclosure on Tennyson Down we see no trace splaying in the south ditch, and we can only conclude that this is now a severely truncated feature since its upper portion and most of the surrounding downland has been steadily lowered by chemical and thermal degradation. The flat-bottomed remnant of this ditch is now 1.2m below the present grassland surface. The survival of the undisturbed primary fill of the north ditch (context 5) has been responsible for the recovery of fine charcoal particles yielding a radiocarbon assay that suggests a construction date of 2850-2400 *cal.* BC (OXA 3076).

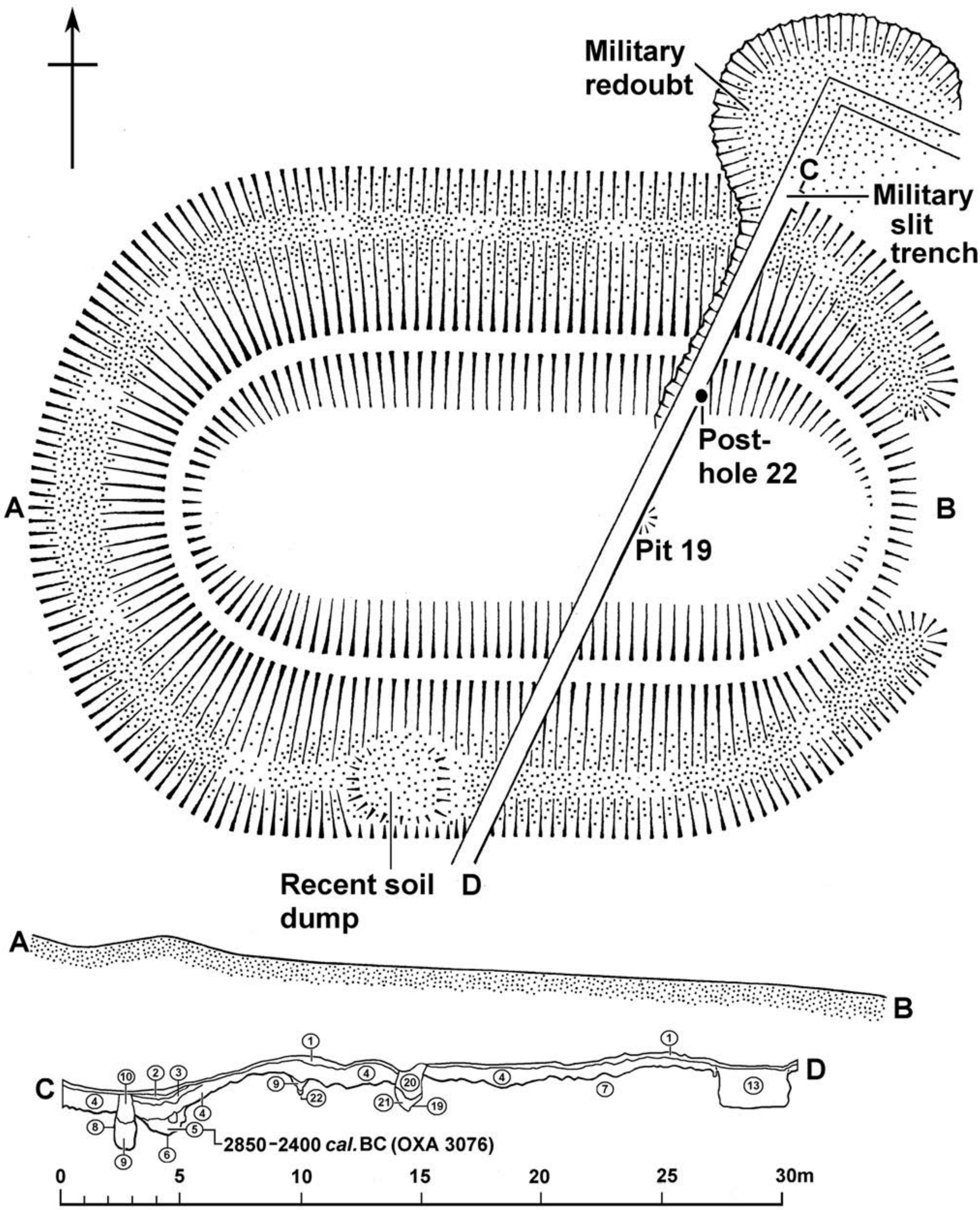


Fig. 6: Plan and section of the Neolithic mortuary enclosure on Tennyson Down, showing the diagonal cut of the WWII military slit trench. The cross-section provided by the slit trench was examined and recorded by Frank Basford in 1989.

Truncation by progressive soil degradation also helps to explain the ephemeral nature of the mortuary bank, in which no convincing trace of up-cast material can be found (fig. 6). Where a horizon of well-compacted angular chalk and flint fragments appears to make up the bank (context 4), the very same material also lines the interior of the enclosure as well as the grassland outside the monument. Here, it seems, we see nothing more than the B-horizon of an impoverished downland soil. It seems that the increased height of this deposit in the body of the bank may represent differential or deferred degradation, an outcome of a long period of earlier insulation during which the true bank could offer a sacrificial and protective blanket. Within the monument, a further feature of note is the apparent presence of a single posthole some 4.7m inside the inner margin of the north ditch. Here perhaps, may be the edge of an inner palisaded enclosure of the kind otherwise seen by Pitt-Rivers after removing the mound of the Wor Barrow (Vatcher *loc. cit*).

Inside the mortuary enclosure, the blanket layer of angular chalk and flint fragments in context 4 suggests that the entire Neolithic land surface has long eroded away. Within the Normanton Down enclosure, the excavator encountered similar archaeological sterility but attributed much of this loss to ploughing rather than natural soil denudation (Vatcher 1962, 162–3).

The proximity of the Tennyson Down mortuary structure to the neighbouring hill-slope enclosure is reminiscent of the Windmill Hill (Horslip) long barrow. This occupies a similar eastern position, just 800m down-slope from Wiltshire's best-known causewayed enclosure (Ashbee & Smith 1960; Smith 1965, xxix, fig. 2). At Hambledon Hill (Dorset) and perhaps at Halnaker Hill (West Sussex), long barrows attend the causewayed enclosures in a similar manner (Whittle *et al.* 2011, 113; fig. 4.2 & 249, fig. 5.30). At the causewayed enclosure at Abingdon, in Oxfordshire, two oval barrows fulfil a comparable role (Whittle *et al.* 2011, 408, fig. 8.3). Beneath one of these, a ditched mortuary enclosure resembles the configuration we see on Tennyson Down (Bradley 1992, 129, fig. 2).

In an overview of Neolithic monumental structures in the Oxford region, Julian Thomas draws attention to an intensity of mortuary enclosures, oval barrows and cursus monuments on the floor of the Upper Thames valley between the riverside villages of North Stoke and Eynsham. (Thomas 2002, 185, fig. 8.1). In this locality there are nine mortuary enclosures within 10km of the Abingdon causewayed enclosure. Here, it seems, both types of monument might stamp an enduring hallmark of territorial identity on this particular landscape.

Round barrows on and adjoining Tennyson Down

Just 300m west of the summit of Tennyson Down, two round barrows mark later prehistoric activity in the vicinity of the hill-slope enclosure. Where a low mound abuts the west rim of the enclosure, an eroded surface has yielded a single sherd of Beaker pottery. It seems that this windswept mound may be a further eroded round barrow. This appears to be appended to the enclosure in much the same way as we see in barrow 649 at the Wiltshire enclosure at Whitesheet Hill (Healey *et al.* in Whittle *ibid.* 2011, 158, fig. 4.23).

Where round barrows attend or occupy other causewayed enclosures, at Windmill Hill, Knap Hill, Robin Hood's Ball, Offham Mill, Combe Hill, Barkhale and Abingdon, we find further analogies with what we may postulate to be the case at Tennyson Down (Whittle *ibid.* 61, fig. 3.2; 98, fig. 3.22; fig. 4.49; 227, fig. 5.12; 248, fig. 5.29; 408, fig. 8.13).

While the time gap between the use of a causewayed enclosure and the eventual construction of Early Bronze Age round barrows may readily exceed a full millennium, it appears that an awareness of the antiquity of these enclosures may well have drawn certain later barrow-builders to these particular locations. It is here that territorial legitimacy might be re-asserted or perhaps disingenuously claimed through a perceived cultural affinity with these archaic enclosures.

Some potential analogies in Neolithic Britain

Since the causewayed enclosure on Windmill Hill near Avebury was recognised in 1923, archaeologists have perceived a common association between these communal monuments and the assembling of Early Neolithic peoples on the chalklands and floodplains of southern Britain. Once aerial reconnaissance of the 1960s had identified both riverine and lowland examples, it soon became apparent that the spatial disposition of these monuments offered perceptible hints of emergent territoriality within Britain's earliest agricultural populations.

At the opening of the twenty-first millennium, the tally of confirmed and potential causewayed enclosures stood at sixty-nine. It was then that an apparent seventieth was proffered in northern Cumbria, where an atypical univallate enclosure was noted at Green How, on Aughertree Fell (Horne *et al*. 2002).

Since these enclosures have been more readily recognised in southern lowland Britain, it is not surprising to find that archaeologists have turned their attentions to locational models and questions concerning intervening distances. It is here that the concepts of 'cultural space' and 'social agency' have fired archaeological speculation (Harding 1998, 206). On the chalklands of Wessex, the concept of early territoriality has been well discussed by Fleming (1971) and Renfrew (1973). In the landscape around Avebury, the positioning of the enclosures at Windmill Hill, Knap Hill and Rybury shows an average spacing of 7km.

Where the spatial arrangement of causewayed enclosures can be observed on chalk terrain in Sussex, we find a minimal spacing as little as 3km between the Trundle and Court Hill. The average spacing in this region is some 9km, a figure not far removed from that of North Wiltshire. On the Dorset chalklands causewayed enclosures appear to be more widely dispersed and here the average spacing is 20km. In all of these cases we must allow that further enclosures may still await discovery.

