

XII

William Senior, Mapmaker, in Northumberland

Robin L. Plackett

SUMMARY

William Senior made estate maps for the Earl of Newcastle early in the seventeenth century, and those which relate to Northumberland are considered here. The contents of a representative selection are described, from which the maps can be characterised. They not only show topographical features, name fields, and state areas, but also locate individuals in the villages, who are identified by names, initials, or symbols from astronomy, some of which are repeated on the fields. Since the codes for initials and symbols have been lost, only part of the information thus conveyed can be extracted. A contrast is made with the maps of Robert Norton, drawn to complement Mayson's Survey.

INTRODUCTION

The number of new surveyors in Great Britain and Ireland before 1600 is a very small proportion of those who became active between 1513 and 1850.¹ In Northumberland, the maps for small areas of the county which have survived from the sixteenth century form a somewhat scattered group made for a variety of purposes. Places surveyed include Berwick on Tweed from 1560 to show the fortifications,² Fallowfield c.1583 arising from litigation about mineral rights,³ Rivergreen c.1586 concerning the ownership of former monastic lands,⁴ and Rock 1599 recording a division of the township.⁵ On the Percy estates, 'Clarkson's Survey' of the late sixteenth century (without maps) was followed in the early seventeenth century

by 'Mayson's Survey',⁶ which was accompanied by maps generally drawn a few years after the relevant information had been collected.

Twelve of these maps, or parts of them, are reproduced as black and white copies in the volumes of the *Northumberland County History*. All are reduced from the originals, and lengths on the prints can be as low as 35 per cent of the original values, with a commensurate fall in the size of the lettering. All but one are by Robert Norton, either with his name or in his style.⁷ The exception is Lesbury and Bilton 1624, which differs from the others in the way that names, acreages, and field boundaries are presented.⁸ Norton was a gunner in the royal service, who wrote books on arithmetic and artillery, and was eventually granted appointments in the Tower of London;⁹ the 9th Earl of Northumberland may have met him while imprisoned there.¹⁰ Norton made eleven maps of Percy estates in Sussex and Yorkshire, dating between 1611 and 1625, as well as those relating to Northumberland.

WILLIAM SENIOR

William Senior made maps in 15 English counties during the period 1600–41, and for about 30 years he was employed by members of the Cavendish family.¹¹ His work for the first and second Earls of Devonshire gave rise to an Atlas with 65 maps, and an accompanying book of written surveys.¹² Sir Charles Cavendish of Welbeck Abbey, younger brother of the first Earl, acquired estates in Northumberland through his marriage in 1591 to Katharine Ogle, younger daughter of Cuthbert, seventh and last Lord Ogle. Their son William succeeded in 1617, and was created Earl of

Newcastle in 1628. He commissioned a survey of his estates in 1629 from Senior, who in 1634 termed himself 'Professor of Arithmetique, Geometrie, Astronomie, Navigation, Dialling, and the making of all mathematicall instrumentes'.¹³ The maps for the Earl of Newcastle are arranged in sets by county, and drawn on vellum, some taking a double folio with an occasional over-run on an added flap, others all or part of a single folio.¹⁴ Those which refer to Northumberland are all dated 1632, occupy folios 93 to 123 inclusive, and include two by Senior's companion, Huntingdon Smithson, who in the same year termed himself 'Practitioner of the mathematiques'.¹⁵ Senior's maps are now in private possession and the analysis which follows is based on copies kept in the Department of Manuscripts and Special Collections, Hallward Library, University of Nottingham and in the Northumberland County Record Office.¹⁶

An Appendix to this paper lists the maps, with folio numbers, orientation, and scale. They display a countryside which has in some places survived, and in others changed considerably. An immediate problem is to find the relationship between what they show and what is seen today, after which further questions gradually arise as inspection continues. They have been used to study the environs of Bothal,¹⁷ and in two theses on deserted medieval villages in Northumberland, the first on those between the Tyne and the Wansbeck,¹⁸ the second on those north of the Coquet.¹⁹ The theses supply a complete account of each settlement from medieval to modern times, using a wide range of documentary sources, together with aerial photographs, archaeological evidence, and site inspection. Nine of the twenty maps have been used for evidence concerning early settlements. A selection taken mostly from the remaining eleven is considered here, and has been chosen to represent different aspects of the countryside as seen by the surveyor.

