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EAST DURHAM: MINING COLONISATION AND THE
GENESIS OF THE COLLIERY LANDSCAPE, 1770-1851.

ABSTRACT OF PH.D THESIS

The purpose of this thesis is to explore the spatial outcomes of the extension of coal mining onto the concealed coalfield of east Durham in the first half of the nineteenth century. Here, in contrast to the long-established exposed sections of the North Eastern coalfield, mining was developed suddenly consequent upon the first successful sinkings through the Magnesian Limestone at Hetton-le-Hole between 1820 and 1822.

In more detail, the first objective of the work is to reconstruct the agrarian base upon which the colliery landscape was superimposed. The agrarian base is presented as a cadaster composed of patterns of landownership, landholding, settlements, fields and land-use that provided a spatial matrix within which the process of mining colonisation developed. Subsequently, the following three questions are examined: (i) to what extent did the legal relationships between the east Durham landowners and the colliery companies structure the emergent locational pattern of the colliery landscape in terms of the siting of the mines with their associated surface installations, the colliery settlements and the transport lines? (ii) what was the social structure of these rapidly-developed mining communities? (iii) what effect did the sudden creation of large-scale centres of mining employment have upon patterns of labour mobility?

By this means, it is intended to analyse, in terms of a regional case study, the impact of coal mining upon the human geography of east Durham. Because of the nature of these objectives, the work is essentially ideographic rather than nomothetic in concept, empirical rather than theoretical in approach, the overall aim being to present the spatial outcomes of the complex and at times subtle relationships between man, technology and 'resource in this small corner of the Industrial Revolution.

EAST DURHAM. MINING COLONISATION AND THE GENESIS OF THE
COLLIERY LANDSCAPE, 1770-1851.

MICHAEL SILL M.A.

A THESIS PRESENTED TO THE UNIVERSITY OF DURHAM FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY, 1982.

DEPARTMENT OF GEOGRAPHY, UNIVERSITY OF DURHAM

TWO VOLUMES: VOLUME ONE

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List of Abbreviations Used in the Thesis

The following abbreviations have been used in the notes at the end of each chapter and in the bibliography.

D.U.L.	Durham University Library
U.D.D.P.D.	University of Durham Department of Palaeography and Diplomatic
N.E.I.M.M.E.	North of England Institute of Mining and Mechanical Engineers, Neville Street, Newcastle upon Tyne.
N.C.R.O.	Northumberland County Records Office
D.C.R.O.	Durham County Records Office

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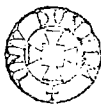
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CHAPTER 1

INTRODUCTION

This is the study of the development of part of the Durham coalfield over a short period of time. The area is the concealed section of the coalfield in east Durham and the time-scale covers the period immediately before, and subsequent to, the first successful sinking for coal through the overlying cover of Magnesian Limestone at Hetton which occurred between 1820 and 1822. The principal focus of the work is an explanatory analysis of the spatial patterns of human activity which resulted from the process of mining colonisation in a formerly rural area. In the study the term "colliery landscape" is used as a convenient portmanteau expression to describe these patterns of human activity. The term embraces both (i) the visual evidence of coal mining, a visible landscape association of surface elements including pit-head installations, associated workshops and offices, railways and mineral lines and housing, and (ii) the society which formed the living communities in the colliery settlements. In order to examine this broad aim more closely, four problems form the detailed objectives of the thesis.

Firstly, it is intended to reconstruct the pre-mining patterns of human activity in east Durham in order to understand the nature of the agrarian base, or rural cadaster, upon which the mining landscape was superimposed after 1820. What were the patterns of landownership and land holding in the area on the eve of mining colonisation? What were the principal uses to which the land was put? Under what systems was farming operated early in the nineteenth century and what impact did the introduction



of coal mining have on the agrarian economy? Through seeking answers to these questions, chiefly by means of an analysis of the Tithe evidence,⁽¹⁾ it is intended to provide a datum base of human activity in chapter 2 from which the changes brought by the introduction of coal mining can be measured . Before examining the impact of the mining colonisation of east Durham in detail in chapters 5, 6 and 7, chapter 3 provides contextual evidence of the geological, technological and market factors which were operative during the early development of the concealed coalfield of east Durham. In addition, the purpose of chapter 4 is to provide an overview of the changing human geography of the concealed coalfield as a basis, in spatial and temporal terms, for the more complex analyses of the spatial outcomes of the extension, of coal mining into the study area, found in the subsequent chapters. Also, it is important to analyse the patterns of landownership at the outset of a work concerned with the spatial outcomes of mining colonisation, as the commercial relationships between landowner and mining interests focussed upon the control by the former, not just of the surface of their estates but also of the concealed mineral wealth beneath their land.⁽²⁾ The second problem issues from the relationships between landowner and colliery company as it is concerned with the identification of those factors which influenced the evolution of the locational pattern of the colliery landscape during the initial period of mining activity. What forces influenced the siting and spacing of the collieries, the alignment of the railways and the location and morphological characteristics of the colliery villages? By the use of contemporaneous colliery company records and cartographic evidence it is intended, in chapter 5, to identify the decision-making processes

that were operative during the early decades of the mining colonisation of the concealed coalfield and to evaluate their influence upon the evolution of the colliery landscape.⁽³⁾

The third problem treated in chapter 6 seeks to answer the question, what was the nature of the communities which had been created with great rapidity in the first few years of the life of the collieries in the area? To be more specific, chapter 6 includes an analysis of household and family structures, demographic and other social characteristics of both mining and rural settlements on the concealed coalfield in 1851, in order to test for significant differences between agrarian and mining communities and also to examine whether the rapid creation of these new industrial settlements had disrupted historic patterns of social structure.⁽⁴⁾ As a fourth objective it is intended in chapter 7 to examine the impact of the extension of coal mining into east Durham upon patterns of migration at both the regional and the national scale. Given that the labour force necessary to run the new collieries could not be obtained from the small local population, where had the workforce originated and what patterns of migration had been stimulated by the development of these new centres of employment? Answers to these questions will be sought from the birthplace entries in the census enumerators' books for 1851 and 1871, whilst the observed migration flows will be discussed within the context of the accepted principles of labour mobility in nineteenth century Britain.

The study area

Throughout the work four terms will apparently be employed interchangeably to describe the area under review, namely, the concealed coalfield, the east Durham plateau, east Durham and the

study area. Whilst the last two represent no more than convenient labels, it must be recognised at the outset, that the boundaries of the study area on the one hand and the concealed coalfield and the east Durham plateau, on the other hand, are not quite coincidental. Firstly, the study area is restricted to the section of the concealed coalfield located to the south of the mouth of the river Wear at Sunderland, although the outcrop of the Magnesian Limestone continues north to the river Tyne (fig. 1.1). Secondly, the western limit of the study area extends a little beyond the actual boundary of the Magnesian Limestone outcrop and therefore includes a small portion of the exposed section of the Durham coalfield in the Wear Valley, where the Coal Measures occur either at the surface or beneath superficial drift deposits. The decision to incorporate this territory, which is neither concealed coalfield, nor east Durham plateau, in the study area, is justified on the grounds that it lies in townships such as Pittington, Sherburn and Coxhoe, which straddled the geological boundary between the Magnesian Limestone and the Coal Measures and in which therefore parts of the concealed coalfield occurred (Fig. 1.1). However, as the collieries in these townships were not sunk through the Magnesian Limestone, the social structure of their colliery settlements and the migrational flows of the labour force are not analysed in detail. In the south, the boundary of the study area includes those parishes and townships in which mines had been sunk by the middle of the nineteenth century and is closely coincidental with the fault system which demarcates the concealed coalfield from the younger Triassic rocks of the lower Tees basin (Fig. 1.1).

Turning to the administrative framework of the study area in

the first half of the nineteenth century, the area lay wholly within Easington Ward but Figure 1.2 shows that the Ward was more extensive as it included considerable sections of the exposed coalfield for example in the parish of Houghton-le-Spring. Figure 1.2 also names the parishes and townships into which the study area was subdivided for the purposes of local administration. As can be seen, the parishes, with the exception of Trimdon and Castle Eden, conform to the northern custom of containing several townships. Under the impact of the rapid growth of population which was produced by mining colonisation, parish boundaries were re-drawn in response to the new population concentrations;⁽⁵⁾ however by the mid-nineteenth century by no means all of the east Durham parishes and townships had experienced the demographic transformation associated with the development of coal mining. By 1841, mining settlements had been established in twelve of the twenty seven administrative units into which the study area was subdivided; by 1851 the number had risen to fifteen. Rapid population growth associated with large-scale immigration into these new colliery settlements changed a rural area with a population of only 3763 and an average density of 47 per square mile in 1801 into densely populated industrial region. By 1841 the population had reached 30457 with a density of 383 per square mile; by 1851 42000 people lived in the study area at a density of 529 per square mile. Central to the explanation of this fundamental geographical transformation was the development, between 1820 and 1850, of sixteen collieries on the concealed coalfield (Fig 1.3). Although the first mining was achieved at Hetton in the early 1820s, it was not until the mid 1830s that there was a rapid diffusion of successful sinkings in east Durham, when in a short

burst of phenomenal mining activity, twelve collieries were developed between the mid-1830s and the mid-1840s. As previously mentioned reasons for the scale and the chronology of the east Durham mining operations are presented in chapter 3, which provides the geological, technological and economic contexts for the study.

The chronological limits

Within a short time span of approximately eighty years east Durham witnessed the complete process of mining colonisation from the first trial borings attempted from the 1770s to establish whether the coal measures continued eastwards beneath the transgressive cover of Magnesian Limestone, through to the establishment, by the middle of the nineteenth century, of a large scale coal industry which produced nearly 20% of the total output of the Northumberland and Durham coalfield.⁽⁶⁾ There is secure documentary evidence that a series of boreholes were sunk in Hetton township from as early as 1772 in order to test whether the rich Main and Hutton household coal seams previously proved in Rainton parish, immediately to the west of the Magnesian Limestone boundary, did continue eastwards towards the North Sea.⁽⁷⁾ If this early phase of mining exploration provides a logical introductory date for the study, then it can also be considered that the middle of the nineteenth century provides a fitting terminal date for a thesis which is essentially concerned with the geographical patterns which resulted from the processes associated with the initiation of mining colonisation. This is because, unlike in the period 1820-1850, few new collieries were sunk on the concealed coalfield during the second half of the nineteenth century, with only four new mines being developed in the fifty years after 1850 owing to the great technical difficulties and attendant costs en-

tailed in sinking deep shafts to the commercially valuable coal seams.⁽⁸⁾

In contrast to the long-established sections of the Northumberland and Durham coalfield on Tyneside and in the Wear Valley where generally short-life collieries had opened and closed over several centuries, resulting in the development of complex industrial landscapes with successive overlap of mining activity, in east Durham the transformation of the regional economy and society was sudden and overwhelming. There is no evidence on the concealed coalfield, for example, of seasonal or part-time employment in the mines such as could characterise the dual economy of old colliery districts. Instead, the east Durham plateau was colonised, in the thirty years after 1820, by large colliery companies, sinking deep mines with large outputs, employing many hundreds of permanent, full-time workers who were effectively proletarianised employees in a highly capitalised industry, with no residual interest in landholding and for whom wages were virtually their sole source of livelihood.

Historical geographers and the coal industry.

Although the development of the British coal industry together with related technological, commercial and labour issues, has been extensively analysed by economic and social historians,⁽⁹⁾ few geographers have studied the industry from the historical viewpoint. One major exception is A.E. Smailes, who, over forty years ago wrote two pioneer studies of the historical geography of the Northumberland and Durham coalfield which were subsequently incorporated in his book, "North England," still the best regional synthesis of the evolution of the coalfield and its settlement pattern.⁽¹⁰⁾ In his first paper Smailes analysed the development

of the North Eastern coalfield in relation to geological conditions, technological changes and the evolution of demand patterns; in his second paper he identified the nature and causes of population changes in colliery districts postulating a cyclical pattern of rapid population growth followed by population decline as coal reserves reached exhaustion at given levels of technology, to be followed by subsequent population increase as new technology and demand factors lead to renewed exploitation.

More recently P.N. Jones has sought to present the topic of colliery settlement in terms of generalizations drawn from his work on settlement patterns in the South Wales coalfield.⁽¹¹⁾ As he states, geographers have in the past noted the striking individuality of the settlement form, the homogeneous demographic structure and the largely monofunctional employment structure of most colliery communities. Jones contends, however, that too little emphasis has been given to the basic paradox between the relatively permanent "fixed" nature of the mining settlement in locational terms and the exhaustive nature and "mobile" locational characteristics of the collieries themselves. Furthermore, in his work, Jones seeks to interpret the relative importance of the several agencies responsible for the development of colliery settlement in South Wales between 1850 and 1926. In order to achieve these aims he erects a descriptive model of colliery settlement growth into which are introduced factors such as the nature of the landforms, landownership and tenurial patterns and the changing role of the various agents of housing provision. Few other historical geographers have examined the development of other British coalfields since Jones published his findings. E. Grant made a through-time study of the growth of the Warwick-

shire coalfield,⁽¹²⁾ whilst S.A. Royle, in a study of contrasting urban development in nineteenth century Leicestershire, considered the genesis and early socio-economic characteristics of the mining town of Coalville.⁽¹³⁾

At an altogether larger-scale, J. Langton's detailed study of the south Lancashire coalfield in the seventeenth and eighteenth centuries, represents a major landmark in the writing of the historical geography of the Industrial Revolution.⁽¹⁴⁾ To summarise Langton's complex and sophisticated arguments in a few sentences is a daunting and perhaps foolhardy task. However, it can be said that Langton analyses the complex processes creating the changing patterns of exploitation in the coalfield with the help of a model which incorporates the market area location theory of August Losch,⁽¹⁵⁾ together with concepts drawn from systems theory and behavioural economics. Langton considers that Losch's scheme is better suited to provide a conceptual framework for the study of the development of the south Lancashire coalfield in which the producers were located at points and the consumers were extended over the areas between and around the points, than is Weber's economic location theory based on the least cost approach,⁽¹⁶⁾ but like all classical location theory, that of Losch makes assumptions about the nature of entrepreneurial behaviour which limit its validity in a given set of empirical circumstances. Theoretical optimising assumptions that knowledge must be perfect, that all relevant information must be fully and instantaneously perceived and that behaviour based on that knowledge must be geared towards the maximization of producers' profits, are clearly grossly unrealistic when one focuses for example, upon entrepreneurial perceptions of the physical environment or market

opportunities. In order to embrace the relevant empirically recognisable elements of Loschian location theory together with historically derived evidence, Langton devised a simple causal model in the form of a mining system, which provides a conceptual basis for,

"an ordered examination of all those aspects of historical reality which might have impinged upon the way the mining industry developed, a framework over which the historical fabric can be stretched so that it can be displayed coherently and comprehensively." (17)

Amongst the variables that Langton identifies as relevant to an understanding of the development of the coalfield are resource, transport, market and entrepreneurial factors.

Langton's rigorous work is a unique landmark in research into the historical geography of the British coal industry; certainly, the few geographical essays on the development of the North Eastern coalfield are rooted conceptually and methodologically in the conventional pragmatism of historical geography rather than in the abstract and complex theory of economists. For example, J.W. House, in his study of population movements and the landscape in North East England since the early nineteenth century relied heavily upon the printed census tables to analyse the inter-relationships between population growth, migration and economic development within the various regional sub-divisions of the two counties.⁽¹⁸⁾ R. Hodgson's work on the impact of landownership on coalmining in county Durham is essentially an empirical analysis based on the examination and interpretation of surviving documentary and cartographic sources.⁽¹⁹⁾ A similar methodological framework is used by both P. Cromar and I. Leister; in the case of the former to discuss the spatial outcomes of the oligopolistic control of the coal industry on Tyneside and Wearside in the late

eighteenth century;⁽²⁰⁾ in the case of the latter to examine the evolving patterns of mining and labour mobility during the seventeenth and eighteenth centuries in two small sections of the Durham coalfield.⁽²¹⁾

What is the conceptual and methodological framework for this study? It should be stated clearly at this introductory stage that in the opinion of the author, because of the nature of the questions posed at the outset and because of the random survival and destruction of much of the documentary evidence of the colonisation of the east Durham coalfield, this study should follow broadly the traditional empirical approach in historical geography. Questions are posed about the impact of landowners on the location of the elements of the colliery landscape, about the social structure of the mining communities and about the patterns of labour mobility which were stimulated by the new collieries. Answers are sought from the appropriate data sources and the findings are considered within the context of received academic opinion. In this way the fundamental aim of the thesis is to throw some light on the nature of the geographical changes brought about by the process of mining colonisation upon a formerly rural area. The work is idiographic in concept rather than nomothetic; the methodology is empirical rather than theoretical; the research strategy is inductive rather than deductive. In summary, the author supports Langtons' view that,

"those who lament, from the sidelines, about the lack of firm and definitive causal analysis in historical geography, of explanations of the geographical past and the way that it changed, are crying for the moon. A search through the relevant theory does not provide a means of injecting rigorously derived causal statements into historical geographical analysis, even though colliery location is a relatively simple geographical problem and industrial location has been given continuous attention by theorists for over fifty years." (22)

Notes and References.