On the East Kent chalklands the sparse examples recognised at Burham, Eastry and Ramsgate (Chalk Hill) offer an average spacing of 23km but we should note that the latter site lies on the Isle of Thanet where prehistoric communication with the Kent mainland is poorly understood (Bayliss *et al*. 2011, 348-350). Judged by the later geography of the Isle of Thanet, a hinterland for the Chalk Hill enclosure may not have exceeded a distance of 10km or an insular land area of some 9.000 hectares. On Kent's estuarine coast in the mouth of the Thames, the Isle of Sheppey accommodates two causewayed enclosures that are apparently contemporary and are set just 200m apart (Kingsborough 1 and Kingsborough 2; Bayliss *et al*. 2008, 371). Like Chalk Hill, Thanet, these may have served an insular territory of somewhat similar size. Unfortunately, here, too, there is also uncertainty concerning the severance and insularity of this coastal territory in Neolithic times (Allen *et al.,* 2008, 277–8).

From these various regional distributions we might suppose that causewayed enclosures may have been the product of optimal populations in particular areas rather than well-spaced territorial foci arising at regular intervals. Some remarkably close spacings on the floodplains of the Nene and Welland valleys suggest that a burgeoning number of people might, perhaps, produce a new enclosure, no matter how near an existing enclosure might be. On Sheppey, the excavators speculate whether the two adjacent enclosures may have served slightly different purposes while also offering different views or 'viewsheds' over the surrounding landscape (*ibid*, 236 & 278, fig. 17).

Nascent territoriality in early prehistoric Wight: perspective and speculation

On the Isle of Wight, the question of insular cohesion versus factional division, has largely evaded archaeological contemplation; yet in a land area of 38,000 hectares that includes high chalkland, the opportunity for recognising significant early prehistoric territories has ever been present (Tomalin 1980, 16). The recognition of the Tennyson Down enclosure in the extreme west of the Island now invites our attention, for this particularly isolated position could offer little convenient accessibility to most of the island's population.

The presence of a neighbouring Neolithic mortuary enclosure on Tennyson Down lays emphasis on the social significance of human endeavours concentrated in this particular locality. Now that an extensive suite of radiocarbon dates convinces us that the causewayed enclosures of Southern Britain were generally constructed no later than the mid fourth millennium BC, we must recognise that the potential time gap between these two denuded monuments on Tennyson Down could span as much as a millennium.

Just 2.6km east of the summit of Tennyson Down, and set on an opposed downland slope, we find a modest long barrow accompanied by an entourage of Early Bronze Age round barrows (figs. 1 & 5b). All of these funerary monuments occupy the low chalkland foot of Afton Down, at a point where they overlook Freshwater Bay (figs. 1 & 5b). Where barrow-building may be seen as an overt statement of heredity and territoriality, here we glimpse further ongoing prehistoric activity focused on chalkland adjacent to the sea-truncated valley of the Western Yar gap.

Where this long barrow and its attendant round barrows occupy a 'false crest', these monuments are now best viewed from offshore. From this we may conclude that in and around Freshwater Bay, a significant area of Neolithic lowland terrain has since succumbed to extensive coastal recession. From peat and alluvium obtained from the floor of this narrow gap in the chalkland, comes pollen evidence for the former presence of *Tilia* (Lime) woodland in close proximity. Professor Scaife (pers. comm.) emphasises that the source of this pollen was not from lime trees on the valley floor but from closely adjacent woodland set on the well-drained soils of the valley sides.

Tilia woodland was undoubtedly attractive to Neolithic communities. It could offer a propitious environment for woodland-based pastoralism as well as a welcome supply of lime bast fibres (Scaife 1988). When combined with a nearby source of fresh water at the head of Western Yar, it seems that this fertile and lightly wooded landscape might harbour a sufficient local population to prompt the construction of all the early prehistoric monuments we now see on the two chalkland flanks of the Freshwater gap. Dated pollen samples from the Isle of Wight and elsewhere show that little lime woodland survived much beyond the Middle Bronze Age (Scaife 2003, 25), a virtual demise being marked by the decline in *Tilia* pollen at around 1200 BC.

Up-slope, and in a primary context at the mortuary enclosure, the former presence of snails *Pomatias elegans* and *Discus rotundatus* hint that this monument may have been included in a shady or, perhaps, a recently cleared environment (Allen 1992). This mortuary site is, nevertheless, high and windswept, and whether lime woodland had once tolerated this particular position we cannot tell. Unfortunately, the mollusca sample recovered from this ditch fill was too small to produce a well-quantified and more informative result.

Where the distance from Tennyson Down to the Island's eastern chalk cliffs is 31km, there is certainly sufficient space for at least one other focus of human activity within the natural confines of Neolithic Wight. The possibility of a two-fold territorial division of this island into eastern and western communities certainly merits consideration. For such a bipartite territorial model, a natural and appealing boundary might be the central divide offered by the Medina River (fig. 1).

Judged by the concentration of Early Bronze Age round barrows on chalkland around Eaglehead Combe, it is evident that the adjacent hilltops of Ashey Down and Middle West Down have been explicit foci of early prehistoric activity in East Wight (fig. 1, 4). Whether this includes the gathering of early Neolithic communities we cannot say. Where the Island's median chalk cuesta approaches Culver Cliff, the coastline displays a high eastern headland that generally resembles the Island's western extremity (fig. 1, 3).

Overlooking the sea near this location, on the cliff-top at Redcliff, we find a profuse scatter of Neolithic flint tools and debitage and some fragments of 'bowl' pottery and Grooved Ware (fig. 1, 2). In his analyses of land snails, in chalk hillwash near this site, Dr Allen has considered evidence for widespread tree-clearance in this neighbourhood during Neolithic times (Allen 1994, 215-216). Above this chalky colluvial deposit, on the crest of Bembridge Down, we find a hilltop location much akin to the setting of the Tennyson Down enclosure in West Wight. Unfortunately, this is exactly the position, chosen in 1860, for the massive construction of Bembridge fort (fig. 1, 2).

In view of the agricultural attractions of the upland chalk, it appears that an early tripartite territorial division must also be considered in prehistoric Wight. This third component might comprise a distinct community gathered on the Island's 'Southern Downs'. The presence of such an entity has long been intimated in the overall distribution of the Island's round barrows (Tomalin 1980, 20, map 6). Other prompts in this direction come from Neolithic bowl pottery found on St Catherine's Down and from an antiquarian account of a putative Neolithic 'oval barrow' and inhumation uncovered on the brink of the Undercliff at Lowtherville (fig. 1, 5; Whitehead 1911, 25–27). This latter account, however, is tantalisingly imprecise, and the site has been long since destroyed.

Conclusion

Lidar imagery of the enclosure on Tennyson Down offers a new and enticing hint of emergent territoriality within the concise geographic and social insularity of Neolithic Wight. It is a conceptual model that we may pursue elsewhere. In the meantime, we must give full regard to the caveat that here is speculation rather than fact. At best, when considering a Neolithic date for this monument, we might draw some encouragement from the similarity it appears to share with the soil morphology and sub-surface degradation we see in the nearby mortuary enclosure. Further favourable indicators are offered by the neighbouring position of the Afton long barrow and its attendant round barrows. Yet excavations on the chalk cliff-top at Belle Tout, near Beachy Head, remind us that at least one enclosed Beaker settlement has been perched in a similar position (Bradley 1970, fig. 1). An interim assessment of the Tennyson Down enclosure by Historic England has also considered a Late Bronze Age or Iron Age attribution (Bowden, Jamieson, & Winton 2014). Lidar is certainly a powerful means of enhancing our vision of early prehistoric landscapes of this kind, yet without ground-truth, might these dark horses of the Island's prehistory carry us no further than a mare's nest?

Authors: David J. Tomalin, Rookley, Isle of Wight, PO38 3LA.
David Marshall, marshalleverington@talktalk.net.

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Acknowledgements

The examination of the Tennyson Down cliff-top enclosure was carried out in 2015 by kind permission of the National Trust. The geophysics team of our society thank the Trust's Estate Manager, Tony Tutton, for arranging access and vehicular support. We also thank him for his patience with technical difficulties. Investigation of the Tennyson Down mortuary enclosure was carried out on behalf of the National Trust by the Isle of Wight County Archaeological Service in 1989. It was then that the cut of the old military slit trench was examined before being in-filled. We thank Frank Basford and Dr Rebecca Loader for access to and use of the archival record. The radiocarbon date was facilitated by Dr Ian Kinnes of the British Museum. We thank Rob Scaife for his comments on the flora and the palaeoecology of Tennyson Down. We also thank Professor Scaife for sharing his knowledge of significant stratified Lime pollen in his palynological core extracted from the floor of the Western Yar Gap.

BORINGS ANCIENT AND MODERN: REWORKED OYSTERS FROM THE FERRUGINOUS SANDS FORMATION (LOWER CRETACEOUS) OF THE ISLE OF WIGHT

Professor Stephen K. Donovan and James Isted

Abstract

Fossil oysters, probably Aetostreon latissimum *(Lamarck), from the Lower Cretaceous upper Ferruginous Sands Formation of the Isle of Wight, were reworked into the Recent shallow marine environment and collected from the beach at Shanklin Bay. Examination of the suite of invertebrate borings in these shells revealed that there were two infestations separated by over 110 million years, in the Aptian and Recent. Aptian* Gastrochaenolites*? isp. was produced by endolithic bivalves, are partially filled by lithified sandstone and are invariably incomplete. Recent borings include* Gastrochaenolites*? isp. that is not filled by sandstone, uncommon* Caulostrepsis taeniola *Clarke and* Rogerella*? isp. (formed by polychaete annelids and acrothoracian barnacles, respectively), and common* Entobia *isp., produced by boring sponges.*

Introduction

The phylum Mollusca must be considered one of the most successful groups of invertebrates, having diversified in marine, freshwater and terrestrial environments (Scales 2015). Within the wholly aquatic bivalve molluscs, the oysters can be recognised as one of the most important groups. The oysters first appeared in the Triassic or earlier (see, for example, Newell & Boyd 1970; Márquez-Aliaga *et al*. 2005; Hautmann 2006; Checa *et al*. 2006; Malchus 2008), and diversified to become an easily identified group of epifaunal bivalves in marine and marginal marine environments. Oyster shells and their disarticulated valves are commonly robust and may be particularly thickened. This gives them two advantages which have favoured their study as both modern shells and fossils. That is, they have a high preservation potential, and it is likely that they will support a biota of encrusting and, of particular interest to the present study, boring organisms (see, for example, Donovan 2014; Donovan *et al*. 2014). Both of these attributes favour the retention of unusual features in extant and fossil oysters.