The maps of Northumberland for the Earl of Newcastle (see Fig. 1) relate to the Baronies of Bothal, Ogle, and Hepple.²⁰ There are ten in the Morpeth area, four in the Tyne valley, five

in Coquetdale, and one is unplaced. William Senior appears by name on fifteen, and he is assumed to be the surveyor for the remainder except where Huntingdon Smithson is specifically mentioned. Small estates share the same folio, even when they are 50 km. apart, and lists are given of places 'not platted'. In accordance with standard practice at the time, the edges of each map are labelled with cardinal points of the compass. A scale expressed in terms of a perch of 5½ yards ranges from 16 to 64 perches in an inch. There is nothing which indicates height above sea level. Most buildings are presented in elevation, but a few appear as bird's eye views. Churches are shown with nave, tower, and spire, sometimes with a cross at each end. Fortified buildings are drawn as a group of towers, surmounted by crosses and connected by walls with doorways. Houses in the villages are smaller, and outbuildings without chimneys are taken to be barns or byres. The village layouts form typical medieval patterns, where rows of houses line a single street or enclose a green, and an area of crofts stretches back from the buildings to a common boundary with the open fields beyond.²¹ No strips or furlongs are shown, but areas are stated in units based on an acre, subdivided into 4 roods, each of 40 (squared) perches. High ground is represented by a set of peaks, steeper than the mounds familiar from Armstrong's county map of 1769, while cleughs or ravines are shown as two lines of little hills enclosing a stream. Wooded country appears much as on Ordnance Survey, some labelled 'the skroges', meaning scrub.²² When the area covered by the map would extend beyond the edge of the folio, the overspill is lopped off, and then removed to a convenient blank space, with repeated symbols to indicate where the extra should be tacked on. There are also symbols on the crofts and fields which show where individuals or households lived and worked; typescript notes accompanying the prints in the NRO propose that their extensive use suggests some form of accompanying written survey, about which nothing is currently known. The symbols are those for Sun, Moon, the five planets known from antiquity, and the twelve equal sectors of

the ecliptic, the signs of the zodiac. All were used by both astronomers and astrologers in the seventeenth century, and the Earl of Newcastle would probably have recognised them instantly in an age that was astrologically literate.²³ Several maps each contain many symbols, and offer scope for cryptanalysis, but in most of the Northumberland series symbols are used sparingly, and generally replaced by personal names or initials. Streams, loughs, and bogs are consistently depicted in blue, and the banks of streams in green and yellow. Woods may be green or yellow, with black trees, fields uncoloured, green, or even crimson, crofts blue or yellow, and commons dark green or dark brown. Towers merit a combination of red, blue and yellow, houses have black chimneys and red roofs, village greens and field outlines are red, and roads yellow or brown.

An old map is a scientific instrument which needs to be checked, in contrast to a modern Ordnance Survey map which is reliable. We require the scale, some assurance that it is uniform over the map, and the direction of geographical north. There may be an inscription which reads '40 perches in an inch', but that is an inch on the original map, and what we have at Nottingham and in the NRO is a print reduced by a factor of unknown magnitude. The factor can be estimated by calculating the ratio of corresponding lengths on the original and on the print, for example the dimensions of a full page. According to the accompanying NRO notes, the size of each original folio is 27 x 15½ in., taken as 400 x 685 mm: to the nearest 5 mm. Measurements in mm. on the size of the prints show that lengths are 55% of those on the map for copies in NRO, and 71 per cent for those obtained from Nottingham. Thus 40 perches to an inch on the original map implies a scale on the print of 1:14,400 or 1:11,150 respectively. Uniformity of scale within each map is assessed by comparing distances between features recorded on both old and modern maps, such as watersmeets, field corners, and points on boundaries or streams. Ambiguities in location which arise from the pictorial representation of features on an old map can be partially resolved

by measuring from village centres, cross bases, hilltops, or the doors of conventional buildings. As regards the direction of geographical north, Senior would have used a compass pointing to magnetic north, and a correction is necessary which varies with place and time.²⁴ When all these matters are sorted out, we can judge how well the mapmaker did his job. If his work appears satisfactory, then the print can be used to locate vanished features from those which survive,²⁵ but otherwise the calculations lead to inconsistencies. The objective here is to assess the information on a selection of maps, evaluate the quality of the survey, comment on difficulties arising from the cartography, and compare the work of William Senior with that of Robert Norton.

SEVEN MAPS BY SENIOR: A COMMENTARY

BOTHALL, BLACKCLOSE, NEWMOORE and AULDMOORE

Folios 93 & 94. South at the top. Scale: 40 perches to an inch. NRO transparency only (#15). Print from Nottingham. Pathfinder 524.

Maps by James Dowland in 1785,²⁶ anonymous c.1830,²⁷ and Edmund Bowman in 1837,²⁸ assist interpretation here. Bothal gatehouse is shown with a dovecot nearby, and a mill stands beside 'The river Wanspeth'. Numerous fields named 'Sheep washe' or 'shipwash' enclose a short section of road down to the river, with a couple of houses at the foot, but no bridge. Further downstream, the ravine is more wooded, and the curve of the dene which now descends to Stakeford Bridge defines the western boundary of 'The black close'. The eastern boundary, with 'Ceeton Moore' to the east, is now the dene west of Ashington cemetery. 'Ould moore Towne' is shown with four houses facing another four across a green, the site of which is now traversed by the road past Old Moor between the two corners where the road changes direction. The green extended east from the eastern corner to where the present lane ends. Inhabitants at 'Ould moore' are C, L, P, and S, of whom C has meadow, L and P