- (1) It is fortunate that Tithe data exist for each of the parishes and townships in the study area. In addition to the Tithe plans and apportionment documents, considerable use has been made in chapter 2 of the Tithe Files, held in the P.R.O. at Kew. For earlier use of the Tithe Files see:
Cox E.A. & Dittmer B.R. "The Tithe Files of the Mid-Nineteenth Century," Agric. Hist. Review, 13, (1965), 1-16.
See also Appendix 5.
For a general survey of the value of the Tithe data in agrarian history and historical geography see:-
Prince H.C. "The Tithe Surveys of the Mid-Nineteenth Century," Agric. Hist. Review, 7, (1959), 14-26.
- (2) See the Literature Review in Chapter 5 for a discussion of the historic rights in the British Isles of landowners to exploit the mineral resources beneath their estates.
- (3) See the Sources of Information section in Chapter 5 for a review of the major documentary and cartographic collections used in the chapter.
- (4) The principal source used in chapter 6 is the census enumerators' books for 1851. For a discussion of the methodological problems associated with the use of the census books in small areas, in particular the problems inherent in the application of sampling techniques at the township scale, see appendix I vol.2.
- (5) Examples of this process before 1850 in east Durham are listed below:-
Hetton parish created in 1847 from the former township of Hetton, Great Eppleton and Little Eppleton in Houghton-le-Spring parish.
Seaham Harbour parish created in 1845 from Dawdon township in Dalton-le-Dale parish.
Thornley Chapelry district created in 1844 from Thornley township in Kelloe parish.
Wingate Grange Chapelry district created in 1842 from the parishes of Kelloe and Castle Eden.
See Whellan W. & Co. History, Topography and Directory of the County Palatine of Durham, (1856), 619, 642, 609, 613.
- (6) Fordyce W. A History of the Coal, Coke, Coalfields and Iron Manufacture in North England, (1860), 45.
- (7) An account of the strata in Northumberland and Durham as proved by borings and sinkings, Newcastle-upon-Tyne, (1878), 218.
- (8) Smailes A. North England, (reprinted 1968), 173.
The mines sunk through the Magnesian Limestone in the second half of the nineteenth century were at Wheatley Hill (1869), Station Town (1871), Deaf Hill (1872) and Blackhall (1894)

- (9) See bibliography: Ashton T.S. Sykes J. (1929); Jevous H.S. (1915); Kenwood A.G.(1962); Nef. J.V.(1932); Sweezy P.M. (1938)
- (10) Smailes A.E. "The Development of the Northumberland and Durham Coalfield", Scottish Geographical Magazine, 51, (1935), 201-214.
- Smailes A.E. "Population Changes in the Colliery Districts of Northumberland and Durham," Geographical Journal, 91, (1938), 220-232.
- (11) Jones P.N. Colliery Settlement in the South Wales Coalfield 1850-1926, Univ. of Hull,(1969)
- (12) Grant E. The Spatial Development of the Warwickshire Coalfield, unpubl. Ph.D. thesis, Univ. of Birmingham, (1977).
- (13) Royle S.A. Aspects of the Social Geography of Leicestershire Towns, 1837-71. Unpublished Ph.D thesis, Univ. of Leicester, (1976).
- (14) Langton J. The Geography of the South West Lancashire Mining Industry, 1590-1799. unpublished Ph.D thesis, Univ. of Wales (1970).
- Langton J. Geographical Change and Industrial Revolution, (1979).
- (15) Losch A. The Economics of Location, New York (1967)
- (16) Weber A. Theory of the Location of Industries, Chicago, (1929).
- (17) Langton J. Geographical Change and Industrial Revolution, (1979), 31.
- (18) House J.W. North Eastern England. Population Movements and the Landscape Since the Early Nineteenth Century, Univ. of Newcastle Upon Tyne, (1959).
- (19) Hodgson R.I. "Agricultural Improvement and Changing Regional Economics in the Eighteenth Century," Chapter 12 in (eds) Baker A.R.H. & Harley J.B. Man Made the Land, (1973), 140-152.
- (20) Cromar P. "The Coal Industry on Tyneside, 1771-1800: Oligopoly and Spatial Change," Econ. Geog., 53, (1977), 80-93.
- (21) Leister I. The Sea Sale Coal Mine and the Durham Miner Dept. of Geography, Univ. of Durham,(1975)
- (22) Langton J. Geographical Change, 31.

CHAPTER 2

EAST DURHAM: THE AGRARIAN BASE.

THE PRE-MINING PATTERNS OF HUMAN ACTIVITY.

In a thesis which is concerned with an analysis of the impact of coal mining colonisation upon the patterns of human activity on the concealed coalfield of east Durham, it is important to examine the nature of the agrarian base upon which mining was rapidly superimposed from the 1820s onwards. By means of the analysis of the agrarian landscape as it had evolved up to the early part of the nineteenth century, a datum line is provided for the examination of the social and economic changes subsequently brought about by the process of industrialization. In order to achieve this aim it is proposed in this chapter to answer the following two questions:

- i) What were the patterns which characterised the agrarian landscape of east Durham at the beginning of the coal mining era?
- ii) What sets of processes had created the agrarian system found in the area?

For the purposes of analysis, the agrarian landscape has been subdivided into three components, although the inter-relationships between them which characterised the working of the agrarian system will also be examined:

- i) Landownership and tenancy patterns.
- ii) Patterns of farms and fields.
- iii) Land-use patterns and farming systems.

In order to answer these questions much evidence has been drawn from the three classes of tithe data, the plans, the apportionments and the tithe files, as mentioned in chapter 1. Through the

use of these sources, which in the case of the east Durham townships date from the period 1838-1845, it is possible to reconstruct in detail the contemporaneous patterns of the agrarian landscape in a manner scarcely possible for any other period in British agrarian history. In order to understand the processes which influenced the evolution of the farming system, the second question will be answered by means of a two-fold analysis of the environmental and cultural factors relevant to the development of the patterns of the agricultural exploitation of the land.

i) Landownership and tenancy patterns.

A useful summary of the patterns of landownership in east Durham at the time of the tithe survey is provided by J.T.W.Bell's map of the Durham coalfield (1843) from which Fig. 2.1 has been constructed.⁽¹⁾ Additional evidence is found in table 2.1 which has been calculated from the tithe documents for the east Durham townships. From these sources it can be seen that although some parts of the district were incorporated in large estates, in general small units of landownership were more characteristic, in keeping with the pattern in the whole of County Durham in the mid-nineteenth century. At this time it has been estimated that the county contained about 4000 estate owners, the great majority of whom owned properties of less than 1000 acres.⁽²⁾ Although any numerical analysis of estate size in east Durham is of limited value as landowners in the district might well have owned properties elsewhere in the county or even further afield, it is apparent that of the twenty seven townships only three recorded average estate sizes of more than 1000 acres, whilst in fifteen cases an average of between 100 and 300 acres was found. Expressed by another means, only two landowners owned over 3000 acres of

land throughout the study area and only ten proprietors owned between 1 - 3000 acres out of a total of 211 east Durham estates exceeding five acres in size.

However, despite a tendency for small estates to predominate, there was, within east Durham, considerable variation of estate size at the township scale. Firstly, in some of the townships that contained ancient rural nucleated villages such as Easington, Trimdon, Hawthorn, Pittington, Shadforth and Hutton Henry, land-ownership patterns were characterised by the existence of many small properties. In Easington township for example, forty nine landowners owned estates averaging only eighty three acres; in Hawthorn township the fourteen properties averages 105 acres, whilst at Trimdon the average estate size was 160 acres. At the other extreme, in five of the townships, Castle Eden, Thornley, Cold Hesledon, Dawdon and Little Eppleton, the whole township was concentrated in one estate owned usually by one of the major east Durham landed proprietors. Of these the best known was the Third Marquis of Londonderry, who besides owning the whole of Dawdon township (1080 acres) and 771 acres in the neighbouring Seaham township, also owned land at Kelloe (1348 acres) and Pittington (15 acres) (total 3214 acres). Also the whole of Castle Eden township (1873 acres) was owned by one landowner, Rowland Burdon, who in addition owned 1529 acres in the adjacent township of Monk Hesleden and a 289 acre estate in Cassop township in the south western part of the district (total 3691 acres). The township of Cold Hesleden was in the sole possession of the Pemberton family (975 acres); Henry John Spearman owned the whole of Thornley township (1094 acres), whilst G.T. Fox was the sole owner of the small township of Little Eppleton (335 acres). In addition to these landowners who owned whole townships, there were other

important east Durham proprietors whose substantial estates incorporated land in more than one township. For example, the Hon. Maria Bowes Barrington who had inherited the estate of the Lyon family, owned, in addition to the 956 acre Hetton estate, seventy two acres of contiguous land in Great Eppleton township and 115 acres at Quarrington, (total 1143 acres): the Baker family of Elemore Hall also held considerable lands in east Durham with their Elemore estate extending into both Haswell township (757 acres) and into Pittington township (739 acres), (total 1496 acres): Lord Howden was the owner of a 993 acre estate at Wingate and seventy acres in the neighbouring township of Hutton Henry (total 1063 acres); John Gregson owned land totalling 1895 acres in Seaham, Murton and Dalton-le-Dale townships, whilst Edward Shipperdson besides his 785 acre estate at Murton also owned land nearby in Great Eppleton (92 acres) some in Pittington township (214 acres), (total 1091 acres). As will be discussed in chapter 5, most of these landowners were to be directly involved with the colliery companies which were seeking to exploit the coal resources underneath their estates from the 1820s onwards. However, it must be remembered that landownership on this scale was not really typical of east Durham any more than it was for the whole of the county; small estates of less than 200 acres were more characteristic particularly in those townships which focused upon a nucleated village.

Only fragmentary evidence survives of the process by which the major east Durham landowners acquired their estates, but such evidence as there is points to a tendency for properties to be engrossed in the decades before the development of coal mining. For example, the Lyon family which in 1776 owned an estate of 644

acres in Hetton,⁽³⁾ had, by the late 1830s, increased their landed property to 956 acres⁽⁴⁾ (Fig. 2.2). This enlargement had been achieved by the purchase of four farms, three in Hetton township and one nearby in Great Eppleton township as can be detected by the sequence of entries of landowners in the Land Tax returns for the two townships.⁽⁵⁾ Similarly, in the south east of the district it is possible to reconstruct the engrossment of the estate of Rowland Burdon. Beginning with the purchase of the Castle Eden estate in 1758, this merchant banker invested heavily in making improvements to his new property which on its acquisition had been,

"waste and unenclosed, the chapel in ruins and not a vestige remaining of the mansion house." (6)

In 1763 Burdon bought the Blackhall estate in Monk Hesleden township; four years later he acquired lands at Horden and by 1777 his estate had been extended southwards by various purchases including High Hesleden and Fillpoke, both in Monk Hesleden township. By the late 1830s the Burdon family owned some 3691 acres in east Durham much of it underlain by productive coal measures. As a third example, the Marquis of Londonderry, through the purchase of the Milbanke estate at Seaham and Dawdon in 1821, not only enlarged his already substantial properties in the county, but also took the initial step towards the development of his private port and town at Seaham Harbour, which were built from 1828 to provide an outlet for the coal from his collieries located six or seven miles inland at Rainton and Pitlington.

Turning to patterns of land holding, it is possible to draw certain conclusions from the tithe data about the size of farm tenancies in east Durham in the first half of the nineteenth

century. Table 2.2 shows that on average the agricultural tenancies tended to be small, with fifteen of the twenty two townships recording mean land holdings of under 200 acres; in five cases, Easington, Hawthorn, Dalton-le-Dale, Trimdon and Sherburn, the tenancies averaged less than 100 acres. In Table 2.2, which gives the distribution of farm size for all the east Durham land holdings in excess of five acres, it can be seen that almost 78% were under 200 acres and as many as 31% were under fifty acres. Only six farms out of the total of 326 exceeded 500 acres in size.

Table 2.2 East Durham: Distribution of Farm Sizes 1838-1845

(Holdings 5 acres+)

<u>Area (acres)</u>	<u>Number of farms</u>	<u>%</u>	<u>Cumulative %</u>
Less than 50	101	31.0	31.0
50 - 100	73	22.4	53.4
1 - 200	80	24.5	77.9
2 - 300	43	13.2	91.1
3 - 400	17	5.2	96.3
4 - 500	6	1.8	98.1
5 - 600	3	0.9	99.0
6 - 700	1	0.3	99.3
7 - 800	0	0.0	99.3
8 - 900	1	0.3	99.6
9 - 1000	1	0.3	99.9
1 - 2000	0	0.0	99.9
2 - 3000+	0	0.0	99.9
Total	326	100	100 rounded

This distribution of farm size within east Durham reflects the contemporaneous pattern in the county as a whole: at the beginning of the nineteenth century, Bailey noted that there were no very large farms in the county and that the greatest number were between 50 - 150 acres in size:⁽⁷⁾ in the middle of the century, Bell calculated that 79% of the farms which had been let over a period of a few years prior to 1856 were under 200 acres, whilst 21% were under fifty acres in extent.⁽⁸⁾ As was the case with the patterns of landownership within east Durham however, the average farm size per township varied in relationship to the rural settlement pattern. In those townships which included nucleated villages the land was closely subdivided; where the settlement form consisted of small hamlets or totally dispersed farmsteads, as at Thornley Wingate, Haswell and Little Eppleton, agricultural tenancies were larger, averaging over 250 acres in these townships (table 2.1).

In terms of the conditions of letting the tenancies, Bell describes how the great majority of farms in county Durham were let from year to year although on some of the larger estates, landlords who were innovating new agricultural methods were also granting fixed leases for terms varying usually between three and seven years.⁽⁹⁾ Evidence from east Durham on lease terms is unfortunately scanty, but it can be seen from details of the management of farms belonging to the Baker family of Elemore Hall that letting terms of six years were common on the estates of this innovatory landowner. For example, three of the four farms which constituted the Baker estate at Wingate Grange in the late eighteenth century, had been let on six year leases, the term for the fourth farm being nine years.⁽¹⁰⁾ Similarly, six year leases were granted on the three farms which formed the Haswell estate of the Baker family.⁽¹¹⁾ However, it cannot be assumed from this

fragmentary evidence that other landowners in east Durham followed the example of the Bakers in the establishment of fixed term leases which were agreed to encourage the introduction of improvements in cropping and rotation systems. Indeed, it is likely from the frequency with which the traditional three-course rotation of wheat - oats - fallow was still found in east Durham as late as the time of the tithe surveys, that year-by-year lettings were prevalent in the district, thus contributing to the inhibition of innovation in new farming methods.

ii) Farm and field patterns

Upon examination of the tithe plans and apportionment schedules for the east Durham townships the following patterns of farms and fields can be readily distinguished:

- a) all the agricultural land in the district was enclosed, there being no open or common land with the exception of the surviving greens in the nucleated villages such as Easington, Trimdon, Hutton Henry and Murton.
- b) the farm units were usually consolidated in discrete blocks of land.
- c) the proportion of the farm buildings still located in the central rural nucleus varied amongst the east Durham townships but, as might be expected, tended to be greater in the larger villages.
- d) there was a tendency for elongated fields to be located close to the ancient rural nucleations; elsewhere field shape tended to be regularly rectilinear or square.

In order to test these generalizations in detail, a sample of nine townships has been selected on the basis of their demonstrating contrasts in the patterns of fields and farms, from wide-

spread locations in east Durham. From the tithe data, evidence of the farm patterns in the nine townships has been presented in table 2.3, whilst for four townships, Hutton Henry, Quarrington, Thornley and Murton, the information is presented cartographically (figs. 2.3 - 2.6).

Table 2.3 Farm shape and location in nine East Durham townships.