The fossil oysters described herein preserve features indicative of both ancient and modern infestations by boring organisms, separated by about 110 million years. Further, borings from each of the two intervals have strongly contrasting dominant ichnotaxa and were the spoor of different invertebrate phyla; they preserve little evidence of cross-cutting relationships (*contra* Donovan & Lewis 2010). Morphological terminology of the oyster shell follows Tebble (1976). All specimens are deposited in the palaeontological collections of the Naturalis Biodiversity Center, Leiden (prefix RGM).

Locality and horizon

The shells described below were collected from the beach at Shanklin Bay, south-east Isle of Wight, by J.I. They are reworked fossils from the Cretaceous strata extensively exposed in this part of the island. Most probably, they are derived from the Lower Greensand Group, upper Ferruginous Sands Formation, either Old Walpen Chine Member, New Walpen Chine Member or members XIV or XV (Alex Peaker, written comm. to J.I., 28 March 2016); Lower Cretaceous, Aptian (White 1921, pp. 26-7; Insole *et al*. 1998, table 1). Alex Peaker has suggested that the oysters may be referred to *Aetostreon latissimum* (Lamarck) (compare Figs. 1, 2 herein with Anon. 1972, pl. 54, fig. 4; Pugaczewska 1975, pls. 7-9).

Description

The more convex, lower valve of an oyster is left; the more flattened, upper valve is right (Barrett & Yonge 1958, p. 155). Ichnospecies, which are biogenic sedimentary structures, are abbreviated to isp. when left in open nomenclature (Bromley 1996, p. 162) rather than the sp. used for true organisms.

RGM 792 291 (Fig. 1C). Conjoined valves (not figured as such) with a second shell cemented to the right valve. Figure 1C shows the second oyster, that is, the inner surface of the attached valve to the right, part of the sandstone infill in the centre and a fragment of the free valve on the left. Both oysters have a medium- to coarse-grained fill of polymict sandstone. This rock is straw to rusty brown in colour, with many well-rounded quartz grains; other grains include rock fragments. Both shells are densely infested by *Entobia* isp.; all chambers are clean of any sedimentary fill and open. Part of the left valve of the (unfigured) shell lacks borings at the umbonal end, suggesting that this was resting on or in the sediment surface at the time of boring, that is, the specimen was not being rolled around on the seafloor. The lower (unfigured) oyster is the more complete.

RGM 792 292 (Figs 1A, B, D, 2A-C). An articulated shell infilled with similar sandstone to RGM 792 291. Both valves are densely infested by clean *Entobia* isp., particularly the right valve (compare Figs 1A, B, 2C). The left valve (Fig. 1B) also has at least two well-preserved *Caulostrepsis taeniola* Clarke, 1908, borings and four *Gastrochaenolites*? isp. Three of the *Gastrochaenolites*? isp. have partial to full infills of sandstone and are thus ancient; the largest also retains part of a poorly preserved bivalve shell, possibly the producing organism (Fig. 2A). The fourth *Gastrochaenolites*? isp. preserves just a thin veneer of sandstone to which is cemented a Recent Y-shaped tube that may be a bryozoan (Fig. 2B). The *C. taeniola* are clean of any sedimentary fill.

RGM 792 293 (Fig. 2D). Single left valve infilled by sandstone and densely infested by *Entobia* isp. One structure (Fig. 2D) is most probably part of the neck of *Gastrochaenolites*? isp. (All borings assigned to *Gastrochaenolites*? isp. herein are very incomplete, hence the doubt expressed in ichnogeneric assignment.) This cuts through the sandstone infill and is thus Recent; there is no remnant of sandstone infill or coating. (It also suggests that the cement of the sandstone is at least partly calcareous.) The valve in the side of the neck is perforated by *Entobia* isp.; these perforations all appear to be intercameral canals and the development of the common chambers, seen elsewhere on this specimen, do not occur here. Thus, it must be assumed that the *Gastrochaenolites*? isp. post-dates *Entobia* isp.

RGM 792 294 (Fig. 2G). A fragment of a single indeterminate (right?) valve with the inner surface concealed by sandstone. The outer surface preserves a mix of borings. *Entobia* isp. is indicated by both apertures and exposed chambers, but the system is not as well exposed as RGM 792 291 – 792 293. Borings with circular to irregularly-shaped transverse sections are *Gastrochaenolites*? isp., filled with sandstone or with at least a surface veneer, indicating that they are ancient. Slot-like borings could be oblique sections through *Gastrochaenolites*? isp., *C. taeniola* or *Rogerella*? isp. (commonly produced by acrothoracian barnacles; Bromley 2004, p. 464) or a mix of all three (Fig. 2G); a sandstone fill to at least some of these indicates that these, at least, are ancient.

RGM 792 295 (Fig. 2E, F). An incomplete left(?) valve infilled with sandstone which has a limonite coating in places. It is rich in Recent *Entobia* isp. and uncommon *Caulostrepsis taeniola* Clarke (Fig. 2E, F).

Discussion

Determining the sequence in which structures were formed on or in a fossil or other geological object or assemblage is an important part of determining its history. Trace fossils provide unique data on palaeoecology and can be related to single times of occurrence. The Aptian oysters discussed herein are unusual in preserving evidence of infestations by boring organisms at two distinct times, separated by *c.*110 million years. The ancient borings all belong to Aptian *Gastrochaenolites*? isp., a boring most commonly generated by endolithic bivalves (Bromley 2004, p. 462). In these Aptian shells and valves the borings are infilled by sandstone that is identical in lithology to that filling the shells. This is firm evidence that the borings were made prior to final interment and lithification.

However, the precise time of boring is problematic. The borings appear angled to sub-parallel to the surfaces of the valves, yet *Gastrochaenolites sensu stricto* commonly (but not invariably) penetrates a substrate perpendicular to sub-perpendicular to the surface (for example, see most of the examples illustrated by Kelly & Bromley 1984). It must be concluded that the Aptian oysters, perhaps stacked and cemented together (evidence of RGM 792 291), were bored by endolithic bivalves, producing *Gastrochaenolites*? isp., which were subsequently infilled by sandstone and lithified. Subsequently, the borings lost much of the substrate around them so that they appear as elongate slots filled by sandstone rather than clavate (club-shaped).

Few such borings lack even a veneer of sandstone (RGM 792 293, possibly 792 294). The specimen in RGM 792 293 cross-cuts the lithified sandstone and thus is Recent, not Aptian. It is the only certain Recent *Gastrochaenolites*? isp. in a suite of modern traces dominated by the spoor of sponges.

In contrast, other ichnotaxa are entirely clean of any cemented sandstone fill and must be considered modern, that is, the common *Entobia* isp., uncommon *Caulostrepsis taeniola* and unconfirmed *Rogerella*? isp. in one valve only (RGM 792 294). These are most commonly the spoor of boring sponges, polychaete annelid worms and acrothoracian barnacles, respectively (Bromley 2004). All of these ichnogenera range back to the Mesozoic and before, so their absence from the Aptian borings is only explicable by their producers being absent from the environment of deposition.

In conclusion, a small collection of reworked fossil Aptian oysters, probably *Aetostreon latissimum* (Lamarck), collected from the foreshore of Shanklin Bay, Isle of Wight, are unusual in containing trace fossils made at two different time intervals. Ancient Aptian borings are limited to a few poorly preserved *Gastrochaenolites*? isp., produced by endolithic bivalves. The modern borings include one certain *Gastrochaenolites*? isp., relatively few *Caulostrepsis taeniola* Clarke (produced by polychaete annelid worms) and *Rogerella*? isp., and abundant *Entobia* (produced by boring sponges).

Acknowledgements

My partner, Karen Robinson, and my children, Hannah and Pelham, are thanked for indulging my fascination with borings and borers while we were on holiday on the Isle of Wight in the summer of 2014. Mr Alex Peaker of the Dinosaur Isle Museum, Sandown, is thanked for his comments on the provenance of these oysters.