share a field equally, and S has 'nienerigs', meadow, pasture, and four closes. 'New-more', with three houses and a barn, a few closes, and a cross, is surrounded by 'New moore common', 'New moor Pasture', 'New moore leies', and 'New moore medowe'. The combination of three houses and a cross suggests that the settlement could have shrunk, but the place survived into the nineteenth century, and evidently stood near the point where now a public footpath leaves the road about 800 m south of New Moor Cottages. Between 'Ould moore Towne' and 'New-more', a series of field boundaries is preserved by the present district boundary. On the east is 'The hirste', consisting of Low Hirst Tower, farm buildings and enclosures.²⁹ The Tower, described in 1832 as 'nothing more than a strong old farmhouse, with a small tower',³⁰ was pulled down in 1908, but survives in photographs³¹ and the name for this part of Ashington.

On the map, the symbol for Sun appears on seven surrounding fields, and nearby is Moon with four closes. 'Essington Towne', with six houses facing five, but no plots, and near the boundary of 'Essington groundes ffree land', has become Ashington Farm. One of the houses is larger than the others and is probably the old mansion-house described in 1832 as 'nearly obliterated'.³² The symbols for Venus and Jupiter are attached to an isolated group of fields in the lower left corner, and the same symbols in the centre foot indicate where the group should be placed. Elsewhere, seven signs of the zodiac identify groups of fields. A few roads are named, for example 'The waie from Tritlington to Bothall', and a few have been modernised. Senior summarised his calculations of area on f.93: 'Thes two Pages contayning Bothall 1966; Blackmoore 402; Newmoore 1316½; Ouldmoore 1060¾; Seaton not platted 59¾; Camas not platted 10; Bigen not platted 6½; Hirst 144; and Gallow close 128. Contayne altogether wth 370 of common the some of 5463 Acurs'.

The following points, shown by both Senior and Ordnance Survey, can be used to check scale and orientation:

(H) Hirst castle (site of) is marked on Pathfinder 524, although the site is now occupied by a petrol station.

(F and G) The points where the western and eastern boundaries of 'The black close' respectively meet the Wansbeck.

(C) The corner of 'New moore leies' which protrudes into 'Ould Moore South ffeild' is the northern end of the district boundary along Potland Burn.

(W) The road end at Sheepwash.

(B) Bothal church.

(T) A small triangular enclosure at the east end of 'ould moore greene'.

There is distortion at the binding of the double folio, so the two folios are best considered separately. Measurements of length round the triangle WBT on f.92, and the quadrilateral HGFC on f.93, imply scales close to the value stated.³³ Calculations on angles show that the top of the map points about 3 degrees east of magnetic north, an error not unlikely with a hand or pocket magnetic compass.

HEBORNE [HEBRON]

Folios 97 & 98. South at the top. Scale: 20 perches to an inch. NRO print #2 and transparency #17. Pathfinders 523 and 524.

On this map, and two of those which follow, William Senior terms himself 'professor of mathematiques', a summary of the description already quoted. Hebron Chapel is depicted conventionally. Five fields are each divided between M: Wilson, Thomas Walker, and Robert Albaine, so that the first always has two thirds of the acreage and the others one sixth each. Moreover, the three men are consistently given the symbols for Aries, Gemini, and Cancer – which Senior always rotates to form 69. Consequently, when these symbols appear on another five fields without personal names, and correspond to acreages in the same proportions as before, the same men are presumably involved. Wilson also has two fields on his own. In addition, further signs of the zodiac indicate the existence of three more fieldworkers. Libra has five fields on his own, while Leo and Virgo

share each of four fields in the ratio of three to one by acreage respectively. Each of the houses in Hebron has a symbol on the croft corresponding to one of the six people concerned, three named and three anonymous.

FFENROTHER with TRITLINGTON & EARSDE COMMONS

Folios 101 & 102. South at the top. Scale: 20 perches to an inch. NRO print #4 and transparency #19. Pathfinder 511.

On the north side of the village street, and reading from east to west, are houses assigned to wid. dawson, rich. tod, w^m spur, john towns [two houses], tho. dobson, and lewis smith. The south side correspondingly has R.T., will^m spur [together], wid. daws., john smith, john tod, tho. dobson, w^m richardson. Neighbours next door or across the street work together. John Smith, Richard Tod, and Widow Dawson share each of 13 fields in equal proportions, and the total for each person is 64 acres. William Spur, John Towns, and John Tod share each of 4 fields in equal proportions, and the total for each person is 36 acres. Lewis Smith, Thomas Dobson, and William Richardson share each of 7 fields in equal proportions, and the total for each person is 40 acres. The arrangement includes all the fields except for a couple of small arable. Fenrother East Common is divided from Tritlington Common by what is now a line of field boundaries between (i) Priests Bridge on the A1, and (ii) Broom Plantation on the approach road to Fenrother from the east

EARSDEN & EARSDEN FFOREST (fig. 1)

Folios 105 & 106. West at the top. Scale: 20 perches to an inch. NRO transparency #21. Print from Nottingham. Pathfinders 501, 511.