<u>Township</u>	<u>Number of farms</u>	<u>Number in nucleus</u>	<u>Number dispersed</u>	<u>Number consolidated</u>
Hutton Henry	15	7	8	13
Quarrington	9	2	7	8
Trimdon	26	10	16	9
Thornley	3	0	3	3
Shotton	16	4	12	15
Haswell	12	3	9	12
Murton	12	9	3	10
Great Eppleton	3	2	1	3
Little Eppleton	1	1	0	1
Total	97	38(39%)	59(61%)	74(76%)

From table 2.3 it can be seen that the majority (76%) of the farms were totally consolidated and furthermore the tithe evidence shows that in the case of most of the unconsolidated farms, the land was disposed in two or at the most three blocks. Only in Trimdon parish were farms distributed in more than three discrete units. It is clear therefore that in east Durham the enclosure and consolidation of farms along modern lines were characteristic features of the agrarian landscape at the time of the tithe surveys.

With reference to the actual location of the farm buildings which worked the agricultural units, table 2.3 indicates that on

average 39% of the farm buildings were located in the central settlement of each township, the remainder being dispersed farmsteads usually working ring-fence farms. There were, however, considerable variations of farmstead location amongst the townships. As might be expected, there was a distinct tendency for a higher proportion of the farmsteads in the townships which contained a significant rural nucleus, to be located in that core settlement, as for example in Hutton Henry, Murton and Trimdon. In the other townships a higher proportion of dispersed farmsteads was found as at Quarrington, Haswell, and Thornley in sympathy with the looser rural settlement pattern in these localities.

Through an examination of figs. 2.3 to 2.6 the spatial relationships between farmstead location, farm shape and rural settlement pattern can be observed in detail. In the case of Hutton Henry, a typical Durham two-row, east-west oriented village, with an irregularly shaped green, the tithe evidence indicates that the seven farmsteads in the village worked land close to the settlement, whilst the eight dispersed farmsteads managed the peripheral parts of the township. Also it can be seen in fig. 2.3 that five of the seven farmsteads in the village lay in tofts that were contiguous with their farm land whilst only two farms in the whole township were not arranged in a consolidated block and these were disposed in no more than two blocks of land. Further north, at Murton, a smaller village than Hutton Henry, but with similar plan characteristics, the overall pattern of settlement within the township was more nucleated with only three dispersed farmsteads not one of which was located within 800 yards of the centre of the village (fig 2.4). Also, as in Hutton Henry township a very high proportion of the farms in Murton township were totally

consolidated (ten out of twelve) although the linkages between farmstead toft and farm land were somewhat more loosely arranged with in two cases, farms in the north row of the village working land to the south of the south rows, a pattern not found in Hutton Henry. Nevertheless, the overall impression of agricultural patterns in Murton township is one of a totally enclosed and largely consolidated system of farms and fields.

On examination of the Quarrington tithe evidence, it can be seen that only two of the nine farmsteads were located in the hamlet itself and that both of these farms worked contiguous blocks of land (fig. 2.5). Of the remaining seven farms, the nearest of which was c.1020 yards from the hamlet, six were arranged as ring-fence farms, whilst the seventh was disposed in no more than three blocks. Finally, in the case of Thornley township (fig 2.6), the whole of the agricultural land was worked by three dispersed, ring-fence farms, this pattern reflecting the totally dispersed pattern of settlement in this township. With the opening of the mine at Thornley in 1835, it can be seen that the rapidly constructed mining village of New Thornley was inevitably built upon a "green-field site" as no rural nucleation existed to be incorporated within the industrial settlement.

With reference to field pattern, the evidence of the tithe plans indicates that although most of the hedged fields were compacted rectangular or square in shape, close to some of the villages a pattern of narrow elongated enclosures could be detected. The fields to the south of Hutton Henry and Hetton-le-Hole displayed such shapes whilst there was a considerable degree of linearity in the field shapes on both the north and south sides of Trimdon village. It is tempting to interpret these elongated

fields as evidence of the process of the early piecemeal enclosure of the former strips or selions of the traditional openfield system, which had been consolidated into groups by purchase or exchange prior to their enclosure. Certainly the hedgerows appear to follow the arartral curve of the medieval ridge and furrow and in the case of the fields lying immediately to the north of Trimdon village it is still possible to detect ridge and furrow bearing the morphological characteristics of the traditional plough lands. In contrast, most of the fields in the district, particularly those at greater distances from the nucleated villages, are more broadly rectilinear or square in shape. If the evidence of research into the evolution of field systems elsewhere in England was to be followed, it might be hypothesised that the elongated enclosures close to the villages represent a phase of early enclosure by agreement in the sixteenth or seventeenth century whilst the more regular-shaped fields bear the plan characteristics of Parliament Act enclosures of the period 1750-1870. Whether this explanation applies to the field systems of east Durham will be tested in the next section of this chapter.

The origins of the East Durham field systems

Although until recently less research effort had been expended on the study of the evolution of field systems in Northumberland and Durham than in regions such as the English Midlands, the enclosure history of which was more dramatic and whose source materials are more fully preserved, it is clear from the extant work that the enclosure of the common fields in the lowland parts of the two counties, including east Durham, had been achieved largely by the middle of the eighteenth century. Writing in 1794, Granger asserted that the common fields of the Durham townships

had, for the most part, been enclosed soon after the Restoration, with the farm holdings, formerly distributed in scattered strips in the open fields, having been consolidated into closes ranging from five to fifteen or twenty acres, surrounded by quickset hedges.⁽¹²⁾ Research this century on the enclosure history of county Durham has thrown some light on the process and motives which stimulated this revolutionary transformation of the farming system. Leonard discovered that the commonest form of enclosure in the county was by agreement between landlord and tenant, usually confirmed by Chancery Decree, often in the Court of the Bishopric at Durham.⁽¹³⁾ Much more recently, Hodgson has demonstrated that the enclosure of townfields in county Durham had been largely achieved by the middle of the eighteenth century and that the county was but little influenced by the enclosure of townfields by Act of Parliament during the period 1750-1870.⁽¹⁴⁾ In more detail, Hodgson has been able to demonstrate, through an examination of the Bishopric records, that in an early period of enclosure from 1550-1750, with a peak of intensity between 1630-1680, 105 enclosures by private agreement constituted the mechanism by which the traditional agrarian system of cooperative farming, with scattered strip holdings in the open fields was extinguished, with the consolidation of land holdings and the creation of newly hedged or fenced closes.⁽¹⁵⁾ Figure 2.7 shows how these early enclosures, which were largely, though not entirely concerned with the transformation of the arable townfield land, were clearly concentrated in the lowland sections of the county, including east Durham, where environmental conditions favoured grain cultivation. In the following table, details drawn from the work of W.E.Tate, are listed for the east Durham townships which experienced

enclosure during this period.⁽¹⁶⁾

Table 2.4 East Durham: Enclosures made or confirmed
by Decree Award of Chancery Court

<u>Date of application</u>	<u>Location and land type</u>	<u>Acreage</u>	<u>Date of decree confirmation</u>
1585	Townfields in Murton township	N.S.	1640
1607	Thornley	N.S.	Not confirmed
1617	Hetton	N.S.	Not confirmed
1621	Part of Cornforth Moor	N.S.	1626
1634	Townfields at Sedge-field	2662	1636
1634	Townfields and waste at Shadforth	1255	1635
1634	Townfields and moor at Sherburn	1267	1635
1655	Part of Easington Moor	102	1656
1658	Townfields of Little Thorpe, Easington	610	1656
1658	Townfields in Ryhope	1550	1680
1660	Part of Easington Moor	599	1661
1664	Townfields in Little Thorpe	1555	1665
1673	Townfields in Shotton	1229	1673

From Figure 2.7 and Table 2.4 it can be seen that the process of the enclosure of the townfields in east Durham reached a peak of intensity in the middle of the seventeenth century, but that at the same time, the less intensively exploited lowland moors and rough pasture lands were also being enclosed. It should also be remembered that the evidence of enclosure during this period probably underestimates very considerably the scale of the process as some of the enclosures may have escaped detection or documentation, especially in those townships where the ecclesiastical authorities of the Bishop or the Dean and Chapter

of Durham were not found as landowners, a common experience in east Durham.

In addition to this positive evidence of enclosure in east Durham in the seventeenth century, negative evidence is provided by the total lack of enclosure by Act of Parliament during the period 1750-1870. Hodgson has confirmed that in only seven Durham townships, none of which were in east Durham, did enclosure by Act of Parliament consist solely of those townfields which had escaped the earlier process of enclosure by agreement.⁽¹⁷⁾ As can be seen in fig. 2.8, enclosures in county Durham during this later phase were almost entirely concerned with the enclosure and subdivision of common, waste and moor in the upland western part of the county: east Durham entirely escaped this phase of Parliamentary Enclosure.

In summary therefore, there would appear to be secure documentary evidence that the pattern of enclosed fields, the lack of unenclosed commons and wastes and the largely consolidated farms of east Durham described in the first part of this section, were the product of a process of agrarian reform that can be dated largely to the seventeenth century, in particular to the middle years between 1630 and 1680.

What were the motives which stimulated landowners during this period to revolutionise the field systems of county Durham in general and east Durham in particular? To what extent was the transformation accompanied by changes in land-use within the township? Leonard stresses as a reason for the enclosure of the largely arable townfields and their conversion to pasture the increasing soil exhaustion of the open fields which had been cultivated for centuries with poor husbandry techniques.⁽¹⁸⁾ Many of

the seventeenth century enclosure documents stress the impoverishment of the soil as a factor, as at Sherburn, where in 1635 the townfields were,

"wasted and worne with contynuall ploweing and
thereby made bare, barron and verie unfruitefull"(19)

To judge from the number of references to encumbents expressing concern about the loss of tithe income from grain crops, it would appear that it was a frequent occurrence for such worn out tillage land to be converted to pasture or permanent grassland. Leonard quotes examples of rectors obtaining commutation of tithes or some other compensation because of a "decay of tithes" in several townships, either in or close to east Durham, such as Sedgfield, Middle Herrington, Seaton Carew, Murton, Middridge and Shotton.⁽²⁰⁾ As Hodgson states, this conversion of tillage to permanent grassland contravened the Elizabethan Tillage Acts and he has found evidence in fourteen lowland townships of cases concerning 1000 acres of arable, which were brought before the Durham Quarter Sessions because of a change of land-use to pasture, "for the fattening and grazing of cattle."⁽²¹⁾ Of these townships, three, Kelloe, Wingate and Hutton Henry are in east Durham.

It is not likely however, that the need to allow exhausted arable land to recuperate was the sole motive for the enclosure of townfields in seventeenth century Durham. It is necessary to place this early enclosure movement within the economic and social context of an accelerating transformation of the regional space economy. Between the middle of the sixteenth century and the latter part of the seventeenth century there was a major expansion of coal mining in the Tyne and Wear valleys; by 1680 the North Eastern coalfield produced 40% of the national output; it dominated the coastal sea-sale coal trade to London and elsewhere;

it acted as a source of primary energy to stimulate other industries such as salt panning and glass manufacture. By a combination of rising fertility levels and net immigration of population, the seventeenth century witnessed the development of an early class of industrial workers, increasingly divorced from the land, which required increasing quantities of foodstuffs for its support. In terms of impact on patterns of land-use, Hodgson considers that enterprising landlords and tenants perceived the market opportunities provided by this growth of demand and so converted much old tillage to pasture in order to produce dairy and meat products for the growing industrial communities.⁽²²⁾ At the same time, however, there were many examples in the county, including east Durham, of the ploughing up of the newly enclosed commons and wastes or old pasture lands and their conversion to tillage. In this content it is significant that in Table 2.4, the entries for Shadforth, Sherburn and Easington indicate the enclosure of both townfields and rough pasture lands, as the division of the latter facilitated their conversion to arable and their entry into more flexible systems of rotation based upon the closes of the consolidated farm rather than upon the communally worked openfield or furlong. Through the use of this evidence, it is possible to suggest that the long narrow curved enclosures found at Hetton, Trimdon and Hutton Henry, might well be contemporaneous with the rectilinear closes found towards the periphery of the townships. If the former represent the enclosure of former strips in the old townfields, some at least of the latter might demonstrate the division of pasture land found elsewhere in the townships. In Hetton township for example, the rectangular enclosures in the southern part near the boundary of the ancient ecclesiastical parish of Houghton-le-Spring, with Easington parish, represent, to

judge from the farm names in the vicinity, Hetton Moor Farm and Hetton Moor House, the division of rough grazing land located near the margins of the old parochial territory.⁽²³⁾ When one learns that in 1617 all the manorial lands at Hetton were enclosed at the same time,⁽²⁴⁾ it is likely that the consolidation and enclosure of the strips in the townfields, where, in some cases the new hedgerows followed the ancient curving alignment of the ridge and furrow, coincided temporally with the subdivision into regularly shaped closes of the peripherally located moorland.

iii) Land Use Patterns and Farming Systems

It is fortunate for students of the historical geography of agriculture in nineteenth century England that the tithe data have survived for so many parishes and townships. In addition to the tithe maps and apportionments already analysed in this chapter, the Tithe Files throw much light on land-use patterns and farming systems in each of the east Durham townships (see Appendix V). In this section, the Tithe Files will be used to describe the patterns of land use and the farming systems which were characteristic of the district in the period 1838-1845; in a final part of the chapter, explanations for these patterns in terms of landowners' and tenants' responses to physical and cultural factors will be explored.

The land-use figures in table 2.5, which have been used in the construction of fig 2.9, have been drawn from the Assistant Tithe Commissioner's questionnaire in the file for each of the east Durham townships. In aggregate terms 52% of the land subject to the Tithe Commutation Act, which in the case of the study area embraced an overwhelming 98.8% of the total land surface, was devoted to arable crops; 41.2% was designated as meadow or pasture

and 6.8% as woodland. The predominance of arable land-use in east Durham C1840, which is reinforced by the observation that in only one township, Castle Eden, was less than 40% of its titheable land under tillage or fallow, probably reflects the continuation in the district of a long tradition of champion farming. The observations of topographical writers from the seventeenth century onwards stress the concentration of arable farming in east and south Durham in contrast to the limited extent of arable land in the harsher environmental conditions of Pennine Durham.⁽²⁵⁾ Within east Durham, no very distinctive patterns of arable land-use occur, although it is possible to suggest, albeit tentatively, that some of the townships which recorded high proportions of arable (60%+), such as Cassop, Quarrington and Thornley, were located, at least in part, on the relatively light-textured, well-drained rendzina soils found either upon exposures of magnesian limestone, or where the bedrock was covered by thin drift deposits (fig 2.11). Elsewhere in east Durham, however, townships recording a large proportion of land under the plough were located on a variety of soil types ranging from the heavy tenacious clays of Dalton-le-Dale to the lighter clay-loams in Dawdon and Seaham townships.

Similarly, with reference to the distribution of permanent meadow and pasture within east Durham, simple deterministic relationships between land-use emphasis and soil conditions cannot be sustained. Townships recording much grassland occurred on both relatively light well-drained soils such as Castle Eden where large spreads of morainic drift exist and on the heavy till deposits which cover much of Monk Hesleden township.

Woodland occupied scarcely 7% of the land surface and the tithe evidence emphasises the treeless, exposed landscape of the

east Durham district. Townships recording higher than average averages of woodland can be placed in one of the following categories:

a) they contained woodland, largely deciduous in type, which occupied the steeply incised valley sides of the coastal denes in townships such as Castle Eden, Cold Hesledon and to a lesser extent Monk Hesleden (Table 2.5).

b) in townships such as Coxhoe and Pittington, woodland, again largely deciduous, survived on the steep west-facing scarp slope of the east Durham plateau (Table 2.5).

c) the townships contained deciduous or mixed blocks of woodland, often designed to provide shelter for foxes or game-birds, such as Little Eppleton, where the sole landowner significantly retained the occupation of all the fox coverts and spinneys whilst the agricultural land was let to the neighbouring Hetton Coal Company.⁽²⁶⁾

By way of contrast, eight east Durham townships recorded less than 4% of their land as woodland, so treeless was much of the plateau in the first half of the nineteenth century.

In Table 2.5 and Figure 2.10 detail is provided of the actual arable crops that were recorded in the tithe files. Considerable caution in their interpretation should be exercised however, as the regular distribution of the areas under the various crops suggests that the acreages noted by the Assistant Commissioners were no more than rough estimates. In fact, we are reminded by Cox and Dittmer that the areas under each crop listed in the tithe files are not accurate as they were usually calculated by the division of the total arable acreage in each parish or township by the number of rotation courses most widely practised.⁽²⁷⁾ Thus

a four course system of rotation is suggested from the arable acreages for Castle Eden township, whilst the arable land in Cold Hesledon and Kelloe townships would appear to have been cultivated with a three course system (table 2.5).