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Authors: Professor Stephen K. Donovan, Taxonomy and Systematics Group, Naturalis Biodiversity Center, Darwinweg 2, 2333 CR Leiden, The Netherlands.
Steve.Donovan@naturalis.nl
Mr. James Isted, Jurassic Jim, 22 High Street, Shanklin, Isle of Wight, PO37 6JY, UK.
mail@jurassicjim.com

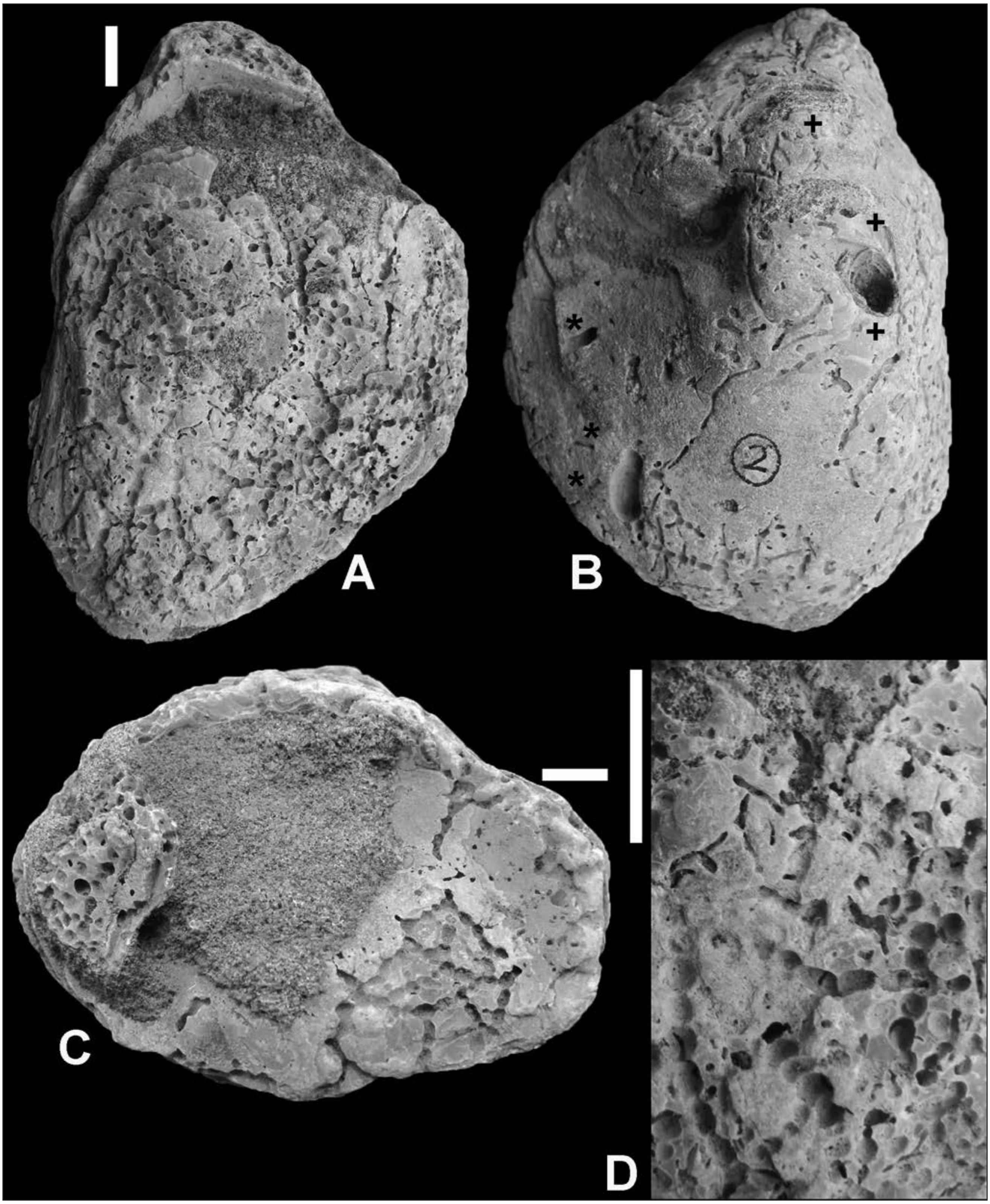

Figure 1. Bored oysters *Aetostreon latissimum* (Lamarck) from the Ferruginous Sands Formation (Aptian), Isle of Wight, collected from float. (A, B, D) RGM 792 292, articulated shell. (A) Right (upper) valve and umbo (top) of left valve showing dense infestation of modern sponge borings, *Entobia* isp. (B) Left (lower) valve showing modern *Entobia* isp. near margins (bottom, right and top) and modern *Caulostrepsis taeniola* Clarke, 1908 (*), and Aptian *Gastrochaenolites* isp. cf. *G. turbinatus* Kelly & Bromley, 1984 (+). (D) Detail of sequential chambers of *Entobia* isp. in right valve; umbo towards left. (C) RGM 792 291, inner surface of left (lower) valve and (left) remnant of outer surface of right (upper) valve, both infested with *Entobia* isp. Note both apertures (circular holes) and bead-like sequences of chambers on the right. All scale bars represent 10 mm. Specimens uncoated.

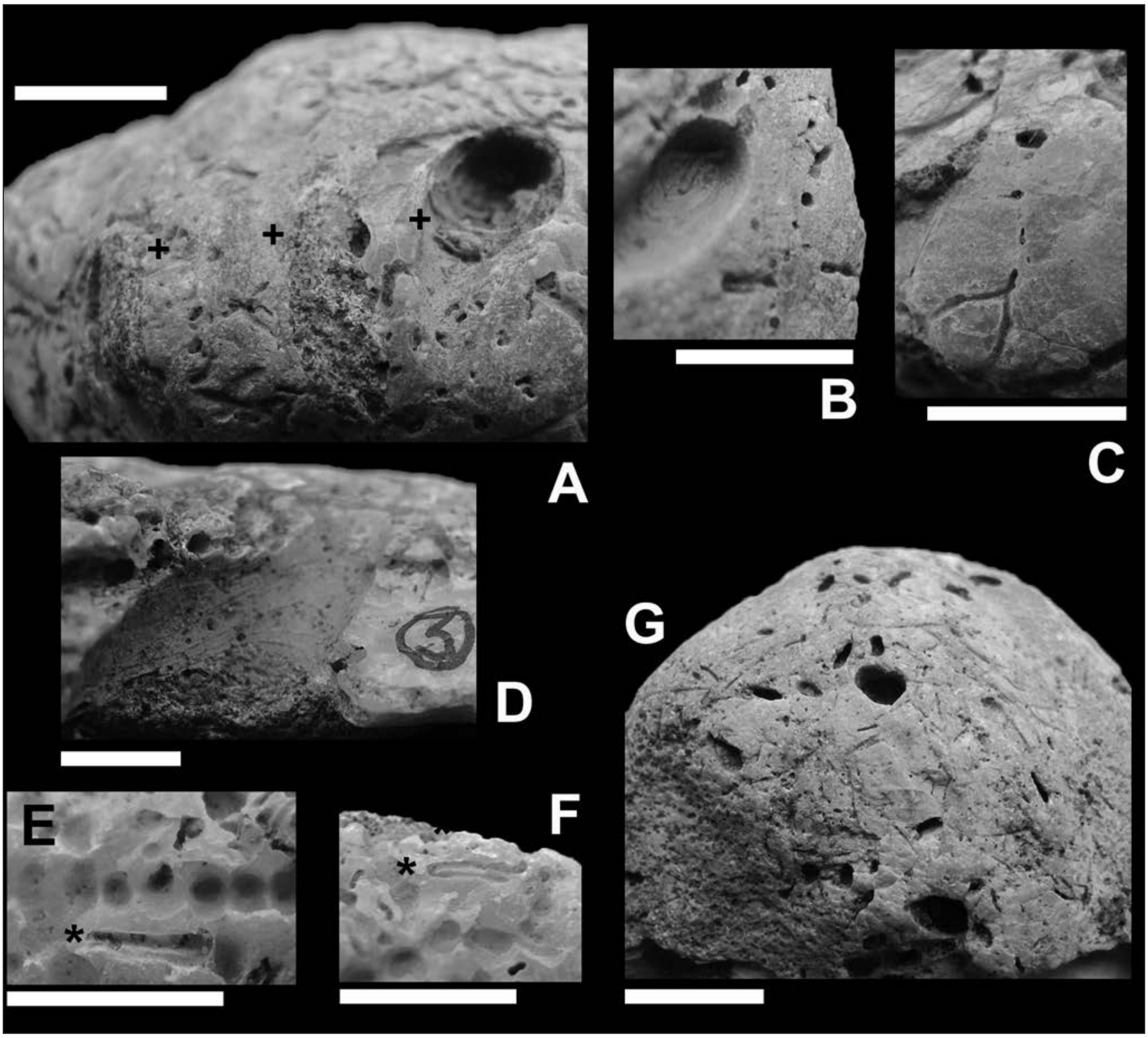

Figure 2. Details of bored oysters *Aetostreon latissimum* (Lamarck) from the Ferruginous Sands Formation (Aptian), Isle of Wight, collected from float. (A-C) RGM 792 292, all left (lower) valve. (A) Three Aptian *Gastrochaenolites* isp. cf. *G. turbinatus* (+), two filled by sandstone (left and centre) and a third only partly infilled by rock, containing poorly preserved bivalve (borer?) and Recent bryozoan colony. (B) Probably Aptian *G.* isp. cf. *G. turbinatus* , lacking sandstone infill, but with a branching bryozoan colony. *Caulostrepsis taeniola* to lower right, other boreholes *Entobia* isp. (C) Bifurcation of early stage intercameral canals of *Entobia* isp. (D) RGM 792 293, left (lower) valve. Incomplete *Gastrochaenolites* isp. without infill, age uncertain. (E, F) RGM 792 295, left (lower) valve, both showing specimens of elongate, U-shaped *Caulostrepsis taeniola* (*) in close association to *Entobia* isp. (E) *Caulostrepsis taeniola* is below *Entobia* isp. (F) *Caulostrepsis taeniola* is above *Entobia* isp. (G) RGM 792 294, fragment of right (upper) valve(?), showing a variety of slot-like to irregularly shaped pits of uncertain identity. All scale bars represent 10 mm. Specimens uncoated.

A SHORT NOTE ON CLAWS

Stephen Hutt

This is a description of two theropod claws; exceptional finds made by individual collectors from the Wealden-age exposures of the south-west coast. Of all the thousands of fossil dinosaur bones collected from the cliffs and beaches of the Isle of Wight, those belonging to members of the carnivorous Theropoda are among the rarest and most sought after. A Victorian appellation, the suborder Theropoda (thero-beast, pod-foot) is Greek, the language of choice for many dinosaur names. There were lots of species of theropod dinosaurs and they evolved into many shapes and sizes, from tyrannosaurs 12 metres long, to little ones as small as garden birds.