'Earsden greene' surrounds what is now the crossing of Earsdon Burn just west of Earsdon West Farm. Two footbridges are marked over the burn. The village lies on the axis of a single street which extends eastwards for 500 m. There are 18 houses, 6 on the north side and 12 on the south. Plots on the north have an average area

of 6 acres, and are labelled 'crofte' or 'garthe', while those on the south average 3 acres, and are labelled 'yard'. These areas are exceptionally large compared with other villages in the series, where the area of a croft is typically half an acre, or so small as to be expressed in perches only. Beside one of the crofts is 'pingle', a paddock. Each of the plots is marked by a symbol. Among the few symbols repeated is Sagittarius, attached to (i) half of 'townend garth', (ii) house, barn and croft, (iii) a small yard. A passage from the street to 'The East feild' has become the public footpath to Earsdon Hill, and a gate gives access to 'The lane being waste', now the road to East Forest. Fields include arable, pasture, and meadow. 'The west fforest' has no trees except along Eshott Burn, and 'The broad forrest and the Holline Hill' is also treeless except for two wooded sections on the north, one of them 'lollers'. 'The lodg' in the middle of 'The broad forrest' has become East Forest, recorded in 1724,³⁴ and built on a site consistent with 'the Holline Hill'. Name, location, and lack of symbol, together suggest that 'The lodg' was once occupied by the keeper of a deer-park.³⁵ Overall Senior has here used 17 out of the 19 symbols at his disposal.

MIDDLETON

Folios 110 & 111. South at the top. No scale. NRO print #8 and transparency #24. Pathfinder 523.

A detached piece of map at the foot of f.110 belongs to the top. 'middleton grene' lies between two converging lines of houses which meet on 'skar burne' [Middleton Burn] at the east end of the village. The lines extend west and upstream from here, thus defining an area which slopes downhill from a ridge to the burn. There are no names, initials, or symbols attached to the houses, each with 'garth', and only a few isolated symbols on the fields. A building on 'middleton grene', appreciably larger than all the little houses around and represented as fortified, was probably the 'Turris de Northmidleton' listed in 1415 and ruinous in 1715.³⁶ Points in common with a