However, despite this necessary caveat, it is apparent that the arable land in east Durham was dominated by the two grain crops wheat and oats, which were obviously cultivated in conjunction with a fallowing system. Because the acreages under wheat and oats are no more than rounded estimates it is not feasible to analyse the distribution of first and second rank crops within east Durham, but it is clear that the only other form of land-use of any significance was the cultivation of clover or temporary grass leys. Other arable crops were recorded infrequently; barley was found in only three townships; beans and potatoes are listed as field crops in only one township each; the cultivation of turnips, perhaps the key indicator of improved agricultural farming systems, was mentioned in no more than three townships and nowhere did they provide more than 8% of the arable cropland. Perhaps these figures should be used to modify the impression given by Hodgson that turnip cultivation ranked as the third most important crop over an extensive area of county Durham, including most of the study area, as early as 1801.⁽²⁸⁾ Certainly within east Durham, the subsequent tithe evidence demonstrates that, in absolute terms, the cultivation of turnips and other root crops was very small scale, in an area largely devoted as late as c1840 to the traditional grain crops.

The tithe files contain few statistics on livestock, which could be evidence that the agistment tithe had, in the case of many of the townships, been commuted before the 1836 Tithe Commu-

tation Act.⁽²⁹⁾ From the scattered references for the east Durham townships, it would appear that sheep reared for wool, to judge from the references to the value of fleeces at Wingate, Thornley, Quarrington and Kelloe, were more commonly found in the southern, less industrialised part of the concealed coalfield. In the longer-established colliery townships further north, such as Hetton and Pittington, there are more frequent references to dairy cattle, to provide liquid milk for the colliery populations, and horses, for haulage work in the collieries. The evidence is slight however, no firm conclusions can be drawn from it and the data do not lend themselves to cartographic presentation.

Farming systems in East Durham c1840

The tithe files contain evidence which confirms that the commonest rotation system practised in the district was the traditional Durham three course system incorporating the rotation of wheat - oats - fallow. In the descriptions of farming methods in eleven of the twenty two townships there are direct references to the survival of this archaic system; five parishes or townships, Castle Eden, Hutton Henry, Trimdon, Murton and Pittington, recorded four course systems arranged as follows, fallow - wheat - clover - oats; in Thornley the tithe file outlines a five course rotation of wheat - seeds - seeds - oats - fallow. However, there is evidence in both the land-use figures and in the descriptive sections of the tithe files, that in east Durham some of the three course rotation systems had been recently modified by the incorporation of clover into the cropping arrangements. At Cold Hesledon for example, the three year rotation system consisted of one year fallow, one year wheat and one year equally divided between oats and clover:⁽³⁰⁾ in Great Eppleton the

Assistant Commissioner noted,

"the course is the usual Durham course of three shifts with variations of clover now and then instead of oats and sometimes, but seldom, a few acres of turnips or potatoes instead of the same quantity of naked fallow." (31)

Similarly in the neighbouring township of Little Eppleton, the old three course rotation was diversified only occasionally by the partial introduction of turnips and clover.⁽³²⁾ At Shadforth the tithe file confirms that,

"a few turnips are grown as also a little barley and some clover, but these are variations in, not part of the regular rotation which is the old Durham three course part of the oats or wheat crop or naked fallow occasionally giving way to barley, clover or turnips." (33)

Elsewhere in east Durham, however, isolated instances are recorded of cropping systems which reflect the acceptance of agricultural innovation and a willingness to experiment on the part of landowners and tenant farmers. At Pittington, a four course system incorporated the cultivation of turnips, wheat, clover and barley or oats, whilst in addition, land was set aside for the growth of potatoes which were sold to the pitmen in the township.⁽³⁴⁾ Four course rotations, usually arranged as follows, fallow - wheat - clover - oats, were found in four further east Durham parishes or townships,⁽³⁵⁾ but the general impression given by the tithe files is of a farming system characterised by inertia and conservatism with only slow acceptance of new rotational systems and little evidence of the close integration of arable cultivation and livestock raising, which was the hallmark of agrarian improvements in the more progressive parts of county Durham such as the Tees Valley.⁽³⁶⁾

Evidence of the backwardness and inefficiency of farming

methods in east Durham c1840 is to be found in the tithe files of many of the districts. Comments about the low standards of husbandry, the impoverishment of the farmers, the inadequate farm buildings and the low grain yields are frequent, whilst a quantitative assessment of this descriptive impression is provided by the yield entries in the township files which are tabulated below for the principal grain crops, wheat and oats.

Table 2.6 Yields of wheat and oats in east Durham
townships c1840.

<u>Township</u>	<u>Wheat</u>	<u>Oats(bushels</u> <u>per acre)</u>	<u>Township</u>	<u>Wheat</u>	<u>Oats(bushels</u> <u>per acre)</u>
Pittington	20	32	Seaham	12	24
Castle Eden	18	28	Quarrington	12	20
Hetton	16	20	Cassop	12	16
Little Eppleton	16	24	Shadforth	12	24
Thornley	16	25	Dalton-le- Dale	12	14
Sherburn	16	28	Trimdon	11	15
Easington Parish	15	22	Wingate	10	12
Kelloe	15	24	Coxhoe	nd	nd
Great Eppleton	14	28	Dawdon	nd	nd
Murton	14	18	Warden Law	nd	nd
Cold Hesledon	12	20	Monk Hesleden	nd	nd
			Average	14	22

Although yields within east Durham varied, for reasons that will be examined in the final section of this chapter, the overall averages of fourteen bushels per acre for wheat and twenty two for oats, compared unfavourably with results obtained from the neighbouring Wear valley lowlands, where wheat yields averaging

twenty to twenty five bushels per acre were recorded no more than ten to fifteen years after the tithe survey.⁽³⁷⁾ As a further measure of agricultural impoverishment in east Durham, use has been made of Bell's calculations of the rental value of the land in the district compared with other parts of the county in the middle of the nineteenth century.⁽³⁸⁾ In Dalton-le-Dale township, he found that average annual rents were 13 shillings per acre, in Hawthorn township, which was part of Easington parish, the figure was 15 shillings, whilst the agricultural land in Easington township was let at 19 shillings per acre. Further south rents rose to 25 shillings per acre in the Sedgefield district, but even these were lower than those found by Bell in the Tees Valley townships such as Sockburn, Dinsdale, Hurworth and Neasham where rents averaged 28 shillings per acre. Only in the western part of the county did harsh environmental conditions cause rents to fall below the levels recorded in East Durham.⁽³⁹⁾

At the township scale, the written descriptions in the tithe files furnish ample evidence of the impoverishment of farming in the study area in the 1830s and early 1840s. In Wingate township, for example, the Commissioner noted that,

"the land is extremely bad, so much so that a farm of 200 acres will not produce a rent of more than £50 per annum and for one of that extent no tenant could be found" (40)

Low rents and difficulty in attracting tenant farmers to the impoverished farms of Wingate were not new circumstances in the 1830s: some fifty years earlier the major landowning family in the township, the Bakers, could not find a tenant for one of their Wingate Grange farms, whilst grain yields and rental levels in all four of their Wingate farms were very low compared with those

which obtained on well-managed estates elsewhere in the county.⁽⁴¹⁾
The entry in the tithe files for Seaham township is equally
pessimistic;

"the soil for the most part is strong and almost
rendered unproductive for want of underdraining
and better management about 300 acres
calculated for turnips, but the whole is wretchedly
farmed without any kind of system there are
several crops of wheat and oats which this year
will not be worth cutting." (42)

The survival of archaic and inefficient farming systems in east
Durham are also alluded to in the entry for Cassop township, as
are hints as to the part played by environmental factors in the
creation of low yields and low returns;

"the soil lime, little calculated for the growth of
corn at present in a very unproductive
state from the want of a better system of manage-
ment here and there little patches of corn
which I doubt will ever come to maturity, its
situation and climate not being favourable to the
ripening of corn." (43)

At Sherburn the Assistant Commissioner considered that the in-
different standard of husbandry was due to,

"the farmers generally appearing very poor and
with but little capital laid out upon their lands." (44)

In several townships, the poor quality of the local roads and the
attendant difficulties of access to market, were put forward as
reasons to help to explain the agricultural inadequacies of the
district.⁽⁴⁵⁾ The existence of backward farming conditions with
low yields and rents in east Durham in the 1830s and 1840s was
nothing new. In the 1790s Granger had commented upon the soil ex-
haustion which resulted from the retention of the old three course
rotation system and the scanty crops harvested in the district.⁽⁴⁶⁾
A little later, in 1810, Bailey asserted that in the area between

Seaham and Trimdon the soil was,

"a poor unfertile clay and they produce miserable crops of corn and a herbage that scarcely any kind of stock will eat unless compelled by hunger." (47)

Before seeking explanations for these agrarian conditions it is interesting to examine the impact that the opening of the first collieries on the concealed coalfield had upon the agricultural economy of the district. Compiled as they were in the period 1838-1845, the tithe files post-date by about fifteen years the first sinkings through the limestone at Hetton, and they are contemporaneous with an active period of colliery development on the east Durham plateau.⁽⁴⁸⁾ The new pattern of demand for agricultural products, which was created by the process of mining colonisation, did not go undetected by the Assistant Commissioners. In general, the evidence of the tithe files suggests that the development of the mines, the rapid growth of population in the colliery settlements and the construction of waggonways and railways, combined to stimulate demand for a variety of agricultural products, to which the farms in some of the townships had responded positively. The evidence from east Durham runs counter to Bell's opinion that the working of minerals was in general an obstacle to agrarian improvement because of the influence of adverse factors such as the intersection of land by railways, the demand for more land for colliery installations, housing and waste heaps, and the trespass and damage caused by the pitmen all conspiring to discourage those farmers who sought to improve their agricultural methods.⁽⁴⁹⁾

In contrast to these views, the tithe files contain significant references to the stimulus to farming methods provided by the growth of industrialisation in the district. For example, the

existence of a greatly expanded horse population employed as draught animals by the colliery companies, created a symbiotic relationship with the agrarian economy. On the one hand, the increased number of horses stimulated the demand for hay, the increased provision of which for the collieries is referred to in the tithe files for Pittington and Seaham.⁽⁵⁰⁾ On the other hand, the increased supply of manure assisted agricultural improvements as at Hetton, where the Assistant Commissioner noted in 1838;

"..... some good land but a considerable quantity of thin cold stiff soil which but for the propinquity of the collieries and the consequent facility of procuring additional manure would make but a poor return to the cultivator." (51)

Similarly, close by at Great Eppleton, the tithe file describes how on land leased to the Hetton Coal Company, the tenants had,

"laid upon it vast quantities of manure and by these means land of inferior quality has been brought to its present state of fertility." (52)

In some of the townships which had experienced rapid population growth in the 1820s and 1830s, references have been found to the impact made by the increased demand for foodstuffs. For example, much of the grain produced in Hetton was consumed in the colliery settlement;⁽⁵³⁾ a similar comment was made at Sherburn,⁽⁵⁴⁾ whilst in the case of Pittington, the file describes how because,

"of the great demand for all sorts of produce, but particularly for milk to supply the increased population, the land is let for much higher rents than they could command in other localities and reach about 30 shillings per acre a quantity of potatoes is set by the farmers and sold to the pitmen after the rate of £20 per acre in the ground." (55)

From this evidence, it is reasonable to suggest that by the late 1830s, farmers close to the new colliery settlements were adjusting to the advantageous demand conditions. In another sense, the

rapid industrialisation of the concealed coalfield was perceived by the Tithe Commissioners to be potentially beneficial to the farming economy of the district, as there are quite frequent references to the likely advantages which should accrue from the construction of railways from the collieries to the coal exporting ports of Sunderland, Seaham Harbour and Hartlepool. Not only would urban markets for agricultural produce subsequently become more accessible, but also the price of lime and manure would be much reduced through cheaper transport costs, so contributing to improvements in soil fertility and in crop yields. Judgements along these lines were expressed by the Tithe Commissioners of Murton and Great Eppleton townships,⁽⁵⁶⁾ whilst at Seaham, the Commissioner anticipated the arrival of better systems of cultivation to be stimulated by the greatly increased demand as Seaham,

"becomes a place of considerable importance which will tend to considerably enhance the value and produce of the contiguous land." (57)

Whatever the impact of mining colonisation upon the farming practices in certain east Durham townships, the general thesis remains that up to the period of the tithe surveys, rotation systems, crop yields, farm rents and incomes were lower than in other lowland parts of the county. Why was this so? In the final section of this chapter it is proposed to examine some of the reasons adduced by the Assistant Tithe Commissioners and then to test this contemporaneous set of perceptions against the results of recent research into the agricultural potential of the east Durham plateau.

Comments of Assistant Tithe Commissioners on environmental conditions in east Durham: 1838-1845. Source: Tithe Files

<u>Township</u>	<u>Comment</u>
Wingate	sited on a high, bleak hill land extremely bad.
Castle Eden	some good soil but also a considerable quantity which is very strong and backward and from which in a wet summer a very productive harvest cannot be expected.
Coxhoe	soil principally a poor clay.
Seaham	there are several crops of wheat and oats this year which will not be worth cutting.
Hetton	some of the clay is very strong and sufficient to allow brick kilns to be established the harvests are late.
Great Eppleton	late sowing occurs somewhat elevated surface harvests are backward.
Little Eppleton	the soil is a cold clay of inferior quality.
Easington	best land adjacent to the village but most of the parish is poor land lying on clay subsoil the crops are late and bad.
Quarrington	the east part is of considerable elevation the soil inferior though resting partly upon limestone.
Cassop	the soil a lime little calculated for the growth of corn its situation and climate not favourable to the ripening of corn.
Dalton-le-Dale	the soil is a cold clay.

It can be seen from this sample of comments on environmental conditions in the study area that relief, soil and climatic factors were perceived as being critically relevant to the state of agriculture at the time. Much of east Durham is a plateau at 400-450 feet O.D., rising in the west to summits of 600 feet in townships such as Thornley, Cassop and Quarrington. Small-scale, but critical climatic modifications due to altitude have been measured which are detrimental to the cultivation of crops. For

example, McKee observed the following changes in climate:⁽⁵⁸⁾

a) an increase in precipitation to over 30 inches in the high western part of the east Durham plateau compared with an average of 25-27 inches in the nearby Wear Valley.

b) a reduction in mean temperatures with altitude was accompanied by an increase in the number of days of snow cover. For every 50 feet above 200 feet O.D. McKee calculated that an additional day of snow cover could be expected, so that whereas on the east Durham coast the mean frequency of snow cover was twenty days, (range eight to forty days), at altitudes of 5-600 feet at least twenty six days of snow cover could be expected (range ten to fifty days).

c) higher rainfall figures in autumn and winter and the longer persistence of snow in spring on the higher parts of the plateau hinder ploughing, particularly on the heavier soils and can delay the spring sowing of cereals. Furthermore, the reduced number of accumulated day degrees in the higher parts of the plateau probably render those areas marginal for wheat cultivation. Basing this calculation on a wheat requirement of 1961 day degrees, Simpson considered that the figure of 2424 day degrees recorded at Houghall in the Wear Valley would have to be reduced by up to 600 day degrees to make allowance for altitude in the highest parts of east Durham.⁽⁵⁹⁾ When low average sunshine figures averaging 1383 hours are also taken into account,⁽⁶⁰⁾ which result in part from the occurrence of the "sea fret", a cold, formless advection fog which invades the Durham coast on an average of five to ten days per year in late spring and early summer, it is apparent that the growing season for cereals can be reduced by a delay at the beginning of the cycle in spring due to

the persistence of snow and to snow meltwater and that the low summer temperatures delay the harvest for two or three weeks later than in the Tees or Wear lowlands. In the light of this modern appraisal of the environmental conditions on the east Durham plateau, it is not surprising that the tithe files contain frequent references to harvesting difficulties in townships such as Cassop, Great Eppleton, Seaham and Easington. When it is remembered that nowadays grain driers are considered to be essential for efficient arable farming on the plateau, the problems which must have faced grain farmers in the first half of the nineteenth century are obvious.⁽⁶¹⁾

To compound the environmental problems facing the farmers in east Durham, much of the soil, particularly in the central parts of the plateau, is a heavy surface water gley, developed from till deposits laid down by two successive ice sheets in Pleistocene times.⁽⁶²⁾ (fig 2.11). Much of the soil of east Durham has been classed by McKee into one of the following types:⁽⁶³⁾ (fig 2.12).

a) the Kelloe series, characterised by a loam textured A horizon with increasing clay content below, evidence of some impeded drainage with slight gleying, seasonally wet site drainage and a tendency to be cloddy and slightly sticky.

b) the Haswell series, a clay loam characterised by impeded drainage, by frequently wet site drainage, severe gleying within 6 - 18 inches of the surface and a tenacious texture.

c) the Shotton series, characterised by a higher clay content than b), badly drained, strongly gleyed soils, a massive to 'cloddy' structure and a tendency to puddle.