Description

Claw A. Properly termed an ungual phalanx; this fossil was found by Steve Burbridge on Chilton beach. It is incomplete, missing much of the distal half (pointed end), and sadly worn from having been trawled along the beach for an unknown time. I have attempted a reconstruction (fig. 1), but this is no more than a suggestion as to how it may have appeared.

The remaining proximal half is still an attractive fossil and, although wear has reduced it to an almost rectangular shape, both parts of the dorsal and ventral borders reveal the beginnings of the powerful curve of the claw. The high lateral faces of the claw are almost flat, with the exception that both have a single, shallow curving groove for fixing the nail. The proximal edge has a shallow, concave articulating facet for the reception of the penultimate phalanx. Beneath the facet, and forming the beginning of the ventral border, is a bulbous swelling, the flexor tubercle. The flexor tubercle provides the anchor for the flexor muscles which pass underneath, uniting each phalanx of the digit, then passing into the palm and onto the wrist. Part of the functions of the flexor muscles is to pull the digit back and down to form a grip.

The claw is narrow at 33mm, about half of its most proximal height of 61mm. Its greatest proximal to distal length is 63mm. Breaks show the interior to be solid.

Claw B. This claw was found by J. Hill and K. Micklewright. They have kindly donated it to Dinosaur Isle Museum and it forms part of the Isle of Wight Council Museum Services Collection (IWCMS 2002.235). As with A, so with B: found on a beach, this time below Cowlease Chine, incomplete and worn. Much of the proximal portion is preserved, perhaps amounting to almost 2/3 of the complete claw; a reconstruction is attempted (fig. 2).

There are differences from A: although roughly the same size, B is much narrower at 24mm, lacking the bulk of A; the ventral border is angled sharply upwards into a pronounced, hook-like curvature. The nail grooves and the flexor tubercle are well defined. The preserved length along the dorsal border is 85mm.

Both claws are coal black, with minerals of calcite, pyrite and siderite; strongly implying they originate from one or more of the Plant Debris Beds that occur within the Wessex Formation of the Wealden Group (Lower Cretaceous).

Discussion

Are these claws from the hand (manus) or the foot (pes)? Most, if not all, theropods were functionally bipedal, so we might expect some notable differences in the morphology (shape) of the digits of the hand compared to those of the foot? For instance, the bones of the human hand and foot are structurally similar, but their shapes have changed to adapt to the very different stresses caused by holding and gripping, compared with walking and weight-bearing. How does this work in theropods? Let us look at the only well preserved European Wealden-age, theropod skeletons known to date: *Baryonyx walkeri* and *Neovenator salerii.*

Baryonyx, named for its heavy claw and after the finder, William Walker, was a large, 7-8 metres long beast, found in a Surrey clay pit. *Baryonyx's* manual unguals (hand claws) are transversely narrow, with enlarged flexor tubercles – similar to claws A and B (fig. 3). In contrast, the single preserved pedal ungual (foot claw) of *Baryonyx* is flat and broad, with a low lateral profile and no obvious sign of a flexor tubercle. This is the common condition for the feet of most large theropods and therefore unlike claws A and B.

Neovenator, named as 'new hunter' after *salerii* for the owners of the excavation site on the south-west coast of the Island, was about 7 metres long. The forelimbs are not preserved but the hind limbs are, including three claws (fig. 4). These are best described as broad, without any discernible swelling of the flexor tubercle: therefore claws A and B are not from *Neovenator's* feet. Could they belong to the hand of *Neovenator*? Given that we don't have any bones of *Neovenator's* forelimbs, determination may seem an impossible task.

Time for some more comparative osteology: *Allosaurus* (other lizard), from the Lower Jurassic Morrison Formation of North America, was a close relative of *Neovenator*. There are many almost indistinguishable post-cranial skeletal elements shared by both beasts, including limbs, and I presume that their hands were also similar: three functional digits armed with narrow, curved claws with prominent flexor tubercles (fig. 5).

Does the above discussion seem a reasonable argument for claws A and B to belong to a hand similar to *Allosaurus*, and therefore to *Neovenator* or *Baryonyx*? Perhaps: in 1969, John Ostrom, a very alert young palaeontologist, published what was to become a classic monograph of his discovery and research of a very unusual, 3 metres long theropod, from the Lower Cretaceous Cloverly Formation of Montana: *Deinonychus*. There are many singular features of *Deinonychus* (terrible claw) of which the most important for us are the feet, with their highly specialised second digit which was held clear of the ground to prevent wear and tear of the very large, slashing claw. The foot claws are narrow, with enlarged flexor tubercles (fig. 6); characteristics usually applied to hand claws! John Ostrom's conclusions: *Deinonychus* used both hands and its spectacularly flexible feet to attack and dismember prey.

Conclusions

Do claws A and B belong not to hands after all, but to the feet of some large, unrecognised deinonychid? It is possible, especially with discoveries such as Utah's 7 metres long *Utahraptor*. But it's not probable. It is more sensible and therefore scientific, to look to A and B as hand claws of *Neovenator* or *Baryonyx* or an unknown theropod from a similar family.

Acknowledgements

Thanks to Steve Burbridge for access to claw A; to J. Hill and K. Micklewright for donating claw B; to Penny Newbery, Jeremy Lockwood and Alex Peaker for helpful suggestions and to Peter Pusey for allowing access to Dinosaur Isle facilities.

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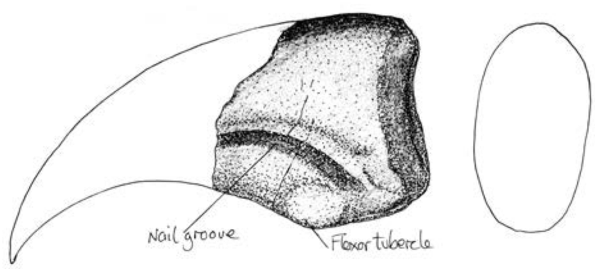

Figure 1. Claw A in left lateral view   Profile

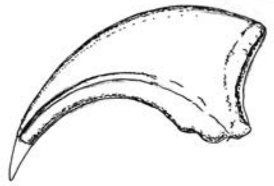

Figure 3. Claw, Baryonyx (hand) in left lateral view (not to size) after Charig + Milner

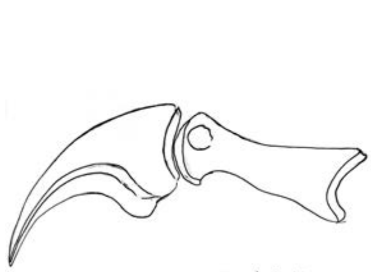

Figure 5. 2nd manual (hand) digit Allosaurus (cast). (not to size)

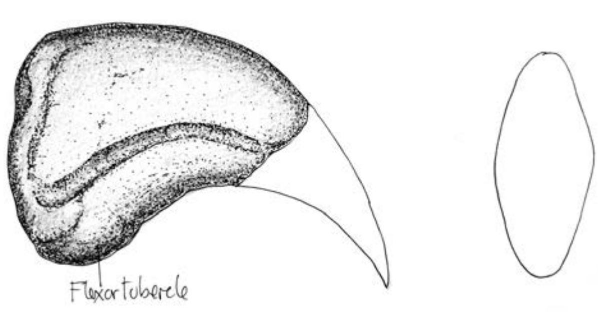

Figure 2. Claw B (IWCMS 2002.235) in right lateral view   Profile

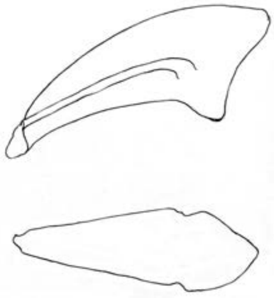

Figure 4 Pedal (foot) claw Neovenator in left lateral view (top) and profile (bottom) (not to size)

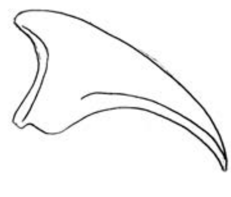

Figure 6. 3rd digit claw (foot) Deinonychus (not to size) After Ostrom

BOOK REVIEW

Trevor Price

Geology of the Isle of Wight: A brief explanation of the Isle of Wight Geological Sheet, by P. M. Hopson and A. R. Farrant. Keyworth, Nottingham: British Geological Survey, 2015. ISBN 0 8527 2772 0.

This 2015 memoir from the British Geological Survey (BGS) is published to accompany the most recent (2013) geological map of the Isle of Wight, which was issued in 2014 as a special sheet. Given how much material is included in the book it is not surprising that the publication of the memoir was delayed: it has obviously taken a considerable effort on the part of its two authors to reach their own conclusions and then assimilate material from other contributors into this colourful volume. The book was produced after an extensive survey by air and on foot, as well as from the use of a number of vehicles which drove across the Island and produced a set of miniature earthquakes by thumping the ground, listening for the returning echoes, and building up a set of cross-sections of the rock layer boundaries and structures below. Archaeological "geo-fizz" may reach a few metres deep but the BGS were looking many kilometres down. The Hi Resolution aerial survey was completed by 2008 with the book being published seven years later. The book is paperback, slightly larger than A5, and has 163 pages, with two colour tables inside the front cover which act as a reference to the stratigraphy.

Contrary to the impression given just by walking over its surface, the underlying sedimentary geology of the Isle of Wight is remarkably diverse and complex. Our sands, muds and limestones were initially deposited in a number of low-lying subsiding basins over millions of years. The basins were formed as the crust pulled apart, the first of these forming south of today's Chalk ridge. Later the southern half of the Island rose as the Island was compressed, and a new basin formed to the north. The story of subsidence, uplift and contortion occurred as the European and African plates and the newly formed Atlantic jostled and squeezed the Island as they fought for supremacy, driven by deep currents of dense rock flowing in the mantle below. Although this action took place deep below the Island, its effects were felt and recorded on the surface.