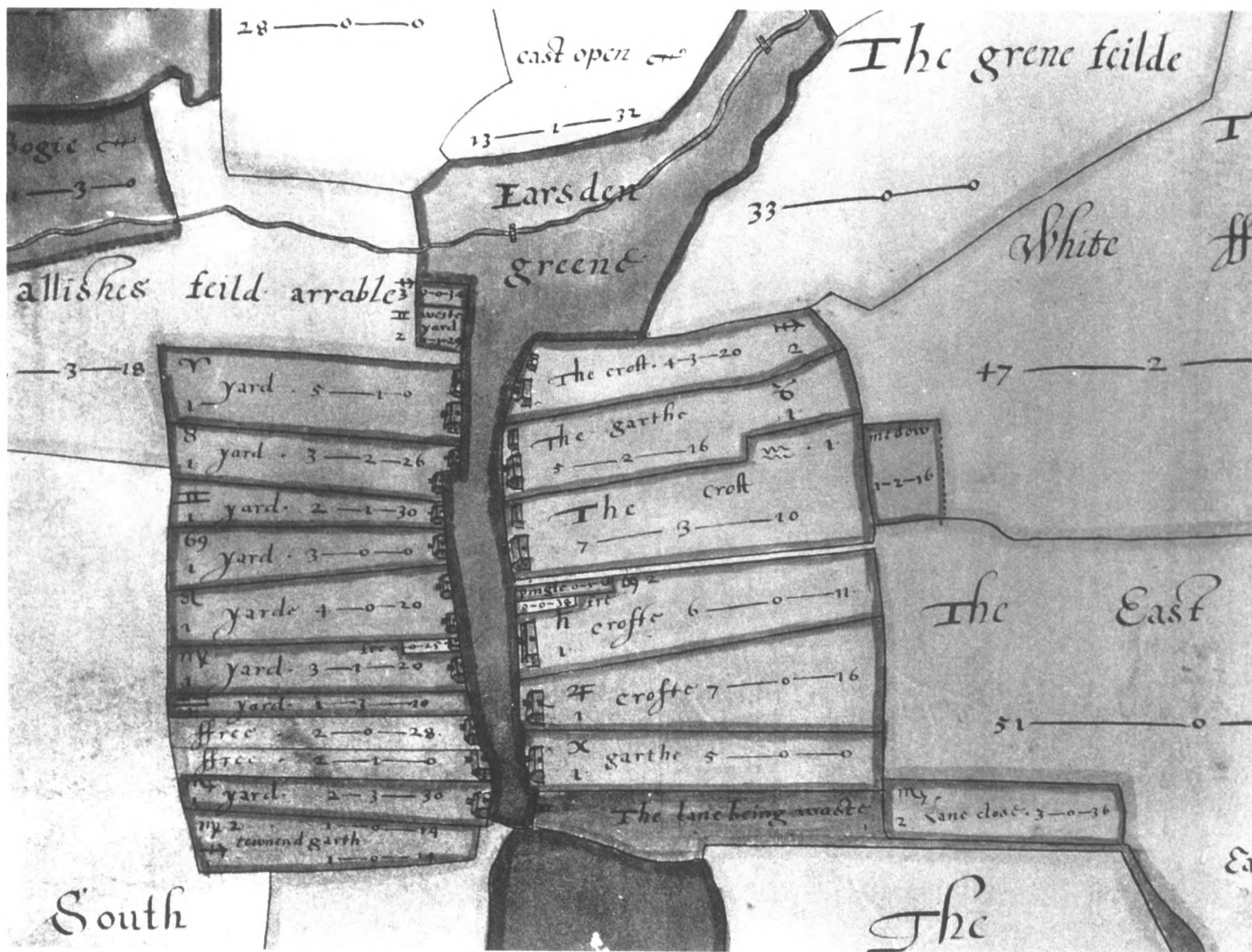


Fig 1. Earsdon village in 1632. West at the top. From folio 105, William Senior's Atlas for William Cavendish, 1st Earl of Newcastle. Private collection.

modern map are: apex of the green; junction of 'skar burne' and 'The river of wanspeth'; 'middleton mill', taken to be an earlier version of the present Mill. The site of the probable Tower on the Ordnance Survey sheet is estimated to be in the middle of the field south of a fork on the approach road from the west. When viewed in 1827, Middleton had been much larger, as many foundations of houses testified.³⁷

HEPPALL, FFLUTTERTON and WHARTON

Folios 116 & 117. North at the top. Scale: 32 perches to an inch. Print only (#11). Pathfinders 499 and 500.

There were medieval villages at Hepple, Flotterton, and Warton.³⁸ Personal names attached to the houses include those of the Snawden clan at Hepple.³⁹ The River Coquet flows right across f.116 (Hepple), and f.117 (Flotterton and Warton), but this ancient name is missing from the map. Pieces of stony ground along the riverbank labelled 'Steane' are assigned to 'Bickering', 'fflotterton', Little Tosson, and Roger Witherington.⁴⁰ These are gravel beds where the river has changed course, comparable with the High and Low Stanners on either side of the Old Bridge at Morpeth. The Tower at Hepple is depicted, but not the one at Great Tosson, which by this time was presumably ruinous. 'Bickering and ffernelow' contains 'Bickering Towne' with seven houses, and 'Fernelow Hill' with three houses together with 'Snawdens Intacke'. 'Bickering' is a mistake for Bickerton, spelt thus from the thirteenth century to the present day. 'Fernelow Hill' can eventually be located through various changes of name: Farniley in 1296,⁴¹ Farmelaye in 1553,⁴² and Farmlawhill in 1663.⁴³ County maps of 1769 and 1828 have a farm at Fairney law, and Sheet 44 of the first six-inch series of Northumberland has a cottage in 1863 at Fernley, on a ridge above Little Tosson, at a point where a field track now turns to descend to a branch of Chesterhope Burn.

Several of the places on this map also appear on the next one to be considered, that of Hepple

Common at half the scale. Thus the ratio of corresponding lengths between Bickering and Great Tosson should be 2, but is in fact 1.5, and the same ratio of 1.5 recurs for lengths between these two places and 'Fernelow Hill'. Neither set of three lengths agrees consistently with Ordnance Survey. This analysis gives advance warning of problems on the next map.

THE COMMON BELONGING to HEPPALL BARONY

Folios 118 & 119. North at the top. Scale: 64 perches to an inch. NRO print #12 and transparency #27. Pathfinders 510 and 511 have been replaced by the East sheet of Outdoor Leisure 42.

The boundary of Hepple Common can be inferred from those of Rothbury Manor, which marched on the east, and Harbottle Manor, which marched on the west and south. Rothbury Manor was defined at the end of the sixteenth century,⁴⁴ and the relevant part of the boundary went:

'... up the said Fallowley Burn to the entry of a little syke called the Caim syke ... and then leaving the same syke so stretcheth in on the east side of the Kayme near Fallowlees ... and so northwards from there to another heap of stones called Ebsterstobb and from thence still on northwarde to a cross at Blakedonhead ... and so fourth the same street, on the west side of Simontside ... to a brooke head called Rowton burne ... and so northwarde down the same Brooke as it runneth between the Newtowne parcel of Rothbury and the town of Tosson to the Milne called the Newtowne Milne, ...'

Harbottle Manor was defined in 1604,⁴⁵ with a boundary:

'... down Cockatt to the Hare Haugh to the foote of Kensopp borne falling into Cockatt ... up Kersop borne to the foot of Darden, and so up Darden to the head thereof from thence to Sliemy Clough Head, and so to the 3 Thorne greene at Fallow borne, ...'

Kensopp borne, or Kersop borne, which Senior names 'Kingip Burne', thus connects the junction of Keenshaw Burn and Grasslees Burn with the Coquet. Sliemy Clough Head perhaps

became 'smithie clough head', an unlikely place for a smithy.