In view of the soil characteristics just outlined, it is not difficult to appreciate the opinions of the Assistant Commissioners

in townships such as Castle Eden, Coxhoe, Hetton, Little Eppleton and Easington, where cold, badly drained clay soils rendered difficult the annual routines of arable farming.

However, it would be unwise to assert that the indices of agricultural poverty and inefficiency were solely the product of an environment which was less advantageous than that found in neighbouring areas. A series of cultural factors also merit consideration. There seems to have been an unwillingness on the part of east Durham farmers to innovate and adopt improved cropping systems and by as late as the mid-nineteenth century, true convertible husbandry, with its close and mutually beneficial association of cereals, clover, rootcrops and livestock, was not widely practised in the district. Perhaps the rather small size of many of the estates and the virtual lack of truly innovatory landlords, from whom the new techniques could have diffused, both hierarchically and contagiously, inhibited such developments.⁽⁶⁴⁾ It is likely that many of the smaller landlords lacked sufficient capital with which to raise the levels of agricultural productivity; certainly the problems of transport before the advent of the railways hindered the market orientation of farm produce and increased the costs of lime and manure; probably the year by year letting system discouraged tenant farmers from investing and experimenting and archaic leasing conditions such as the insistence that all manure be put on the permanent grassland were likely to reduce arable yields. In addition it is known (see chapter 5) that some of the larger landowners were investing in the newly-developed collieries, thereby diverting capital from their agricultural estates. It seems reasonable to suggest that a combination of cultural and environmental factors, acting in consort,

were such that agricultural enterprise was discouraged, with the persistence of traditional practices sufficiently obvious to explain the cryptic entry in the Great Eppleton tithe file,

"the husbandry is bad, the farmers generally being such as would, in a well-cultivated district, be called "afternoon farmers." (65)

Summary

In brief it can be seen that the agrarian landscape of east Durham at the beginning of the coal age presented a distinct paradox. Whilst, on the one hand the field systems and farm layouts were organised along modern, enclosed and largely consolidated lines and had been for almost two hundred years, on the other hand, the agrarian system which operated within this physical framework was still largely archaic and inefficient. In east Durham, enclosure of common land and the creation of ring-fence farms had not brought commensurate improvements in farming techniques. Even within fifteen to twenty years of the peak of high farming in England, agrarian practices in east Durham were still largely traditional in nature.

Notes and References

- (1) Bell J.T.W. Plan of the Hartlepool Coal District, (1843), N.E.I.M.M.E.
The Bishop of Durham is shown as the land-owner over part of east Durham. Bishopric estates were generally leased on lives or for terms of 21 years and in the Tithe Apportionment documents it is these leaseholders, not the Bishop, who are actually listed as owners. Although actually leasees of such land, estates held in this manner from the Bishopric have been included in the calculations of overall estate size for the east Durham proprietors.
- (2) Bell T.G. "A Report upon the Agriculture of the County of Durham," Journal of the Royal Agric. Soc. of England, vol.17 (1856), 96.
Bell lists the acreages of sixty eight estates which had been sold in a short period before 1856 as follows:
Between 2 - 3000 acres 1
7 - 800 acres 1
4 - 500 acres 1
3 - 400 acres 1
2 - 300 acres 15
1 - 200 acres 22
less than 100 acres 27
- (3) "Plan of the Estate of Thomas Lyon at Hetton" (1776) Watson Coll. Vol.45.
- (4) "Plan and Apportionment of the Township of Hetton-le-Hole," (1839) Tithe Awards and Apportionments. U.D.D.P.D.
- (5) "Land Tax Returns: Hetton-le-Hole Township" LTA/E/N D.C.R.O.
"Land Tax Returns: Great Eppleton Township" LTA/E/N D.C.R.O.
- (6) Surtees R. A History of Durham, Hartlepool's Section, (1816), 57.
- (7) Bailey J. An Agricultural Survey of the County of Durham, (1810), 67.
- (8) Bell T.G. op. cit. 98
Bell lists the sizes of 575 farms which had been let in county Durham in a period of a few years before 1856 as follows:

Above 2000 acres	2	3-400	24
1 - 2000	2	2-300	74
7 - 800	3	1-200	190
6 - 700	3	50-100	142
5 - 600	3	Under 50	121
4 - 500	11		

- (9) Bell T.G. op. cit. 99
- (10) Baker - Baker Coll. Vol.4 18/116, (1794), U.D.D.P.D.
- (11) Ibid 18/78, (1791)
- (12) Granger J. General View of the Agriculture of the County of Durham, (1794), 43.
- (13) Leonard E.M. "The Inclosure of Common Fields in the Seventeenth Century," Trans. Royal Hist. Soc. N.S.19, (1905), 108.
- (14) Hodgson R.I. "The Progress of Enclosure in County Durham 1550-1870," in (eds) Fox H.S.A. and Butlin R.A. Change in the Countryside, I.B.G. Spec. Publ. No.10 (1979) 83-102.
- (15) Ibid. 89.
- (16) Tate W.E. "Durham Field Systems and the Enclosure Movements," Proc of the Soc. of Antiquities of Newcastle upon Tyne, 4th series, vol.10 No.3, (July 1943).
- (17) Hodgson R.I. op. cit. 89.
- (18) Leonard E.M. op. cit. 117.
- (19) Ibid. 117.
- (20) Ibid. 117.
- (21) Hodgson R.I. op. cit. 93 and fig.4, 94.
- (22) Ibid, 91
- (23) "O.S. First Edition Map 1: 10560," Durham County Sheet 21, (1856), D.C.R.O.
- (24) Kerridge E. Agrarian Problems in the Sixteenth Century and After, (1969), 97.
- (25) Butlin R.A. "Field Systems of Northumberland and Durham" in (eds) Baker A.R.H. and Butlin R.A. Studies of Field Systems in the British Isles, (1973), 130.
- (26) "Plan and Apportionment of the Township of Little Eppleton", (1839) Tithe Awards and Apportionments, U.D.D.P.D.

- (27) Cox E.A. & Dittmer B.R. "The Tithe Files of the Mid-Nineteenth Century," Agric. Hist. Review, 13,(1965), 5.
- (28) Hodgson R.I. op. cit. Fig.5, 97.
- (29) Cox E.A. & Dittmer B.R. op. cit. 5.
- (30) Cold Hesledon township Tithe File, IR18/2015, (1838), P.R.O.
- (31) Great Eppleton township Tithe File, IR18/1965, (1838), P.R.O.
- (32) Little Eppleton township Tithe File, IR18/1961, (1839), P.R.O.
- (33) Shadforth township Tithe File, IR18/2118, (1838), P.R.O.
- (34) Pittington township Tithe File, IR18/2096, (1840), P.R.O.
- (35) Trimdon parish Tithe File, IR18/2154, (1839), P.R.O.
Hutton Henry township Tithe File, IR18/2032, (1837), P.R.O.
Castle Eden township Tithe File, IR18/1916, (1838), P.R.O.
Murton township Tithe File, IR18/2074 (1839), P.R.O.
- (36) Bell T.G. op. cit. 101-102, provides detail of the improved systems which had been established on the Duke of Cleveland's estate at Raby, near Staindrop in Teesdale. On the farms in this district yields of wheat averaged 20 to 30 bushels per acre and yields of oats averaged 40 to 60 bushels, both at least twice the average recorded yields in east Durham. (See table 2.6).
- (37) Ibid. 101.
- (38) Ibid. 90.
- (39) Ibid. 91-92.
- (40) Wingate township Tithe File, IR18/2179, (1839), P.R.O.
- (41) Baker-Baker Coll. Vol.4, 18.3, (1782), U.D.D.P.D.
- (42) Seaham township Tithe File, IR18/2115, (1840), P.R.O.
- (43) Cassop township Tithe File, IR18/1915, (1840), P.R.O.

- (44) Sherburn township Tithe File,
IR18/2121, (1838), P.R.O.
- (45) Adverse comments on the condition of the minor roads and the occupation roads with references to the isolation of the townships from markets, particularly the one in Durham City, are referred to in the tithe files for Cassop and Great Eppleton townships and for Trimdon parish.
- (46) Granger J. op. cit. 71.
- (47) Bailey J. op. cit. 8.
- (48) See chapter 3 for a chronological resume of the development of the collieries on the concealed coalfield during the period 1820-1850.
- (49) Bell T.G. op. cit. 95.
- (50) Pittington township Tithe File,
IR18/2096, (1840), P.R.O.
Seaham township Tithe File,
IR18/2115, (1840), P.R.O.
- (51) Hetton-le-Hole township Tithe File,
IR18/2017, (1838), P.R.O.
- (52) Great Eppleton township Tithe File,
IR18/1965, (1838), P.R.O.
- (53) See note 51.
- (54) Sherburn township Tithe File,
IR18/2121, (1838), P.R.O.
- (55) See note 50.
- (56) See notes 35 and 52.
- (57) See note 42.
- (58) McKee R.F. An Investigation in the east Durham Plateau into the Problems of Soil Survey in Relation to Agricultural Productivity,
Unpubl. Ph.D thesis, Univ. of Durham,
(1965), 30.
- (59) Simpson R. Some Geographical Aspects of the Agriculture of the Hartlepoons Region, Unpubl.
M.Sc. thesis, Univ. of Durham, (1964), 42.
- (60) McKee R.F. op. cit. 33.
- (61) Ibid. 33.

- (62) Detailed discussions of the sequence of glacial deposition in east Durham in Quarternary times are found in:
- i) Beaumont P. The Glacial Deposits of East Durham
Unpubl. Ph.D. thesis, Univ. of Durham, (1967).
 - ii) Smith D.B. & Francis E.A. The Geology of the Country Between Durham and West Hartlepool, (1967),
Chapter 6, 198-256.
- (63) McKee R.F. op. cit. 115-123.
- (64) The Bakers of Elemore could be considered as innovatory landowners since as from as early as the 1770s there is evidence that they were experimenting with rotational systems incorporating clover crops and grass leys on one of their farms at Layton near Sedgefield. (See Hodgson R.I. op. cit. table 5, 97). However, on their farms at Wingate and Haswell, in a less hospitable environment pedologically and climatically than Sedgefield, the traditional Durham three course system of wheat - oats - fallow was generally retained on the arable land (see scheme of husbandry Wingate Grange estate, Baker-Baker Coll. Vol.4, 18.3, (1782) and scheme of husbandry Haswell estate, Baker-Baker Coll. Vol.4, 18.78, (1791).)
- (65) Great Eppleton township Tithe File,
IR18/1965, (1838), P.R.O.

CHAPTER 3

THE CONTEXTS OF MINING COLONISATION

Introduction

The function of this chapter is to provide a bridge between the analysis of the agrarian landscape in chapter 2 and the principal objectives of the study, namely the examination of the impact of the process of mining colonisation upon the patterns of human activity on the concealed coalfield of east Durham, which occupies the remainder of the thesis. In order to understand the motives, the problems and the expectations of the groups of entrepreneurs who risked large sums of capital in the search for marketable reserves of coal in this section of the Durham coalfield, it is important that, at the outset, their decisions are studied within a meaningful context. Therefore, to fulfill this objective, the chapter has been divided into three sections, (i) Resource Geology, (ii) Coal Transport Systems, (iii) The Economic Context, the examination of which is intended to provide a framework for the subsequent analyses of the process and patterns of mining colonisation.

1) Resource Geology

Prior to the first successful sinking which proved the existence of marketable reserves of coal beneath the overlying Magnesian Limestone of the concealed coalfield at Hetton in 1822, geological opinion had generally been sceptical as to whether the Coal Measures continued eastwards towards the North Sea. Even as late as 1830, two eminent geologists, Sedgewick and Buckland,

doubted whether much coal would be found to the east and south of the winning at Hetton,⁽¹⁾ but those views were soon to be confounded by the successful development of sixteen collieries on the concealed coalfield by the middle of the nineteenth century.⁽²⁾ In this first section it is proposed to examine the nature of this resource and to examine whether any aspects of the geology of the concealed coalfield influenced the spatio-temporal diffusion of coal mining in the study area.

The full stratigraphy of the Upper Carboniferous Coal Measures of east Durham is given in Fig. 3.1, in which the full sequence of coal seams, in both the Lower and Middle Coal Measures, is indicated.⁽³⁾ Some 600 feet of Lower Coal Measures is succeeded by the 1100 feet thick Middle Coal Measures, which contained the principal coal seams that were exploited in the area up to 1850. Above the Middle Coal Measures an unconformity marks a period of post-Carboniferous erosion, upon the surface of which, Permian age deposits were subsequently laid down. Within the Coal Measures, the lithological succession is generally regarded as a series of cycles or cyclothems reflecting different environments of deposition, with marine mudstones, non-marine mudstones, sandstone, seatearth and coal being found in repeated sequences. As a consequence, the individual coal seams are separated by barren measures which could be several hundred feet thick. All the seams in east Durham contain bituminous type coal; there is no coal of anthracitic rank and only occasionally are cannel coals found, particularly at the top of certain seams. Although the coal reserves of east Durham have been mined in more recent times for coking, gas and household purposes, the principal demand up to the middle of the last century

was to provide household coal for the sea-sale coal trade to London and other extra-regional markets.

With the extension of coal mining onto the concealed coal-field, shaft sinking to previously unreachd depths occurred in order to exploit the deeply-buried coal seams. In appendix 3 the geological columns for each of the east Durham collieries to be sunk by 1850, indicates the depths of the principal coal seams down to the Harvey seam, the lowest to be reached by this date.⁽⁴⁾ Examination of these columns demonstrates two fundamental factors relevant to the ultimate exploitation of the resource: i) the coal seams were deeper and therefore likely to be more difficult and costly to win than in the exposed section of the coalfield. ii) the seams became progressively deeper towards the east. Taking the highly-prized Hutton seam as an indicator, the seam was encountered at depths of no more than 535 feet and 540 feet respectively at Sherburn Hill and Littleton collieries, which were located on the exposed field just to the western edge of the Magnesian Limestone boundary. In contrast, depths for the same coal seam on the concealed section ranged from 670 feet to 1538 feet. The easterly dip of the coal seams explains the increasing depth of the Hutton seam in that direction. For example, between Hetton and Seaham, a distance of no more than five miles, the depth of the seam increased from 884 feet to 1538 feet (Fig. 1.3). Similarly, further south, the depth of this seam increases to the east from 670 feet at Kelloe Colliery to 1000 feet five miles away at Castle Eden Colliery (Fig. 1.3).

What influence did the depth of the coal reserves of east Durham which was consequent upon the easterly dip of the seams have upon the spatio-temporal pattern of colliery sinkings during

the period 1820-1850[?] Within east Durham it might be expected that collieries would be sunk first where the coal seams had been proved by trial borings to be shallower and more accessible. Certainly, the earliest successful sinkings through the limestone at Hetton (1820-22) and Elemore (1825-26), occurred at the north western edge of the concealed coalfield where the seams were relatively shallow (appendix 3), whilst the deeper sinkings to the east followed in chronological sequence: Eppleton(1833), Murton (1844), Seaton (1844) and Seaham (1849). Elsewhere on the concealed coalfield this simple relationship between depth and date of sinking does not seem to apply. Near the southern limit of the study area there is a reverse chronological sequence with Castle Eden (1842) and Wingate (1839) to the east, both predating the 1843 winning at South Wingate despite the shallower depth of the coal seams there. In order to supplement this descriptive discussion, a statistical test has been conducted to see whether there was a significant correlation between the age of the collieries and the depth of the Hutton seam in the east Durham collieries.⁽⁵⁾ The result of the Spearman Rank Correlation test showed that the null hypothesis, that there was no relationship between age of mine and depth of seam, could not be rejected for the collieries at the 0.05 significance level. Examination of the Spearman test table shows that two groups of collieries, one in the north (Hetton, Eppleton and South Hetton) and one in the south (Kelloe, Trimdon Colliery and South Wingate) deviate from the expected relationship between depth and age of undertaking. In the case of the first group, the collieries were developed earlier than their depth would suggest, whilst the reverse is true for the second group. Rather than seeking an explanation

for the diffusion of coal mining in east Durham in purely geological terms, the pattern of deviations mentioned above suggests the influence of other factors. It is likely that the precocious development in the Hetton-South Hetton area owed much to the example of active colliery sinking immediately to the west of the concealed coalfield at Rainton and Moorsley between 1800 and 1820, whilst the explanation of the later exploitation of the coal reserves in the southern part of the study area probably owes much to the chronology of the construction of rail links to tide-water at Hartlepool and on the river Tees (see section 2 of this chapter). Furthermore it will be demonstrated in chapter 5 how landowners strongly influenced decisions about the location of mines.