An understanding of the underlying geology of the Island is important if we are to interpret the natural patterns on its surface. Rocks degrade to form soils, and they also influence slopes and drainage patterns. Plants and insects are dependent on the soil type; thereby larger animals are affected in turn. We build our settlements to allow us to be close to water, and in the best places for our crops to grow, and when we lose our favourite trinket the soil type will determine whether it will be preserved for later generations to find.

The book starts with a short review of previous research into the geological structure of the Isle of Wight, a brief overview of the underlying structure and basins, and a summary of the High Resolution Survey. From there it goes on to describe the major rock units from the buried older rocks to the Cretaceous, Palaeogene, and youngest of all the Quaternary. The last major section then deals with a mixture of chapters on economic geology and resources, ground movement, and geodiversity. Last of all is a short section on the occupation of the Island by humans. A number of references to academic papers, books and reports are included; some will be easier to obtain or access than others if further reading is necessary.

The opportunity has been taken to update some loose ends, and a number of rock units have been renamed for national consistency. The long-awaited naming of the Selborne Group for the Gault Clay and Upper Greensand Formations has now been formalised; and we can say goodbye to the Carstone Formation as it has now been renamed the Monks Bay Sandstone Formation (MBSF) after its research site. This has been done to avoid confusion with the Carstone elsewhere in England, which is of similar age but not linked. I already refer to it as the Em-Bee-Ess-Eff because the Monks Bay… just seems too long to memorise. Look elsewhere in the book and you will find similar alterations. Pencil the old names alongside if you are used to them. The book adds extensively to the 1921 version by Osborne White, and the older Victorian volumes on the geology of the Isle of Wight, but it doesn't replace them.

This book goes a long way towards providing an overview of the Island's geology for the specialist reader. For the lay reader it can be dipped into if you want to learn a lot about one particular area of the Island; that is you start from the map, find the lithology, then look it up in the book. Its comprehensive pictures help identify specific landmarks. It is not a guide to popular walks like the Geologists' Association Guide, but it does provide a great deal more information. While other public guides sometimes favour the exposures seen around the Island's coasts, this book includes a great deal of information on inland geology. For example, much is included on the effects of the major rivers on the landscape and the gravels and terraces they left behind as they evolved. I cannot recollect another modern book that has done this in this level of detail.

The book presents the case that interpretation of the Palaeogene is still not settled, with two alternatives proposed in Figure 24, page 68. That opens the door to an update in the future. The use of high-resolution colour photographs, and colour in tables and diagrams, makes the book easy to use. Having tramped the Island myself taking pictures, I envy the authors this survey; I cannot see anything similar being done for a long while, and the detailed content of the book shows the huge amount of effort they put in.

One of the book's limitations is that it is written to a significant degree as though it is an academic paper with in-text references to published works. While this may be of use to justify an argument or direct the reader to further works, it makes for a difficult read at times if you are not used to it. Fortunately, as the book progresses the amount of references diminish. Perhaps the most important drawback is the lack of an index at the back, or a set of definitions of commonly used terms, and as with the Geologists' Association Guide previously this absence of an index makes it a more difficult book to access the information you want: such as for instance looking up the name 'Brook' then finding where it is mentioned in the book.

Small niggles also exist, and I expect other readers will find their own. In the table on the first pages we see reference to the Anthropocene, an epoch that began when human activity started to have significant global impact on Earth's geology and ecosystems; a term that is not yet universally accepted. References to East and West Wight in the table also place the East on the left, which seems the wrong way around and cumbersome. Given the major unconformity below the MBSF, the base of the Selborne Group still lies above it, and maybe this will change in the future. Inconsistencies over the age of the oldest rock can also be found. For example, the base of the Atherfield Clay Formation (and Lower Greensand Group) is defined as 125 million years on page 21, but on page 140 the oldest rocks on the Island (which lie within the Wessex Formation) are also defined as 125 million years. Ages within the Lower Cretaceous vary based on dates published elsewhere, which highlights the problems of identifying ages consistently within some terrestrially generated sediments.

Will it be a useful book to me? Well, I have just bought my second copy so that I can keep it in my rucksack, write notes on it and generally let it get as dog-eared from use as my G.A. Guide 60 and 1970s geological map of the Island. I will, however, be adding some pages to the back to create my own reference list and it is unlikely to escape being written on. That is the real test of a book, and I recommend it as a purchase if you want to learn more about the fascinating world beneath our feet. However, buy the map as well – you may be able to get the two cheaper if you can purchase them together in one package. Given the colossal effort that went into producing this book, the vast array of detailed information collected by the authors, support team and other contributors, as well as the sheer volume of detail that is contained in it, I don't believe that there is any better guide to the geology of the Isle of Wight available today. Certainly not in a book of this compact size.

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NOTICES OF NEW BOOKS AND ARTICLES REGARDING THE ISLE OF WIGHT

The stream of local publications about the Island shows no sign of abating, and notice is given below of John Medland's important new volume on Domesday Wight. In addition, evidence of the international importance of the Isle of Wight to natural history, archaeology, geology, and related disciplines comes from articles appearing in mainland publications with larger print runs than Wight Studies. The following significant publications for 2015/16 have been identified although the list will necessarily be incomplete. The résumés are intended to signpost members rather than acting as comprehensive summaries. Unless otherwise indicated, abstracts (not necessarily the whole article) are available online.

Discovering Domesday Wight: The Domesday Book entries of the Isle of Wight and their interpretation

Paperback book by J. C. Medland. Newport, IW: Crossprint, 2015. 99 pages.

The Domesday Book of 1086 'is like a flashlight photographic exposure of the landholding, population settlement and economic productivity of England almost a thousand years ago'. The book is arranged in three parts. Part 1 gives the background, including what the Domesday entries mean, the basic geography of the Wight, and its archaeology from the first evidence of occupation by humans to the Norman invasion. Part 2 examines the Domesday entries in detail, combining the relevant manors with place-name evidence and Saxon manorial records. The Island is divided into seven regions broadly based on watersheds, and for each one the author reconstructs, as far as is possible, the settlements, economy and population that existed at the time. The third and final part of the book provides, for the first time in a single volume, the original translated text of the 120 Domesday entries relating specifically to the Isle of Wight. Throughout the volume the author makes no secret of his debt to the work of other Island scholars in this field, especially John Margham, and the bibliography lists no fewer than 15 articles that have appeared in the Society Proceedings, 13 by John Margham and one each by Vicky Basford and David Tomalin.

Celtic Influence on the Isle of Wight Dialect of British English

B.A. thesis by James Rayner, *University of Iceland* February 2015, 25 pages. Thesis available online:
http://skemman.is/is/stream/get/1946/20651/47457/1/James_Rayner_BA_Thesis_Skemman.is_Feb_2015_$00283$0029.pdf

In nineteenth-century dictionaries of the Isle of Wight dialect it was claimed that its basis was "purely Saxon" with only French and Latin being acknowledged as having any influence. This is likely to be related to the prevailing view of Anglo-Saxon history at the time which suggested the Celts were either slaughtered, enslaved or forced to retreat to remoter parts of the British Isles. Recent academic research – both historical and linguistic – has disproved this assumption and the proposal that 'Celtic' influenced the English language has been gaining support. It is with this change of stance in mind that this essay seeks to undermine the denial of Celtic influence by drawing attention to examples found in the dialect of the Isle of Wight. Firstly, the Celticity of the toponyms are highlighted as an encouraging indication of Celtic continuity following the arrival of the Anglo-Saxons. After that, a number of features from the dialect are examined; their link is illustrated with Brittonic Celtic and its successor languages such as Cornish, Welsh and Breton. Where possible the dissimilarity of these features with other potential routes of influence is then brought forward, specifically French, the Germanic languages and their ancestor languages. In some cases historical and ethnographic evidence is also used to increase the credibility of the claims. In this way the Isle of Wight dialect is shown to contain a number of lexical items with Celtic etymologies as well as calques of Celtic words, and may show signs of Celtic influence on the grammar as well. The conclusion is then drawn that the claim of Saxon purity and only French and Latin influence is unfounded. (Original abstract – amended)

First occurrence of the pterosaur *Coloborhynchus* (Pterosauria, Ornithocheiridae) from the Wessex Formation (Lower Cretaceous) of the Isle of Wight, England

Proceedings of the Geologists' Association June 2015, 4 pages. D. M. Martill.

A new specimen comprising a fragmentary pterosaur rostrum can be referred to the ornithocheirid genus *Coloborhynchus* sp. on account of its anteriorly directed anterior-most teeth located on an upturned palatal surface. The new specimen from the Early Cretaceous Wessex Formation, Wealden Group of the Isle of Wight, southern England, is the first record of this taxon from the Barremian and the Isle of Wight. (Original abstract)

A critical new ankylosaur specimen from the Wessex Formation of the Isle of Wight
Abstract accepted for the 63rd Symposium of Vertebrate Palaeontology and Comparative Anatomy held in Southampton September 2015. S. Pond, S. Strachan, D. Naish and M. Simpson.
Ankylosaurs (Dinosauria, Ankylosauria) have been known from the Lower Cretaceous English Wealden for over 170 years. A specimen found at Chilton Chine in 1994 'is one of the most complete ankylosaurs ever found in the UK and has the potential to resolve many questions about these dinosaurs'. (Original abstract – amended)

Leprosy in red squirrels on the Isle of Wight and Brownsea Island
Veterinary Record August 2015. V. R. Simpson, J. Hargreaves, H. Butler, and others.
In the light of the discovery of leprosy in red squirrels in Scotland, it was decided to reinvestigate past postmortum specimens and evidence of leprosy was found in three squirrels from the Isle of Wight and one from Brownsea Island. In view of the fact that there are no grey squirrels on the Isle of Wight or Brownsea Island it has been concluded that grey squirrels are implicated in the spread of leprosy as they are for squirrelpox virus.