The scale on the print is approximately 1:23040, slightly larger than the Pathfinder sheets. A search for features which occupy the same position now as in 1632 is soon rewarded by 'maine stone on Tosson moore', a huge block of Fell Sandstone near the Ravensheugh crags. A large morass at 'Bodwell Moss' is the source from which the unnamed Darden Burn flows west then north, and the unnamed Chartner Burn flows east then south. Both Darden Lough and Little Lough are named 'mammer mere lough', and the second is the source of the stream in 'smithie clough', then 'Bodwell Burne' and now Smiddy Burn. After a change of name in each case, Chartner Burn and Smiddy Burn meet close to The Comb, depicted on the map as 'Kame Hill'. This is a gravel ridge similar to the 'kaims' east of North Charlton,⁴⁶ and now somewhat quarried away. The line connecting 'maine stone' and 'Kame Hill' has the right length for the scale stated above. An analysis based on lengths measured from these features identifies 'Helliburnehead Kearne' with Coquet Cairn, 'Blackden head pike' with a point between Ousen Sike and Cove Sike where the parish boundary changes direction, and 'Brod meere' with a lough in Selby's Cove.

A plan of Tosson Common for the enclosure of 1806⁴⁷ shows 'Tosson Broad Moss' extending north-west from Coquet Cairn. The name suggests that the mere had then dried out, and the location is further south than Senior seems to indicate. Senior's watersmeets are similarly suspect, because lengths between junctions differ from their modern equivalents, and such distortions mean that there are limits to what can be achieved by trilateration. Several old landmarks are however depicted. A cross named 'Eldin stob', perhaps the same as Ebsterstobb, lay north of Coquet Cairn, roughly where 'Browns Cross' is marked on the enclosure plan. 'Darden cross', among the hills north of Darden Burn, was most likely on Darden Rigg (previously Gunner's Box on Pathfinder 511). This cross is connected by a

mysterious dashed line to 'Brode stone', on the boundary west of 'smithie clough head'. 'Chartner Sheild' was the area south of a curved line through Little Lough, Dubler Knowe and Lamb Cairn, which came under separate ownership shortly before the Common was enclosed. Two black spots named 'Carle quenes', on a green background inside the black outlines of 'Ravens heugh', represent the sandstone pinnacles Kate & Geordy, named thus on the enclosure plan.

DISCUSSION

William Senior made maps for 40 years. During 30 of these he worked for a family with wealth and power, who doubtless chose their employees with care, so that in 1632 he would be one of the foremost surveyors in England. His 18 maps of Northumberland form only a small part of his output of 150. The orientation is stated on sixteen, and has been estimated for the other two. There are nine with South at the top, and the other cardinal points score three each. The scale is given on nine of the maps, and has been estimated for seven of the remainder, those for Brunton Lees and Newhall being indeterminate. Scales range from 16 to 64 perches in an inch, with half at 20 perches in an inch or below. They have been confirmed as accurate in the Morpeth area, less so in Coquetdale, where the high standards achieved further south may have been lowered by the combination of a difficult terrain and a lawless neighbourhood. The large-scale map of Earsdon presents a full description of the village and fields, while those for Hebron and Fenrother in addition locate named individuals, and explain how they combined to work the land. A question posed by this group is why maps on the same scale vary in the information given about personal names: complete at Fenrother, partial at Hebron, and absent at Earsdon. The absence of symbols on the fields at Earsdon is perhaps because they were shared in a complex way, explained in the missing survey.

Middleton has a vanished Tower (as does Newton Hall), and at the smaller scales – but

still large by modern standards – both Bothal &c. and Hepple &c. provide more evidence on deserted settlements. Hepple Common illustrates climatic change, and displays an upland landscape filled with unfamiliar place-names which challenge interpretation (as does Lorbottle). Some deciphering of the astronomical code has been attempted to organise the details, and the results have been carried to the stage where the limitations of cartography become clear. The wide range of colouring suggests a high quality of presentation which can be glimpsed only dimly by viewing transparencies.

Huntingdon Smithson was about 20 years younger than Senior, the practitioner who accompanied the professor. He arranges that the tail section of his map of Morralee lies on top of the main part, for which he supplies a written explanation,⁴⁸ whereas Senior foreshadows the modern style in which detached pieces occupy blank spaces, and a few symbols indicate to the reader how the map is assembled.

Robert Norton made maps for about 20 years. Those for Northumberland complement Mayson's Survey. For example Shilbottle 1624 shows furlongs but working arrangements are explained in the Survey with lists of the acreages for each of fifteen copyholders on the three main fields.⁴⁹ Norton uses versions of the Maltese cross, entire or mutilated, to indicate quality of the soil,⁵⁰ a technique he may have

acquired from his colleague Ralph Treswell at Petworth House.⁵¹ Senior's use of symbols on his maps is wholly original. Despite the absence from most maps of personal names and relevant material, presumed to form the contents of a missing document, William Senior provides much information not available elsewhere about settlements, landscape and people in early 17th-century Northumberland.