If the depth of the seams did not greatly influence the diffusion of colliery sinking in east Durham to what extent did the depth of the shafts on the concealed coalfield influence the spacing of the individual mines? It should be noted that very great capital costs were incurred by the colliery enterprises in sinking shafts to the coal seams. By November 1832, for example, the South Hetton Colliery Company had spent £120,000 on sinking two pits to the Hutton seam;⁽⁶⁾ at Wingate Grange Colliery, the total cost of winning the colliery was put in 1839 at £86,000⁽⁷⁾, whilst in the case of Murton Colliery, a sum variously estimated between £250,000 and £400,000 was invested between 1838 and 1843 on sinking shafts down to the Hutton seam⁽⁸⁾. It is clear from contemporary sources that two geological factors contributed to the difficulties experienced by the colliery companies and therefore raised development costs, firstly the thickness and nature of the overlying Magnesian Limestone and secondly the

existence of aquiferous sands at the base of the Permian sequence. As can be seen in the geological columns (appendix 3), the thickness of the Magnesian Limestone increases eastwards from a minimum of fifty seven feet at Eppleton to a maximum of 581 feet at Castle Eden, as a result of the easterly dip at the base of the Permian rocks which averages c125 feet per mile.⁽⁹⁾ It is clear from the mining records that certain of the physical characteristics of this overlying rock did present problems for shaft sinking in the first half of the nineteenth century, as well as subsequently. For example, the Viewer in charge of sinking Wingate Grange Colliery (1837-39) reported in 1838 to the owners that the two shafts had been sunk no more than 280 feet through, "the hard and expensive limestone".⁽¹⁰⁾ More frequently, there are references to the existence of fissures in the limestone which caused flooding in the shafts and which increased the operational costs. Such hazards are mentioned in the records of borings and sinkings of nine of the east Durham collieries,⁽¹¹⁾ whilst in the case of some there is reference to the use of iron tubbing by the shaft sinkers in order to keep the shafts free from water.⁽¹²⁾

Adding to the technical problems and to the capital costs of the early colliery undertakings on the concealed coalfield was the existence of a layer of water-bearing sands at the base of the Permian sequence. Occurring to the north of a line from Rushyford to Blackhall and therefore absent in the collieries in the very south of the study area, such as Trimdon Grange, Trimdon Colliery and South Wingate, these wind-deposited fossil sand dunes varied greatly in thickness, but despite this, their aquiferous nature caused severe flooding problems during the sinking of several of the east Durham shafts. In the records of the winning

of six collieries there are references to such circumstances,⁽¹³⁾ whilst three of these mines, Eppleton, Murton and Haswell, were particularly troubled by flooding from the sands to the extent that the production of coal was delayed by several years. In the case of the sinking of the two Eppleton shafts by the Hetton Coal Company, the penetration of 111 feet of sands caused such severe flooding that the sinking operation, which had begun in May 1825, was abandoned in 1827 when water overpowered the pumping engines and was not resumed again until November 1831. It took a further two years before coal was finally brought to bank at Eppleton.⁽¹⁴⁾ In the case of Haswell Colliery the initial sinking in 1831 had to be abandoned after the expenditure of £60,000 because of severe flooding from the 120 foot thick deposit of basal sands which yielded water at a rate of 4000 gallons per minute.⁽¹⁵⁾ Only after three further boreholes had been discontinued for the same reason, was a shaft finally sunk between 1833 and 1835, which was free from quicksand and which proved the Hutton seam at a depth of 930 feet.⁽¹⁶⁾ Perhaps the most difficult and costly sinking occurred at Murton Colliery, where the South Hetton Colliery Company began excavating two shafts in February 1838. At a depth of 192 feet, increasing quantities of water from fissures in the limestone were encountered but were successfully tubbed off and pumped to the surface. However, in June 1839, whilst penetrating the sands in the East pit, sand feeders burst into the shaft, choking the pumps and depositing ten feet of sand on the floor of the pit. Attempts to use the combined engine power of both shafts made no impression on the sand feeders and it took the sinking of a third shaft in 1840 and the concentration of 1478 horse power of combined pumping engine power, draining off 10000

gallons per minute, to eventually penetrate the sand. Metal tubing was then employed to keep the shaft dry and by April 1843, the Hutton seam was reached at a depth of 1448 feet.⁽¹⁷⁾

To sum up, it can be seen that because of the depth of the coal measures and the difficulties encountered in sinking through the overlying rocks, the capital costs expended on winning the east Durham collieries were generally higher than elsewhere on the Northumberland and Durham coalfield at this time (see summary of this chapter). Therefore, there were powerful economic incentives for the colliery companies to lease large coal concessions in order to secure a sufficient output of coal in order to provide a profitable return on this investment.⁽¹⁸⁾ Furthermore they also secured large outputs of coal which it was only possible to raise through the use of multiple-shaft mines and the application of powerful winding engines to raise the coal from such unprecedented depths.⁽¹⁹⁾ As a result, the east Durham collieries were widely spaced, in contrast to the dense scatter of coal workings on the exposed coalfield; each worked concessions of generally between 5 - 10000 acres with the outcome that most of the collieries were more than one mile distance from their nearest neighbour. (See chapter 5 for details of colliery leaseholds).

Turning to the actual coal seams exploited by the middle of the nineteenth century, although borings in east Durham had proved the existence of the Harvey seam in the Lower Coal Measures, there is no documentary evidence of its exploitation by 1850, the lowest worked seam was the Hutton seam in the Middle Coal Measures. First proved at a depth of 887 feet at Hetton Colliery, this seam was prized as a replacement in the North Eastern sea-sale coal trade for the High Main seam of Lower Tyneside, the reserves of

which were becoming exhausted by the 1820s.⁽²⁰⁾ From the Hutton seam, the east Durham collieries furnished the best quality "Wallsend" household coal which was invariably priced more highly than other grades of coal.⁽²¹⁾ In Fig. 3.2 it can be seen that this seam occurred as a single stratum to the north of a line from Shincliffe Colliery to Horden, whilst to the south it was split into a Top and Bottom seam. In addition the seam reached a maximum thickness of between five and seven feet six inches in the north of the study area. For example, at Hetton Colliery, the seam was six feet thick,⁽²²⁾ at Elemere Colliery a valuable seam five feet nine inches in thickness was discovered,⁽²³⁾ whilst at Murton Colliery the seam was as much as seven feet six inches wide.⁽²⁴⁾ In the southern part of the concealed coalfield, the Hutton seam was divided by intervening strata between thirteen and forty three feet thick.⁽²⁵⁾ Of the two seams it was the Bottom Hutton which proved to be of greater economic importance being about three feet thick, although in places, such as Thornley, the Top Hutton seam was worked where it locally reached three feet or more in thickness.

Lying above the Hutton seam, the Low Main seam had been worked on a small scale by the middle of the nineteenth century as a second class household coal. Averaging three to four feet in thickness, this seam exceeded five feet in the sinkings at Eppleton, South Hetton and Seaham in the north of the study area.⁽²⁶⁾ Of much greater importance in the early phase of mining activity in east Durham was the exploitation of the Main Coal seam (Fig. 3.3). From this stratum the colliery companies obtained some first class "Wallsend" coal, but it was sold primarily as one of the cheaper household grades on the sea-sale coal market.

Although it occurred throughout the concealed coalfield, the Main seam was thickest in the northern part of the district where it averaged between six and seven feet.⁽²⁷⁾ To the south of a line from South Hetton to Moorsley, the Main Coal seam was thinner with thicknesses of two feet seven inches at Thornley and two feet three inches at Shotton collieries being recorded, whilst in the southern part of the district, to the south of this central belt of impoverishment, the seam thickened to over five feet in several collieries.

There is evidence that one of the higher seams in the Middle Coal Measures had been worked in east Durham by mid-century. In the south of the district, the Five-Quarter seam, which would locally reach a thickness of six feet,⁽²⁹⁾ but which was absent in the South Hetton, Haswell and Shotton area, had been proved and worked by 1844 at Trimdon Colliery.⁽³⁰⁾ Averaging about three feet eight inches thick at Trimdon and of uniform thickness and quality, the five-quarter coal was considered to be of equal rank to the best of the second class household coals of the Wear district and it was shipped to London from Hartlepool docks.⁽³¹⁾ By this date the owners of Trimdon Colliery had also reached the Main Coal seam. Although five feet seven inches thick, the top most one foot four inches of the seam was found to be inferior in quality and not capable of being marketed in London, but the rest of the seam was, "decidely good and very little inferior to the five-quarter coal."⁽³²⁾ As a result it too had entered the household sea-sale coal trade by the mid-1840s.

Because of the lack of full documentary evidence, it is not possible to present a complete account of the volume of coal worked from the four seams which had been exploited by the middle

of the nineteenth century on the concealed coalfield. However, it is clear from the records which have survived, that the Hutton seam was the most important, followed by the Main Coal seam. Several reports suggest the vigour with which the search was mounted in order to ascertain the extent, thickness and quality of the Hutton seam. For example, within three years of the opening of Hetton Colliery, the company had pushed exploring driftways in the Hutton seam to the eastern boundary of its royalty in Little Eppleton township, almost a mile from the shaft bottom.⁽³³⁾ One year later, in 1826, it was reported to the Company that the Hutton seam, which by now had been proved by driftways under Murton township one and a quarter miles from the Hetton shaft,

"was found in great perfection not only in quality, but in height, being 4'10" in thickness and from every appearance the coal will be of considerable importance to the concern." ⁽³⁴⁾

To supplement these descriptive comments, output figures for each seam have been found and tabulated in Appendix 4 for the three collieries managed by the Hetton Coal Company during the period 1827-41 and for the two mines of the South Hetton Colliery Company between 1836 and 1861.⁽³⁵⁾ From these tables the following points can be made with reference to the Hetton Company.

- i) The Hutton seam dominated overall coal production, the seam providing over 60% of total production, except in two years, whilst by the late 1830s and early 1840s, over 75% of the total output came from this seam.
- ii) In Elemore Colliery, coal production was limited largely to the Hutton seam, entirely so from 1835 onwards, whilst output from Eppleton Colliery, with the small-scale exception of 1834, was drawn entirely from the Hutton seam.

iii) Only from Hetton Colliery was production from the Hutton seam augmented throughout the whole period from the Main Coal seam and from 1837 by production from the Low Main seam.

In the case of the output of the South Hetton Colliery Company, the tables show that production throughout the period 1836-61 was dominated even more than with the Hetton Company by workings from the Hutton seam. Between 1836 and 1854 no other seam was exploited at South Hetton, whilst in subsequent years production from the Main and Low Main seams was only insignificant in scale. From the company's second colliery at Murton there was some initial extraction of the Main Coal seam, but between 1847 and 1854 and 1857 and 1860, the total colliery output was derived from the Hutton seam. The contents of these tables indicate, therefore, the extent to which this group of large collieries in the northern part of the concealed coalfield had, through the mining of the famous Hutton seam, entered vigorously into the household coal trade by concentrating on the provision of the best grade of domestic coal for the London market.

2) Coal Transport Systems.

It is well known that the development of railways in Britain was closely linked with the growth of the coal trade as the first railways were employed almost exclusively in the overland haulage of coal. This was particularly true on the North-umberland and Durham coalfield, where coal owners had been faced, from the middle of the seventeenth century, with the need to transport coal from inland sections of the coalfield to tidewater on the Tyne or the Wear, as the collieries close to the banks of these rivers became gradually exhausted. Because of this long

involvement in the development of railed ways, North East England, by the early nineteenth century, was well endowed with the experience and technical skills necessary to make railway building a success. With the extension of coal mining onto the concealed coalfield of east Durham, the need to link the district to tide-water became of paramount importance to the colliery companies intent on the production of coal for the sea-sale coal trade. It has been suggested that the technical problems of transporting coal from the pit face to the port were to greatest to face coal owners at this time.⁽³⁶⁾ Bearing this in mind, it is proposed to examine in this section, the process by which the pattern of rail links between the concealed coalfield and the coast had been established by mid-century and to highlight the intimate relationships between railway construction and colliery sinkings.

In a detailed investigation into capital investment in North East England in the nineteenth century, Kenwood identified two waves of railway investment, the first occurring in the late 1830s, and the second in the late 1840s.⁽³⁷⁾ He considered that the earlier burst of railway construction was stimulated by the need to link expanding sections of the Northumberland and Durham coalfield to the exporting ports, whilst the rapid increase in railbuilding activity in the late 1840s was explained by the completion of the east coast trunk line from Darlington to Berwick.⁽³⁸⁾ It is of course with the first phase that this study is concerned and at the outset it is important to identify two distinct methods by which the necessary rail links to tide-water were constructed. Firstly, in the early phases of mining on the concealed coalfield in the 1820s and early 1830s, the colliery companies built private waggon ways, at their own expense,

in order to link their mines with the coastal outlets. Secondly, from the mid-1830s, the provision of transport to tidewater for the new colliery undertakings, was provided by public railway companies, incorporated by Acts of Parliament.

On the concealed coalfield three private waggonways were built to the coast; the Hetton waggonway to Bishopwearmouth (1822), the South Hetton waggonway to Seaham Harbour (1833) and the Rainton to Seaham waggonway (1831) (Fig. 3.4). In the case of the first two the lines linked collieries sunk, through the Magnesian Limestone, to tidewater, whilst the third line provided the means by which coal from the Marquis of Londonderry's collieries in the Rainton district on the exposed coalfield, could be transported to his newly-constructed port at Seaham Harbour more cheaply than through Sunderland.⁽³⁹⁾ Even before the sinking of the mines at Hetton and South Hetton, the estimates of the mining costs included allocations of capital for the construction of these essential rail links. At Hetton, for example, an estimate in 1819 for the winning of the colliery totalled £57,100 of which £26,400 (46%) was itemised for expenses to be incurred in the construction of transport facilities as follows:⁽⁴⁰⁾

Seven miles of railroad as "per Stephenson"	£12320
Three 30 horse power engines	4200
120 Chaldron Waggons	2880
Horses	2000
New Waggonways to Second Pit (Elemore)	2000
New Staith and Lowering Machinery	4000
Buildings at Staith	1000
Fencing, Drainage, and Gates for Waggonway	2000
	£26400

The somewhat smaller sum, in absolute and relative terms, of £16,447 was estimated in 1830 for the provision of a rail link from the proposed winning at South Hetton to Seaham Harbour, out of a total estimate for sinking to the Main Coal seam of £66,668 (25%).⁽⁴¹⁾ It is probable that the proportion of the total development costs taken up by the waggonway was smaller in the second case, partly because the length of the line was only four miles and partly because the South Hetton Company was not responsible for the provision of its own coal handling facilities at the port. Nevertheless, in both examples, the construction of the waggonway was the largest single item of expenditure, exceeding the cost of sinking the two mines themselves.

Dating from the early phases of the application of steam power to rail haulage, these waggonways provided fascinating examples of the technological experimentation and innovation which characterised the Industrial Revolution in the region. In particular, the seven mile long Hetton waggonway was surveyed by George Stephenson, constructed between 1820 and 1822 over Warden Law the highest point in east Durham (620') and incorporated three means of haulage depending upon gradient. Locomotives of the 'Killingworth' type were employed to haul the coal waggons where the gradient did not exceed 1:300; along these sections of the line where gradients between 1:30 and 1:300 were encountered, stationary engines were employed to pull the full waggons up the slope (see plates 14-16 Appendix 2), whilst on the steepest gradients, self-acting incline planes enabled the energy generated by the descent of full waggons to be used to haul empty waggons up the slope. On the South Hetton waggonway, along which gradients were less severe, haulage was achieved by means of

stationary engines alone.