Coastal flood analysis and visualisation for a small town (Yarmouth, Isle of Wight)
Ocean & Coastal Management November 2015. M. P. Wadey and others.
This paper describes how inundation modelling was used to engage local stakeholders about climate change and adaptation for Yarmouth, Isle of Wight. This included a participatory visualisation exercise using three extreme sea level scenarios, informed by a recent flood event. Further analysis, informed by the repeated floods during the 2013/14 storm surge season, placed these scenarios in a broader perspective across a range of events. Results indicate that coastal flooding may become a significant issue during this century due to sea-level rise, unless there is adaptation. These methods engaged the interest of the community, and this paper presents practical considerations for future studies. (Original abstract – amended)

Coastal soft cliff invertebrates are reliant upon dynamic coastal processes
Journal of Coastal Conservation December 2015. M. A. Howe.
In respect to the UK, the study concluded that by far the richest sites for soft cliff invertebrates are on the Dorset and Isle of Wight coasts. More sympathetic management of these areas is needed to reconnect sites and their associated invertebrate populations, to reduce a dependence upon the cliff slope and to increase the availability of suitable nesting and foraging habitats. (Original abstract – amended)

Year 1 Report on the Archaeological Excavation at Quarr Abbey, Isle of Wight 2014
Southampton Archaeology Unit Report 1193, 2015 M. F. Garner.
Seven trial trenches were dug as part of a community excavation in September 2014. The work was commissioned by the Quarr Abbey community as part of their 'Two Abbeys Project' funded by the Heritage Lottery Fund. The fieldwork showed that substantial remains of the abbey buildings survive below ground level in the Excavation Field although some of the walls and foundations had been subject to stone-robbing. The work confirmed the presence of abbey remains detected by recent geophysical work but one wall in the area of the infirmary, a low lying part of the site, had not been detected. In addition to the building remains, artefacts and ecofacts provided evidence of medieval and later occupation and activities on the site. Soil samples contained evidence of the environment and diet including fish bones.

Highlights from a season of hoverflies at Newtown
Newtown Harbour National Nature Reserve Report 2014/2015, pp.10-13 & 28-29 Stephen Plummer
Observations commenced in March and were aided by a fallen Goat Sallow that remained rooted and flowering so that species that would have remained aloft were brought to ground level. Walter's Copse was a particularly productive site. Some expected hoverflies were not seen, possibly because dry and warm weather conditions, particularly a hot July, meant that some species were probably on the wing for a very short period of time. 91 hoverflies were recorded over the year.

METEOROLOGICAL REPORT FOR SHANKLIN, ISLE OF WIGHT, FOR 2015

Clive Cooper

Introduction

Shanklin Weather Station was established approximately 65 years ago, although weather diaries are only available from February 1983. The Station is owned by the Isle of Wight Council and is maintained by the Met. Office. The station is situated at The Mead, a park area near Shanklin 'Old Village' towards the outskirts of the town, and is 50 feet above sea level. The station is a simple one consisting of a 5" standard rain gauge and a Stevenson's Screen equipped with four thermometers. Readings and observations are taken once daily at 09.00 GMT. The Campbell Stokes sunshine recorder is located on the roof of Shanklin Theatre, at a height of 180 feet above sea level.

Temperature

The yearly mean temperature was 11.31°C and was 0.38°C above the long-term average. 2015 was 11th warmest year in the 33-year series. Five of the twelve months had positive anomalies. The months with the positive anomalies were December with 5.1°C, November with 2.3°C, January with 0.6°C, April with 0.3°C, and March with 0.2°C. There were seven months with a negative anomaly; September with 1.2°C, July and August with 0.7°C, February with 0.6°C, May with 0.3°C, June with 0.2°C and October with 0.1°C. The winter period December 2014-February 2015 was the 19th warmest since the winter 1983-1984. The spring of 2015 was the 19th mildest in the series. Autumn 2015 was the 11th warmest since 1983. Summer 2015 was the 11th coolest summer in the last 33 years.

The highest temperature of the year, 25.1°C, occurred on 1st July. There was a total of 8 days (the long-term average being 30) when the temperature reached or exceeded 21.1°C *(70°F)*: 1 in April, 1 in June, 1 in July and 5 in August. The lowest maximum daytime temperature, 3.3°C, was recorded on 3rd February. The highest overnight temperature was 17.5°C and was recorded on the 1st July. The lowest overnight minimum temperature was -(minus) 4.1°C, on 23rd January. There were a total of 10 air frosts, defined as a temperature below 0.0°C; 5 in January and 4 in February and 1 in November. The latest frost was recorded on 10th February. The first frost of the autumn/winter was on the 23rd November.

Rainfall

The rainfall for the year 2015 totalled 1032.3mm representing 114% of the long-term average. There were 170 days with measurable rainfall. The nine months with above average rainfall were August with 161.7mm, January with 151.4mm, May with 64.2mm, July with 62.8mm, February with 82.9mm, November with 129.4mm, June with 55.2mm, September with 73.7mm, and December with 117.7mm. This represented 281%, 151%, 128%, 126%, 120%, 115%, 112%, 109%, 109% positive anomalies, respectively. The three months with below average rainfall were April with 24.7mm, October with 67.6mm, and March with 41.0mm. This represents 43%, 56% and 67%, respective negative monthly anomalies.

2015 was the 6th wettest year that I have recorded. The winter (Dec-Feb) started wet, producing 310.5mm of rain – over 10% of what would normally be expected. Spring with 129.8mm was drier than usual, and the 10th driest in the 33-year series. The summer produced 279.7mm of rain and was the 3rd wettest in the series. Autumn, with 270.7mm, was drier than normal and the 13th driest in the series. The month that stands out, August, was the wettest in the 33-year series.

An amount of rainfall reaching or exceeding 25.4mm *(1 inch)* in a 24-hr period ending at 09.00 GMT, occurred on seven days: 7th January with 36.1mm, 12th January 34.9mm, 19th February 27.1mm, 25th July 30.9mm, 25th August 30.5mm, 5th October 27.5mm, 10th December with 27.2mm.

Sunshine

The total sunshine hours for 2015 were 1874.5, which represents 97% of the long-term average. The sunshine for the three summer months June, July and August totalled 720.7 hours. The three spring months totalled 595.4 hours. The sunniest month was June with 290.9 hours representing 116% of its long-term average. During 2015 seven months of the year had above average sunshine hours. The months with the highest sunshine anomalies were September with 213.6 hours – 123%, April with 234.9 hours – 116%, June with 290.9 hours – 116%, March with 155.3 hours – 114%, January with 76.1 hours – 111%, February with 94.7 hours – 107%, and July with 263 hours – 101%. November had 33.5 hours of sunshine which was only 40% of its long term average The other months that did not reach their long term average were December with 32.2 hours – 51%, August with 166.8 hours – 70%, May with 205.2 hours – 85%, and October with 108.3 hours – 88%. The sunniest day of the year occurred on the 7th June when 15.2 hours of sunshine was recorded.

Thunder

Thunder was heard on 8 days in 2015; 1 in January, 1 in June, 3 in July, and 3 in August.

Hail

Hail was recorded on 2 days; 1 in January and 1 in February.

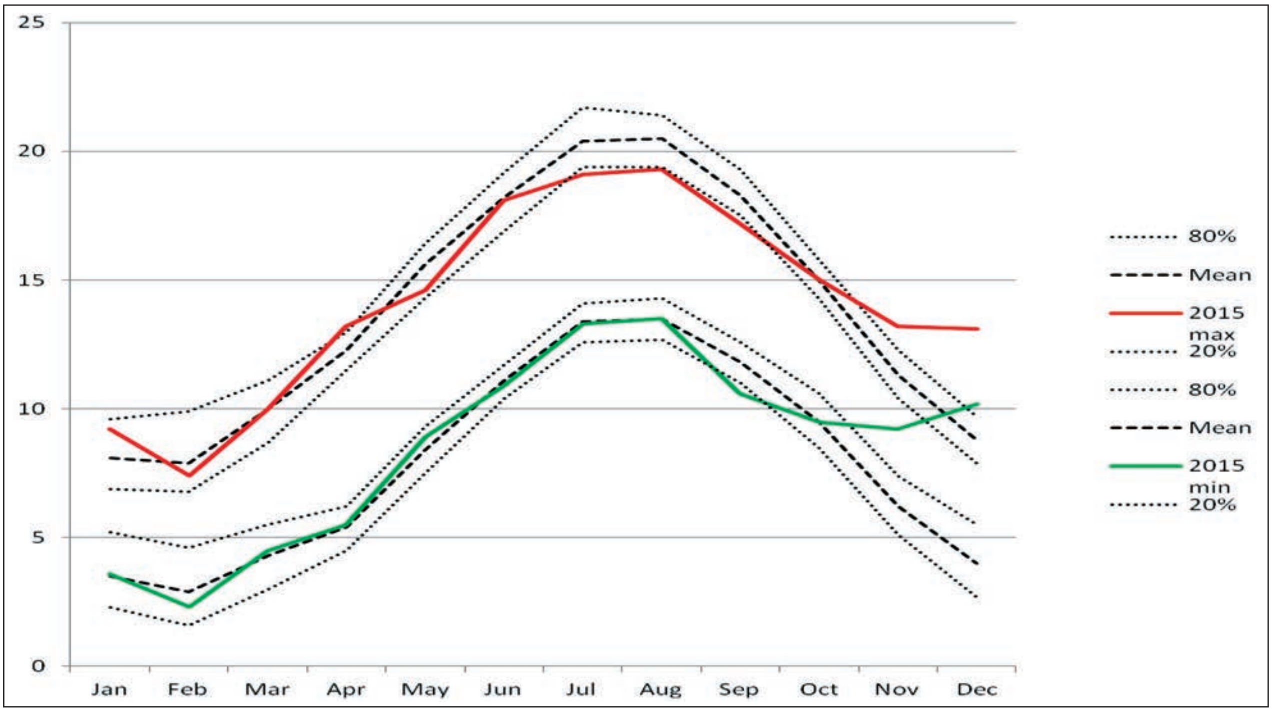
Sleet / Snow

Sleet/Snow was observed at Shanklin on 2 days in February.