ACKNOWLEDGEMENTS

William Senior's Atlas for William Cavendish, 1st Earl of Newcastle, is in a private collection. The owner has kindly agreed to my use of the Hallward Library photograph of the map of Earsden and Earsden fforest on folio 105, which is reproduced here by permission of the University of Nottingham Department of Manuscripts and Special Collections. Helpful information from the Duke of Northumberland on the maps of Robert Norton and Ralph Treswell is appreciated. I am grateful to Constance Fraser, Frank Lowes, and Ruth Wallis for comment and advice. Staff at Newcastle City Library, Northumberland County Record Office, and West Sussex Record Office gave ready assistance. Careful reading by the Editor and referee has improved the presentation. I am responsible for any mistakes or omissions which remain.

APPENDIX

<i>Folios</i>	<i>Title</i>	<i>Top of Map</i> (Estimated)	<i>Scale p/i</i> (Estimated)
93 & 94	Bothall, Blackclose, Newmoore and Auldmoore	South	40
95 & 96	Pegworth, Langhirst and Cockle Park	South	40
97 & 98	Heborne	South	20
99 & 100	Tritlington	South	20
101 & 102	ffenrother with Tritlington & Earsdē commoms	South	20
103 & 104	Fenrother	East	20
105 & 106	EARS DEN & EARS DEN fforest	West	20
107	Part of Shilvington and of Saltwek moore	(East)	(20)
108 & 109	OGLES east part & OGLES west part	South	(32)
110 & 111	Middleton	South	(20)
112	Bearle	South	(16)
113	Newton Hall	South	(16)
114 & 115	Moreley	(North)	(20)
116 & 117	Heppall, fflutterton and Wharton	North	32
118 & 119	The common Belonging to HEPPALL Barony	North	64
120 & 121	Sharperton	West	(20)
121	Brunton Lees	West	NA
122	Lorbottle	East	(40)
123	Hexham	(North)	(20)
123	New-hall	South	NA

NOTES

¹ Sarah Bendall, ed., *Dictionary of Land Surveyors and Local Map-Makers of Great Britain and Ireland, 1530–1850*, 2nd ed., 2 vols (1997), I, Figs. 4 and 5.

² *Maps and Plans in the Public Record Office, I: British Isles, c. 1410–1860* (1967), MPF 300; M. W. Beresford and J. K. S. St Joseph, *Medieval England: An Aerial Survey*, 2nd ed., Cambridge (1979), # 79.

³ M. Beresford, “Fallowfield, Northumberland: An early cartographic representation of a deserted village”, *Medieval Archaeology*, 10 (1966), 164–167.

⁴ *Maps and Plans. . .*, MPB 34; J. Hodgson, *History of Northumberland*, Pt 2, 2, 23.

⁵ *NCH*, 2, 128. Original in Bodleian Library.

⁶ *NCH* gives extracts from the Survey, and those which are accompanied by maps include Tuggal in vol. 1, Long Houghton in vol. 2, Acklington in vol. 5, and Thirston in vol. 7.

⁷ Bendall, *op. cit.*, I, 29; II, #N129.

⁸ This map is a later copy or compilation in the style of Norton, most likely executed by William Barnfather, clerk of works some time after 1819. (Information from the Duke of Northumberland.)

⁹ *DNB*, XIV (1909), 664.

¹⁰ G. R. Batho, “Two newly discovered manuscript maps by Christopher Saxton”, *The Geographical Journal*, 125 (1959), 72.

¹¹ Bendall, *op. cit.*, II, #S140.

¹² D. V. Fowkes and G. R. Potter, eds., *William Senior’s Survey of the Estates of the First and Second*

Earls of Devonshire, c.1600–28, Derbyshire Record Society, 13, (1988). The Introduction contains biographical notes on Senior by P. Eden.

¹³ R. Wallis pointed out to me that 'Dialling' is the art of constructing sundials. 'Dial' meant a hand or pocket magnetic compass. Both meanings seem to be embodied in a later version of the job description which includes the phrase 'as well instrumentall as Gnomonical'.

¹⁴ G. Scurfield and J. M. Scurfield, "To be as a Looking Glass to their Estates: The early 17th century surveys of William Senior", *The Cartographic Journal*, 33 (1996), 149–156.

¹⁵ Huntingdon Smithson was a grandson of Robert Smythson, and brief notes on his career are given by Marc Girouard, *Robert Smythson and the Architecture of the Elizabethan Era* (1966).

¹⁶ The Northumberland County Record Office has coloured transparencies and black-and-white prints filed under NRO 782. Two of the maps lack prints, obtained from Nottingham.

¹⁷ R. Bibby, *Bothal Observed: A survey of a Northumbrian Castle, Village and Church*, Newcastle upon Tyne (1973).

¹⁸ S. Wrathmell, *Deserted and Shrunken Villages in Southern Northumberland from the Twelfth to the Twentieth Centuries*, 2 vols. (1975). Unpublished Ph.D. thesis, University of Wales.