However, the rapid extension of coal mining into the central and southern parts of the coalfield in the 1830s and 1840s was made possible, not by the building of further private waggonways, but by the construction of public railways, incorporated by Act of Parliament and designed to link the new colliery districts to the Wear and the Tees. Between 1821 and 1839, twelve railway companies were created in North East England,⁽⁴²⁾ three of which, built lines which were intimately related to the development of the coal industry in east Durham. These were, the Clarence Railway Company, the Hartlepool Dock and Railway Company and the Durham and Sunderland Railway Company (Fig. 3.4). In each case these companies were funded largely by local capital⁽⁴³⁾ and, furthermore, included amongst their first directors were several members of the east Durham colliery companies, as well as local landowners who stood to profit from the exploitation of the coal under their estates.⁽⁴⁴⁾ Clearly the lines which were built by these companies were of local appeal and were eventually designed to convey sea-sale coal to tidewater, although by the early 1840s they had gained an increasing proportion of their revenue from passenger traffic.⁽⁴⁵⁾ This objective was further confirmed by the involvement of each of the railway companies in the development of port facilities for coastal collier vessels. On the Tees, the Clarence Company erected coal staithes on the north bank of Haverton Hill in 1828, whilst by 1833 they had extended the line downstream to the new deep water shipping point of Port Clarence. The Hartlepool Dock and Railway Company, which was formed in 1832, was concerned with the conversion of the former decayed fishing harbour at Hartlepool into a coal port, as well as with its conn=

ection by rail to newly developed collieries in south east Durham. Finally, the Durham and Sunderland Railway Company, erected coal staithes on the south bank of the Wear in 1836 in order to facilitate the export of its principal cargo. No clearer evidence is needed of the motives for the construction of these lines and of their crucial importance to the extension of coal mining into the rest of the concealed coalfield than the following quotation from a railway company prospectus;

"several collieries are now in progress of winning immediately contiguous to the proposed line which of themselves will form a considerable revenue for the capital to be employed." (46)

This railway, like other lines at the time, was built in anticipation of future traffic which would flow from the success of a venture in another field, so closely linked were the mining and railway interests during this period.

Although a detailed analysis of the development of the rail transport system in east Durham is beyond the scope of this study, it is proposed to examine briefly how their intense rivalry influenced the evolution of the pattern of coal transport to tide-water up to the middle of the nineteenth century. Within the context of the North East coal trade, the construction of the Clarence and Hartlepool lines in the early 1830s augmented the volume of coal already exported from the Tees by the Stockton and Darlington railway. As a result, the volume of coal shipped from the Tees increased between 1826 and 1835 from only 18588 tons to 357726 tons.⁽⁴⁷⁾ This rapid rate of growth caused rivalry with the shipping interests on the Wear which became manifest in east Durham by the opening in 1836 of the Durham and Sunderland railway, built to transport coal north to the river Wear. Under the Act

of Incorporation of 1832, the Hartlepool Company was empowered to build a main line of fourteen miles to Moorsley pit, a Littleton branch of $4\frac{1}{4}$ miles, a Thornley branch of $\frac{1}{2}$ mile and a Wingate branch $4\frac{1}{2}$ miles long (Fig 3.4).⁽⁴⁸⁾ However, in 1834, the Durham and Sunderland Railway Company was given the right to build a 16 mile line from Gilesgate near Durham City to a new shipping point at Sunderland, passing close by Moorsley and through Hetton. This posed a severe threat to the traffic that the Hartlepool Company anticipated to tap from the northern part of its proposed railway. Furthermore, after the company had failed to receive assurances from the North Hetton Coal Company and from Lord Durham that coal from the Moorsley and Littleton collieries should be shipped at Hartlepool, it was not prepared to continue the railway to the Parliamentary terminus. Therefore, the main line was built only to Salter's Lane, near Haswell and the Littleton branch was not developed.⁽⁴⁹⁾ By July 1835 coal had been sent down the Thornley branch to Hartlepool from the newly-opened Thornley colliery; in November 1835 the main line to Haswell was opened and in that month the first coal from South Hetton Colliery at the northern end of the railway, was received at Hartlepool.⁽⁵⁰⁾ However, with the opening of Durham and Sunderland Railway in 1836, coal from the newly won Haswell Colliery was first shipped north to the Wear in July of that year, whilst by October, with the linking of South Hetton Colliery to this railway, coal from this mine had been sent to Sunderland.⁽⁵¹⁾ At the same time the South Hetton Company continued to send coal on its own waggonway to Seaham Harbour, the cost of the construction of which, had in part been met by a loan from Colonel Braddyll, the principal owner of South Hetton Colliery, to Lord Londonderry in 1832.⁽⁵²⁾ The loan was

made on condition that certain of Braddyll's coal would be shipped from the new harbour.

Intense competition for coal traffic also characterised the development of the railway system in the southern part of the concealed coalfield. In this area, the Hartlepool and Clarence Railway Companies entered into fierce rivalry which centred over access to the collieries in the Coxhoe area (Fig 3.4). By 1831 the Clarence Company had surveyed and begun to construct their main line from Haverton Hill to its junction with the Stockton and Darlington line at Simpasture, by which they gained access to the Auckland coal district. In addition, two branch lines were pushed towards Durham City and Sherburn. By early 1834, the Sherburn branch was sufficiently advanced to admit coal traffic and on January 16th the first cargo of "Wallsend" quality coal from Crowtrees Colliery near Quarrington, was shipped at Stockton, which was soon to be superceeded as a coal port by Port Clarence.⁽⁵³⁾ Faced with these developments and anxious to tap the coal trade of south west Durham as well as that of the southern part of the east Durham concealed coalfield, the Hartlepool Company, in 1836, promoted the Great North of England, Clarence and Hartlepool Junction Railway (Fig 3.4). This line, despite its grandiose title, was simply designed to extend eight miles west from the Wingate branch of the Hartlepool Railway to the Byers Green branch of the Clarence Railway and hence gain access to south west Durham. By March 1839 the Hartlepool Junction Railway had been opened for a distance of five miles west from the Wingate branch as far as the junction with the Kelloe Colliery waggonway.⁽⁵⁴⁾ A little later it was extended to Thrislington Colliery and by July 1839 coals passed along it from Cornforth

Colliery to Hartlepool.⁽⁵⁵⁾ By the mid-1840s this line had also tapped the coal trade from the newly-opened mines at South Wingate, Trimdon Colliery and Trimdon Grange which were linked to it by short private mineral lines. As further evidence of the nature of the competition for coal freight at this time, the owners of Crow Trees Colliery, near Quarrington, diverted their coal from the Clarence Railway to the Hartlepool line in December 1839, by means of a short $\frac{3}{4}$ mile rail link which was built across the western edge of the Magnesian Limestone escarpment between Quarrington and Cassop. By this means, the company obtained a direct connection with the Cassop Moor waggonway which joined the Hartlepool Railway via its Thornley branch (Fig. 3.4)⁽⁵⁶⁾

In order to summarise the development of the system of coal transport in east Durham between 1820 and 1850 the following table indicates how and when the individual collieries had been linked to the coal ports by the middle of the nineteenth century.

TABLE 3.1 EAST DURHAM: COLLIERIES AND LINKS TO
COAL EXPORTING PORTS 1820-50

<u>Colliery</u>	<u>Railway</u>	<u>Type</u>	<u>Date of Railway Opening</u>	<u>Port(s)</u>
Hetton	Hetton Waggonway	Private	1822	Bishopwearmouth
Elemore	" "	"	1826	"
Eppleton	" "	"	1833	"
South Hetton	Durham-Sunderland	Parlty.	1836	Sunderland
	South Hetton Waggonway	Private	1833	Seaham Harbour
	Hartlepool Railway	Parlty.	1832	Hartlepool
Haswell	Hartlepool Railway	"	1832	"
	Durham-Sunderland	"	1836	Sunderland
Murton	" "	"	1836	"
	South Hetton Waggonway	Private	1833	Seaham Harbour
	Hartlepool Railway	Parlty.	1832	Hartlepool
Seaton	Rainton-Seaham Waggonway	Private	1831	Seaham Harbour
Seaham	Rainton-Seaham Waggonway	"	1831	"
Thornley	Hartlepool Railway	Parlty.	1832	Hartlepool
Shotton	"	"	1832	"
Wingate	"	"	1832	"
Castle Eden	"	"	1832	"
South Wingate	"	"	1832	"
Kelloe	"	"	1832	"
Trimdon Colliery	"	"	1832	"
Trimdon Grange	"	"	1832	"

3) The Economic Context of the Coal Trade, 1800-1850.

During the first half of the nineteenth century, the North-umberland and Durham coalfield underwent a massive expansion both spatially and in terms of capacity and output, of which the mining colonisation of east Durham was only part. The opening up of districts previously remote from water transport resulted from the spread of the railway network throughout the region and as the collieries became more widely dispersed, the previous highly concentrated pattern of mining activity close to the Tyne and Wear disappeared and with it, the monopoly in the coal trade known as the Limitation of the Vend which had been in existence since 1771. This Limitation or Regulation of the output of the sea-sale collieries which shipped their coal from the Tyne, the Wear and after 1834 from the Tees, was essentially an attempt by the major coal owners to create a cartel within the industry in order to reduce the likelihood of over-production and the associated reduction of prices and profit levels. Detailed discussions of the Limitation and its ultimate demise by 1845 exist elsewhere,⁽⁵⁷⁾ but it should be noted that it was because of the development of the railway system which greatly extended the area of the coalfield and its productive capacity in areas such as east Durham that the combination of coal owners finally collapsed.

As some measure of the unprecedented growth rate of the North Eastern coalfield, between 1822 and 1854, the number of sea-sale collieries increased from 62 to 184;⁽⁵⁸⁾ total coal output rose from 4.8 million tons (1816) to 15.4 million tons;⁽⁵⁹⁾ coal exports expanded from 3.4 million tons to 8.4 million tons;⁽⁶⁰⁾ capital investment rose from an estimated £2.2 million for the Tyne and Wear collieries in 1829 to £14 million in 1855;⁽⁶¹⁾

numbers employed increased during the same period from 21000 in 1830⁽⁶²⁾ to 38800 in 1854.⁽⁶³⁾ In spatial terms, expansion of coal mining, particularly in the second quarter of the nineteenth century, was most pronounced in south west Durham between Bishop Auckland and Crook, in south east Northumberland to the north of the ninety fathom fault, in the Cramlington area, as well as on the concealed coalfield of east Durham.⁽⁶⁴⁾ At the same time, some old-established sections of the coalfield, such as north west Durham, did experience a revival of investment and output, particularly in the 1840s, because of the increased demand for coking coals related to the growth of a coalfield-location iron industry on the exposed West Durham field at locations such as Consett ⁽⁶⁵⁾ (Fig. 3.5).

In order to place the chronology of the mining colonisation of east Durham within the context of the development of the North Eastern coalfield, it is helpful to distinguish temporal phases between 1822, the date of the Hetton sinking, and the middle of the century. Between 1822 and 1829, when there was a marked depression in the coal trade,⁽⁶⁶⁾ eleven new collieries were opened up, six on the Tyne and five on the Wear and by the end of the decade the Wear collieries were beginning to take the foremost place in the coal trade and to command higher prices than the collieries of the Tyne.⁽⁶⁷⁾ To this period belong the first deep and costly sinkings through the Magnesian Limestone at Hetton (1822) and Elemore (1826), as well as the neighbouring collieries of Houghton (1827), North Hetton (1828) and Pitlington (1828). Despite the increase of colliery capacity which was achieved during this period, output did not keep pace with demand, prices and profit levels were generally high and the individual

colliery owners achieved large vends.⁽⁶⁸⁾ For example, the Hetton Coal Company, whose vend basis had been set at 50000 chaldrons in 1823, the first full year of production, by 1825 had its quota raised to 90,000 chaldrons out of a total Wear vend of 530000 chaldrons.⁽⁶⁹⁾ The profits of the Hetton company totalled £80000 during 1823 and within a few years shares in the partnership were being sold for very large sums.⁽⁷⁰⁾

During the period 1829-1836, which ended with a frenzy of speculative investment in the coal industry, the centre of new mining activity in County Durham shifted to east Durham and to the Auckland district in the south west of the county. Although economic circumstances did vary over these years,⁽⁷¹⁾ in general, investment in collieries was stimulated by a series of fiscal measures calculated to increase the demand for sea-sale coal. In 1831 the coal duty of 6 shillings per London chaldron was discontinued, the abolition of the Richmond shilling which had been levied on each chaldron and the reduction of the duty on foreign coal exports also occurred at this time.⁽⁷²⁾ On the Wear, eight new collieries were opened, at South Hetton (1835), Eppleton (1833) and Haswell (1835) in the study area, as well as at Monkwearmouth (1834), Littleton (1833), Sherburn Hill (1835), Belmont (1836) and West Hetton (1836) in neighbouring locations.

Because of rising demand, increasing coal shipments from the new or improved ports of the Wear and Tees as well as Seaham Harbour, increasing prices and improved profit levels, a burst of capital investment in the coal industry after 1836, led a contemporary writer on colliery affairs to observe,

"since the year 1836, the successive exploration of new coalfields has proceeded with the greatest vigour; the public railways have continued to open more extensively the western districts of the Wear and a succession of winnings has been completed in the deep coal districts of South Hetton, Castle Eden, Shotton and Trimdon." (73)

Although the winning at South Hetton dated from the early part of the 1830s and notwithstanding that Dunn omitted any reference to the new collieries at Wingate, South Wingate, and Murton, that also began operations during this period, this passage does hint at the excitement which must have been felt in east Durham at the time, as new deep coal mines, new railways and port facilities were brought rapidly into operation. Of course it should be remembered that this feverish extension of colliery activity on the concealed coalfield was only part of the massive expansion which characterised the whole coalfield in the late 1830s and early 1840s. A total of sixty one new collieries was opened during this short period, twenty seven of the new winnings being on the Tees and twenty five new mines entering the coal trade of the Tyne. In the case of the former, the connection by rail to the Tees of the former small-scale land-sale mining areas between Auckland and Crook, stimulated colliery investment for the extraction of the rich coking coal seams in the area. On the Tyne, the increased demand for steam coal led to the first successful exploitation of the coal measures to the north of the ninety fathom fault (dyke) in new collieries such as Cramlington, Seghill and Seaton Delaval.

Perhaps the inevitable outcome of this major burst of investment and expansion of colliery capacity was the depression of 1843, in which year,

"stocks grew at the staithes, prices fell, wages were reduced and the pits stood idle for two or three days a week." (74)

By this date, the productive capacity of the North Eastern collieries had progressively exceeded the demand for coal with the result that prices had fallen⁽⁷⁵⁾ and many mines were working well below the output levels of which they were capable. For example in the more favourable trading circumstances of 1828, the mines of the major Wear coalowners had been achieving vends ranging between 78% and 84% of the agreed maximum output figure, or basis, as allocated by the Tyne and Wear coal owners' committee.⁽⁷⁶⁾ However, over the next fifteen years there was a progressive reduction in the ratio of the actual vend to the assumed basis for many of the collieries on the North Eastern coalfield. By 1835 the proportion was 72.5%, by 1840 it was only 55.7%, whilst by 1844 the ratio had declined to 44%.⁽⁷⁷⁾ When the impact of the major coal miners' strike of 1844 is added to this unfavourable economic climate, the ultimate demise of the Limitation in 1845 was perhaps inevitable as individual collieries tried to exceed their allocated vend in an attempt to achieve profitability.

As might be expected in this troubled period, the rate of new colliery sinkings declined markedly compared with the years 1836-43. Between 1844 and 1850, only twenty nine new winnings were successfully brought into production on the Northumberland and Durham coalfield, chiefly in the coking coal districts of south west and north west Durham, such was the demand for metallurgical coke by this time. On the east Durham concealed coalfield, however, where production was largely concentrated upon the traditional household coal market until the middle of the nineteenth century, this period was characterised by a virtual stagnation of investment in new sinkings. Only two new collieries date from the years 1844-50, Seaton Colliery begun in 1844 by the Hetton

Coal Company and Seaham, which was commenced in 1849 by Lord Londonderry.