Gales

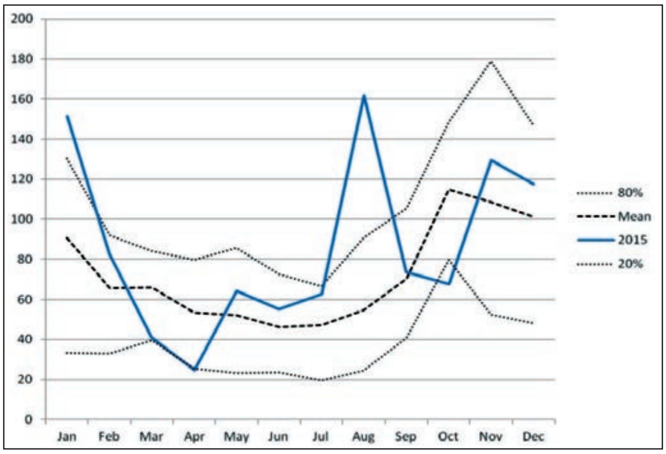
Gales occurred on 22 days during the year; 5 in January, 2 in March, 1 in May, 1 in June, 10 in November, and 3 in December.

Graph of maximum and minimum temperature for 2015 superimposed on Shanklin data for 1981 to 2010

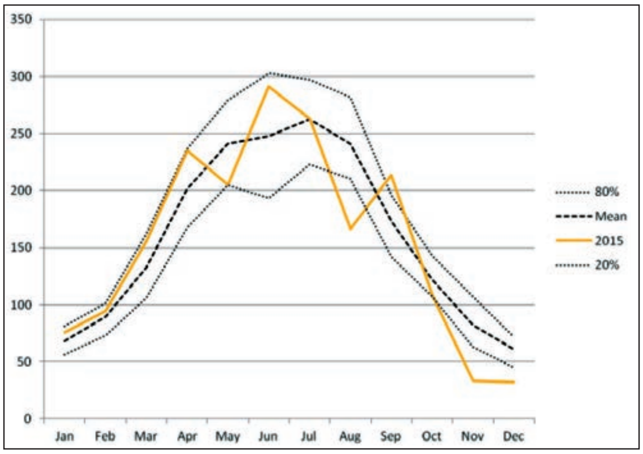


The data for 1981 to 2010 consists of the mean and 80% and 20% percentiles for each of the four variables, maximum and minimum temperature (see above), rainfall and sunshine (see opposite). The 80% and 20% 'tramlines' delineate the central 60% of observations 1981 to 2010. The observations for a year in the subsequent decade might for any month be expected to exceed the 80% tramline one year out of five and fall below the 20% tramline also one year out of five.

Graph of rainfall for 2015
superimposed on Shanklin data for 1981 to 2010



Graph of sunshine for 2015
superimposed on Shanklin data for 1981 to 2010



Monthly weather summary – 2015

Month	Average Temp.	Mean Max.	Mean Min.	Rainfall	Sun Hours
Jan	6.4	9.2	3.6	151.4	76.1
Feb	4.9	7.4	2.3	82.9	94.7
Mar	7.3	10.0	4.5	41.0	155.3
Apr	9.3	13.2	5.5	24.7	234.9
May	11.7	14.6	8.9	64.2	205.2
Jun	14.5	18.1	10.9	55.2	290.9
Jul	16.2	19.1	13.3	62.8	263.0
Aug	16.4	19.3	13.5	161.7	166.8
Sep	13.9	17.2	10.6	73.7	213.6
Oct	12.3	15.0	9.5	67.6	108.3
Nov	11.2	13.2	9.2	129.4	33.5
Dec	11.7	13.1	10.2	117.7	32.2
Yearly Figure:	**11.31**	**14.12**	**8.50**	**1032.3**	**1874.5**

Sunshine recorder on top of Shanklin Theatre.

Picture by Clive Cooper

Adder on 16th December seen in Shide Quarry by IW Green Gym during conservation work.

Picture by Terry Noyce

Author: Clive Cooper, 20 Newport Road, Godshill, Isle of Wight, PO30 3HR.

OBITUARY

LT. CDR. JAMES MILTON CHEVERTON R.N. (Rtd)

15th May 1921 – 3rd June 2015

Born in Shanklin and educated at Sandown Grammar School, Jim, as he was more commonly known, was interested in wildlife, particularly birds, from an early age. On one occasion he fell whilst scaling Culver Cliff searching for herring gull eggs and received multiple broken bones for his troubles.

He entered the Royal Navy as a naval artificer apprentice in 1937, passing out in 1940, and then served in HMS *Intrepid*, which was sunk off Leros in the Aegean Sea in September 1943.

He married his wife Veronica shortly after V.E. Day at St. Patrick's Church, Sandown. They had three sons, Christopher, John and Michael.

Whilst in Rosyth in 1950 he bought a complete set of *The Handbook of British Birds* (Witherby) for £7. This encouraged him to join the BTO in 1954 and started a 61-year association with the Nest Record Scheme, collecting over 4,400 nest records covering 97 species. He joined the IWNHAS in 1960 and in 1967 became the leader of the Ornithological Section.

After compulsory retirement from active service at the age of 50 having become a Lt. Commander, he became a Technical Author for the MOD, working at HMS *Vernon*, Portsmouth, until his retirement in 1983.

Meanwhile from 1965 until 2001, he single-handedly covered Bembridge Harbour and Brading Marshes monthly for the BTO National Wildfowl counts and the Birds of Estuaries Enquiry, later merged to become the Wetland Bird Survey (WeBS). During this period he clocked up over 1300 hours and recorded 95 species. He served as President of the Society from 1978 to 1981, reactivating the concept of Recorders for various species groups with himself serving as Odonata Recorder from 1981 to 2007.

With obvious spare time on his hands he, along with Bill Shepard, wrote in 1987 *Watching Birds in the Isle of Wight*, which was funded by the IWNHAS. Later, in 1989, he wrote *Breeding Birds of the Isle of Wight* which was joint funded by H.W. Morey & Sons Ltd and the Society. He was a wise member of the Society Council for many years and a mentor to generations of birdwatchers.

My first encounter with him was in the spring of 1962 when we were both looking for lapwing nests in the same field at Vittlefields. It was only a few years later that I along with Jim, Bill Shepard and Norman Davis, would spend many enjoyable outings together. In 1969 we confirmed that kittiwakes were breeding at Main Bench for the first time and Jim wrote an article for the Proceedings on the subject.

Later, a new group was formed in 1978 with Jim, Bill and David Biggs, enjoying Sunday mornings together, and upon David's retirement also Wednesdays, which included lunch at the nearest hostelry.

At the time of his death he was the longest serving BTO member on the Island. It was testimony to him that at the age of 94 he was still contributing to the Nest Record Scheme and Garden Bird Watch, where he amassed over 13,000 records from his Shanklin garden.

The phrase 'an officer and a gentleman' is most apt in Jim's case. I never heard him utter a negative remark about anyone. The Society will always be indebted to him for his records, enthusiasm, commitment and dedication and I count it a privilege to have been able to call him a friend.

Jim's wife Veronica died a few months after him in 2016. They are survived by their remaining son, Michael.

Author: David J. Hunnybun

NOTES FOR THE GUIDANCE OF AUTHORS

General: Proceedings are published annually and papers on all topics within the range of interest of the Society are welcomed. Papers should preferably be submitted electronically to the Managing Editor (email address on reverse of front cover). Longer papers should be received by 28th February, and shorter papers and reports by 30th April. Submissions will then be forwarded to the relevant section editor for their review and recommendations. The Managing Editor will make the final decision on publication. Papers are accepted on the understanding that they have not been submitted or published elsewhere, and become the copyright of the Isle of Wight Natural History and Archaeological Society. Papers should not generally exceed 8,000 words in length; longer papers may be published under special circumstances but it is advisable to consult the editor at an early stage.

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For a book or monograph

Pope, C., Snow, L. & Allen, D. 2003 *The Isle of Wight Flora*. Wimborne: Dovecote Press.

For a chapter in a book or monograph

Allen, D. 2003 'A History of Botanical Recording in the Isle of Wight', in Pope, C., Snow, L. & Allen, D. *The Isle of Wight Flora*. Wimborne: Dovecote Press, pp. 36-48.

For a journal paper
Margham, J. 2011 'Place-Names in an Island Landscape: Hills and Valleys part 1', *Proc. Isle of Wight Nat. Hist. Archaeol. Soc.* 25: 16-51.

Editors & Editions
Douglas, D. C. & Greenway, G. W. (eds.) 1981 *English Historical Documents vol. 2.* 2nd edition. London: Eyre Methuen.

Series
Edwards, H. 1988 *The Charters of the Early West Saxon Kingdom.* BAR British Series 198. Oxford.

For an online source
Elith, J. *et al.* 2011 **'**A statistical explanation of MaxEnt for ecologists**',** *Diversity and Distributions* 17: 43-57. [Online.] http://onlinelibrary.wiley.com/doi/10.1111/j.1472-4642.2010.00725.x/pdf

For an unpublished source
Chatters, C. 1984 *The downs and heaths of the Isle of Wight*. Isle of Wight Countryside Heritage Study. Unpublished document.

Citations: within the main body of the paper should usually take the form: author(s), year of publication and page number(s), e.g. (Bingham & Larkum 2014, 56-7). Works with three or more authors should be referred to using the first-named author followed by '*et al.*', e.g. (Pope *et al.* 2003).

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