¹⁹ P. J. Dixon, *The Deserted Medieval Villages of North Northumberland: A Settlement History from the Twelfth to the Nineteenth Century*, 2 vols. (1984). Unpublished Ph.D. thesis, University of Wales.

²⁰ H. A. Ogle, *Ogle and Bothal*, Newcastle upon Tyne (1902).

²¹ B. K. Roberts, *The Making of the English Village*, Harlow (1987). Fig. 3.4 sketches Earsdon and Longhirst, which are classified as 'regular row plans' on the basis of maps by William Senior.

²² C. M. Fraser gave me the explanation.

²³ A. Cook, *Edmond Halley*, Oxford (1998), 67, 211, 453; Ann Geneva, *Astrology and the Seventeenth Century Mind*, Manchester (1995), chs. 1, 5; Fowkes and Potter, *op. cit.*, 203 displays a much larger set of symbols used on the later maps and terriers for the Earls of Devonshire.

²⁴ F. J. Lowes referred me to the paper by S. R. C. Malin and Sir Edward Bullard, "The direction of the Earth's magnetic field at London, 1570–1975", *Phil. Trans. R. Soc.*, A299 (1981), 357–423. On this basis, magnetic north was perhaps 2 degrees east of geographical north in Northumberland in 1632. Orientation can be checked by comparing the direction of a line calculated from the grid references with

the angle at which the line intersects the edge of the map.

²⁵ Locations for features not recorded by Ordnance Survey are estimated by trilateration, in which all angles are calculated from grid references or measurements made on the print. The process is approximate when the scale on the print is not uniform, for example near the spine of the atlas, and supplementary information from later maps is then necessary.

²⁶ NRO ZSA 51/5

²⁷ NRO ZHE 64/23.

²⁸ NRO DT 58 M.

²⁹ W. B. Coombs, *A History of the Hirst (Ashington)* (1980). Typescript, NRO 942.82 HIR.

³⁰ J. Hodgson, *op. cit.*, Pt. 2, 2, 192.

³¹ W. Harrison, *Ashington in Old Picture Postcards*, 2nd. ed. Zaltbommel/Netherlands (1985), 10, 11.

³² Hodgson, *op. cit.*, Pt. 2, 2, 168.

³³ WBT measures 790 mm. on the print, and the distance calculated from the Pathfinder sheet is 8920 m., whence the scale is 40.5 p/i. Similar calculations on HGFC imply 41 p/i.

³⁴ NRO ZSA 18/1

³⁵ O. Rackham, *The History of the Countryside* (1995), 126.

³⁶ C. J. Bates, *The Border Holds of Northumberland*, Newcastle upon Tyne (1891), 16; J.C. Hodgson, "Notices of ruined towers, chapels, etc. in Northumberland circa 1715", *AA*³, 13, 8.

³⁷ Hodgson, *op. cit.*, Pt. 2, 1, 304.

³⁸ P. J. Dixon, *op. cit.*, 2, #112, 88, 211.

³⁹ D. D. Dixon, *Upper Coquetdale, Northumberland*, Newcastle upon Tyne (1903), 313 ff.

⁴⁰ Roger Widdrington of Cartington was the likely owner. His life and work are reviewed by W. P. Hedley, *Northumberland Families*, Newcastle upon Tyne (1970), 2, 106–109, and by S. J. Watts with Susan J. Watts, *From Border to Middle Shire: Northumberland 1586–1625*, Leicester (1975), *passim*.

⁴¹ C. M. Fraser, *The Northumberland Lay Subsidy Roll of 1296*, Newcastle upon Tyne (1968), #398.

⁴² W. Nicolson, *Border Laws* (1705), 277.

⁴³ Hodgson, *op. cit.*, Pt. 3, 1, 273.

⁴⁴ *NCH*, 15, 341–342.

⁴⁵ R. P. Sanderson, ed., *Survey of the Debateable and Border Lands adjoining the Realm of Scotland and belonging to the Crown of England, taken A.D. 1604*, Alnwick (1891), 84–85.

⁴⁶ *NCH*, 2, 219.

⁴⁷ NRO QRA 51.

⁴⁸ An area outlined on 'morelee common' bears the legend '-a, b-whereof is to be ioyned to .a.b ynder in greater letters'.

⁴⁹ R. A. Butlin, "Northumberland field systems", *Agricultural History Review*, 12 (1964), 103; R. Newton, *The Northumberland Landscape* (1972), 76–80, connects the landscape of Shilbottle 1624 with the present.

⁵⁰ A. R. H. Baker and R. A. Butlin, *Studies of Field Systems in the British Isles*, Cambridge (1973), ch. 3.

⁵¹ Ralph Treswell's plan of Hazelbury Bryan 1607 with Maltese crosses on the fields is reproduced by J. H. Battey, *Estates and the English Countryside*, (1993). The original is in Syon House (Information from the Duke of Northumberland).