So far this section has been concerned with an analysis of how the economic vicissitudes of the period 1822-50 influenced the rate of colliery development in east Durham. In the final section, it is proposed to examine the extent to which the coal production and trade data presented in Appendix 4 reflect the generalized trends outlined above. The tables contain information on five of the sixteen collieries in the study area, the Hetton, Elemore and Eppleton collieries run by the Hetton Coal Company and the mines at South Hetton and Murton which were controlled by the South Hetton Colliery Company. Detailed production figures for the eleven remaining collieries have not been discovered. With reference to the series of production figures, any analysis is restricted by the termination of the Hetton Company data in 1842, but even so it is possible to suggest that the performance of the collieries did respond to the regional trends. Within five years from opening in November 1822, production at Hetton Colliery had grown rapidly during a period of high prices⁽⁷⁸⁾ to 51374 scores in 1827.⁽⁷⁹⁾ Augmented successively by the output of Elemore and Eppleton collieries, the combined production levels of the company generally exceeded 70000 scores until the late 1830s and early 1840s when a rapid decline in production to 47674 scores in 1842 coincided with the company having to face increasing competition from the rapid expansion of colliery capacity both in east Durham and elsewhere on the coalfield. At the scale of the individual collieries it can be seen that this reduction in output was caused by a marked diminution in production from Hetton Colliery which resulted at least in part from persistent drainage problems

in the Main Coal Seam, which increased production costs.

In the case of the South Hetton Colliery Company, there was a similar decline in output from 35026 scores in 1837 to 20403 scores in 1843, again probably in response to the massive expansion of regional productive capacity and the associated competition and falling prices for coal. However, it is also possible to discern how the economic climate of the period 1844-50 was reflected in the performance of the company as even with the added production of Murton Colliery from 1844, in no year before 1850 did the total output of the two collieries equal the performance of South Hetton Colliery alone in 1837. Not until the more favourable trading circumstances of the mid-1850s did the Company's output begin to exceed consistently the levels achieved in the late 1830s.

With reference to the market patterns for the output of the five collieries, it is clear from appendix 4 that the great bulk of the coal produced was shipped outside the region on the sea-sale household coal market. For example, the proportion of the vend of the collieries of the Hetton Company that entered this market between 1827 and 1841, varied from 80.7% to 90.9% (average 87.6%), whilst in the case of the South Hetton collieries the proportion was even higher. With the exception of one year, over 90% of the output of South Hetton Colliery was shipped from the coast during the period 1836-61 (average 97.3%): for Murton Colliery the proportion of total output which was exported from the region in the period 1844-1861 ranged from a minimum of 79.5% to a maximum of 100% (average 96.6%). Interestingly, there was no tendency for the proportion of the vend from the South Hetton Colliery to the household coal market to decline after the middle of the century, despite the growth of competition to provide the

capital with rail borne coal from the Midlands and Yorkshire coalfields.⁽⁸⁰⁾ Possibly this was because the colliery was able to produce the best quality "Wallsend" coal for that market; the proportion of this most highly prized and priced household coal frequently exceeded 90% of the total output of round coal at South Hetton Colliery (average 92.4%) and 80% in the case of Murton Colliery (average 82.4%). Up to 1861, very little coal was produced by the Company for land-sale and the vend tables provide little evidence of the search to diversify the markets for coal, particularly for gas and steam-raising purposes, apparently characterised by the commercial behaviour of some other east Durham mining enterprises after the middle of the century.⁽⁸¹⁾ However, there was a noticeable tendency for the South Hetton Company to produce a greater proportion of inferior and less valuable small coal during the period 1836-61 with the proportion increasing from c10% to c30% between these dates. As most of the small coal was sold as sea-sale coal, the Company must have been able to find an outlet on the London market, or perhaps exports abroad increased to provide alternative markets.⁽⁸²⁾

Turning to the vend details of the Hetton Coal Company, small coal usually provided between 20% and 25% of the total sales and it is fortunate that the company's coal accounts for the period 1827-41 provide a detailed breakdown of the market disposal of both round and small coal. Almost all of the former were led to the staithes and exported on the household market, but in the case of the latter the accounts give a detailed picture of the diversified uses to which the small coal was put. At least half was vended as inferior sea-sale coal. Of the remainder, some was consumed in Sunderland, which was the terminus for the Hetton

waggonway; some was used in the coke ovens and foundry at Hetton; some was sold direct from the pits as landsale, whilst a significant proportion was consumed by the Company's own steam engines, either colliery winding and pumping engines, stationary engines on the waggonways or the Company's locomotives.

Summary

In this chapter, three sets of contextual factors related to the development of the concealed coalfield of east Durham have been examined as a prelude to the analysis of the geographical impact of the process of mining colonisation, which occupies the remainder of the work. As a convenient summary of the significance and characteristics of the east Durham collieries within the context of the Northern East coalfield up to the mid-1840s, the following tables have been compiled.⁽⁸³⁾

Table 3.2 COLLIERY DETAILS: EAST DURHAM AND THE NORTH EAST COALFIELD, 1843.

	<u>East Durham</u>	<u>North East Coalfield</u>	<u>East Durham as % age of North East Coalfield</u>
No. of collieries	5	70	3.5
No. of mines (in prodn)	9	nk	-
No. of pits	20	192	10.4
Nos. employed	4691	25770	18.2
Coal output (tons)	910,200	4,823,967	18.9
Capital invested	£720,000	2,475,000	29

TABLE 3.3 AVERAGE NUMBERS EMPLOYED

East Durham Collieries	938
Per Pit	235
Other North East Collieries	324
Per Pit	123
All North East Collieries	368
Per Pit	134

TABLE 3.4 AVERAGE OUTPUT (TONS/ANNUM).

East Durham Collieries	182,040
Per Pit	45,510
Other North East Collieries	61,153
Per Pit	22,754
All North East Collieries	68,914
Per Pit	25,125

TABLE 3.5 AVERAGE CAPITAL INVESTMENT

	£
East Durham Collieries	120,000
Other North East Collieries	56,613
All North East Collieries	66,892

TABLE 3.6 AVERAGE DEPTH OF SHAFTS

	Feet
East Durham Pits	934
Tyne Pits	510
Wear Pits	450

From the tables the following conclusions can be drawn.

1) Within the brief span of twenty years, the sinkings through the Magnesian Limestone had made an important contribution to the regional coal industry with the nine mines in production by 1843 providing employment for 18% of the workforce and raising 19% of the coal output.

ii) The scale of mining operations on the concealed coalfield was much larger than was found in other sections of the Northumberland and Durham coalfield; using the three scales of measurement (tables 3.3, 3.4, and 3.5), it can be seen how in the east Durham collieries, the average numbers employed, the average output and the average capital investment were each at least two times the values recorded for the other North Eastern collieries.

iii) Table 3.6 demonstrates the differentially greater depths to which the sinkings on the concealed coalfield had reached by the mid 1840s.

In sum therefore, the development of the east Durham coalfield rapidly transformed a formerly rural section of the county into a centre of large-scale mining operations. Geological factors, which were responsible for the late development of this coal district and for the creation of a pattern of deep, highly-capitalised and widely-spaced collieries, do not, by themselves appear to explain the diffusion of colliery sinkings over the east Durham plateau during this period. Rather it was the crucial role of the rail links to tidewater which influenced the emerging pattern of mining operations. Finally, it can be seen that the rate of investment in the east Durham collieries tended to reflect regional economic trends, in which investment activity was particularly high during the period 1836-1843, as in this short period sinking was undertaken at seven of the sixteen mines won on the concealed coalfield between 1820 and 1850.

NOTES AND REFERENCES

- (1) Dunn M. A View of the Coal Trade of the North of England, Newcastle upon Tyne, (1844), 3
- (2) The names of the sixteen collieries which had been sunk in the study area by 1850 are listed in note 5 below. For their locations see Fig. 1.3.
- (3) The following section of this chapter is drawn largely from; Smith D.B. and Francis E.A. Geology of the Country Between Durham and West Hartlepool, Memoirs of the Geological Survey of Great Britain, (1967), 11-29.
- (4) An Account of the Strata in Northumberland and Durham as proved by Borings and Sinkings. NEIMME, Newcastle upon Tyne, (1878).

Hetton,	225-228,	Vol.2.
Elemere,	275-278,	Vol.1.
Eppleton,	301-304,	Vol.1.
Murton,	116-122,	Vol.2.
Seaton,	42-44,	Vol.3.
Seaham,	45-47,	Vol.3.
Haswell,	169-174,	Vol.2.
South Hetton,	162-163,	Vol.3.
Thornley,	273-276,	Vol.3.
Shotton,	146-150,	Vol.3.
Kelloe,	289-290,	Vol.2.
Wingate,	180-182,	Vol.3.
Castle Eden,	18-19,	Vol.1.
Trimdon Colliery,	318-319,	Vol.3.
Trimdon Grange,	322,	Vol.3.
South Wingate,	314,	Vol.3.
Sherburn Hill,	93,	Vol.3.
Littleton,	34-35,	Vol.2.

(5) Spearman Rank Correlation Test

<u>Colliery</u>	<u>Age Order</u>	<u>Depth Order</u>	<u>D</u>	<u>D²</u>
Hetton	1	7	6	36
Elemere	2	2	0	0
Eppleton	3	10	7	49
Murton	12	13	1	1
Seaton	13	14	1	1
Haswell	5	8	3	9
South Hetton	4	11	7	49
Thornley	6	6	0	0
Shotton	14	12	2	4
Kelloe	7	1	6	36
Wingate	8	4	4	16
Castle Eden	9	9	0	0
Trimdon Colliery	11	5	6	36
South Wingate	10	3	7	49

$$\Sigma d^2 = 286$$

(5) Cont'd

Applying the formula $r_s = 1 - \frac{6 \sum d^2}{(n^3 - n)}$ $r_s = +0.371$

When N=14 the critical value of r_s @ 95% = 0.456

Therefore the null hypothesis, that there was no relationship between the date and the depth of the collieries, cannot be rejected with confidence

Therefore there is no significant correlation between depth of seam and age of colliery.

NB N=14 because two of the collieries were omitted from the test, Seaham, because the opening took place after 1850 and Trimdon Grange because there is no record of the depth of the Hutton seam.

- (6) N.C.B. Coll 1/Th/14 (4). Report of the Viewer to the South Hetton Colliery Company, (November 1832).
- (7) Johnson Coll. Bk No.9, 161.
- (8) Victoria County History: Durham, Vol.2, 334.
- (9) Smith D.B. and Francis E.A. 90.
- (10) Johnson Coll. Bk No.9, 161.
- (11) The collieries were Hetton, Seaton, Seaham, South Hetton, Haswell, Castle Eden, Trimdon Grange, Thornley and South Wingate.
- (12) For example in the sinking record of Castle Eden colliery it is mentioned that tubbing was placed around the circumference of the shaft for a depth of 186 feet down into the limestone in order to keep the shaft dry.
- (13) The collieries were Elemore, Eppleton, Murton, South Hetton, Haswell and Shotton.
- (14) Account of the Boring and Sinking at Eppleton Colliery, Vol.1, 301-304.
- (15) Account of the Boring and Sinking at Haswell Colliery, Vol.2, 169-174 Subsequently abbreviated to B & S.
- (16) Galloway R.L. Annals of Coal Mining and the Coal Trade, Vol.1, (1898), 452.
- (17) Dunn M. op. cit. 239-242.
- (18) Detail of the areas of the coal concessions leased by some of the East Durham colliery companies is included in chapter 5.
- (19) See Note 6. In this report, the Viewer stresses to the company that two shafts should be sunk down to the Hutton seam in order to produce the greatest quantity of coal in view of the great investment of £120,000.

- (20) Smailes A.E. "Population Changes in the Colliery Districts of Northumberland and Durham," Geog. Journal, 91, (1938), 222.
- (21) For example it was commonly found in the coal lease agreements made in east Durham between the colliery companies and the landowners that the rents paid on the extraction of the Hutton seam at 22/6 per ten would exceed the rents for the other seams by about 5 shillings per ten. A ten was a measure of coal upon which the lessors paid rent which equalled 51.76 tons.
- (22) B & S, Hetton Colliery.
- (23) B & S, Elemere Colliery.
- (24) B & S, Murton Colliery.
- (25) Smith D.B. and Francis E.A., 64
- (26) B & S Eppleton, South Hetton, and Seaham Collieries.
- (27) The Main Coal seam recorded thicknesses as follows: Hetton 6'6", Eppleton 6'6", Murton 6'2", Seaton 6'1", Seaham 6'1" and South Hetton 6'6".
- (28) The Main Coal seam exceeded 5' at Wingate, Castle Eden, Trimdon Colliery and Trimdon Grange Colliery.
- (29) Smith D.B. and Francis E.A., 78
- (30) Johnson Coll. Bk No.10, 3.
- (31) Ibid, 4.
- (32) Ibid, 5.
- (33) Watson Coll. Vol.45, Unsigned report on Hetton Colliery (June 1825).
- (34) Watson Coll. Vol.45, Report on Hetton Colliery by J. Watson, (March 1826).
- (35) Shipperdson Papers, Vol.2. Production details of the Hetton Coal Company are found in entries 3417 and 3418. For the South Hetton Colliery Company output figures are given between entries 3512 and 3638.
- (36) Wrigley E.A. "The Supply of Raw Materials in the Industrial Revolution," Economic History Review, 2nd series, 15, (1962), 9.
- (37) Kenwood A.G. Capital Investment in North East England, 1800-1913, unpublished Ph.D. thesis, University of London, (1962), 63.
- (38) Ibid. 63.

- (39) Sturgess R.W. Aristocrat in Business: the Third Marquis of Londonderry as Coalowner and Portbuilder, Durham County Local History Society, (1975) 44.
- (40) Watson Coll. Vol.45 Estimate of Cost of Hetton Colliery, (September, 1819).
- (41) N.C.B. Coll 1/Th/14 (2) Estimate of the Cost of South Hetton Colliery, (April 1830).
- (42) Kenwood A.G. op. cit. 63.
- (43) Ibid. 72-73.
- (44) In the case of the Hartlepool Dock and Railway Company six of the fifteen directors elected at the first general meeting in June 1832 were either colliery owners or land-owners in east Durham. See Tomlinson W.W. The North Eastern Railway: its Rise and Development, new edition, (1967), 222.
- (45) On the Durham and Sunderland Railway for example, the proportion of the revenue derived from passenger traffic had increased from 4% in 1837 to 18% by 1839. See Tomlinson W.W. op. cit. 368.
- (46) Kenwood A.G. op.cit. 74. Prospectus of the Great North of England, Clarence and Hartlepool Railway Company, 1836, British Railways' Archives, York, GNC4/T
- (47) Dunn M. op. cit. 86.
- (48) Tomlinson W.W. op. cit. 221.
- (49) Ibid, 250.
- (50) Ibid, 253.
- (51) Ibid, 308.
- (52) Sturgess R.W. op. cit. 61.
- (53) Tomlinson W.W. op. cit. 239.
- (54) Ibid, 328.
- (55) Ibid, 328.
- (56) Ibid, 336.
- (57) See Sweezy P.M. Monopoly and Competition in the English Coal Trade, 1550-1850, (1938).
- Taylor A.J. "Combination in the Mid-Nineteenth Century Coal Industry," Trans. Royal Historical Society, series 3, Vol.5 (1953) 23-39.
- Cromar P. "The Coal Industry on Tyneside 1771-1800: Oligopoly and Spatial Change," Economic Geography, (53), 1977, 79-94.
- (58) Kenwood A.G. op. cit. 79.

- (59) Ibid, 79.
- (60) Ibid, 79.
- (61) Ibid, 80.
- (62) Ibid, 80.
- (63) Ibid, 80.
- (64) Smailes A.E. "The Development of the Northumberland and Durham Coalfield," Scottish Geographical Magazine, 51, (1935), 201-214.
- (65) Smailes A.E. "Population Changes in the Colliery Districts of Northumberland and Durham," Geographical Journal, 91, (1938), 224.
- (66) Sweezy P.M. op. cit. 95.
- (67) Kenwood A.G. op. cit. 83.
- (68) Galloway R.L. op. cit. 472.
- (69) Coal Trade Minutes Books, Vol.9, 13 and Vol.10 (no pagination)
The chaldron was the measurement unit for coal production at the time. The Newcastle chaldron, which was twice the weight of the London chaldron was the equivalent of 53cwt.
- (70) Galloway R.L. op. cit. 472. Galloway quotes shares in the Hetton company selling for over £300,000 although it is not possible to authenticate this enormous figure.
- (71) For example the Limitation of the Vend was temporarily suspended in 1833 and during the period of open trade lower coal prices and profit levels prevailed.
- (72) Sweezy P.M. op. cit. 105-106.
- (73) Dunn M. op. cit. 202-203.
- (74) Wellbourne E. The Miners' Unions of Northumberland and Durham, (1923), 61.
- (75) Sweezy P.M. op. cit. Appendix A. The Effects of the Limitation on Coal Prices and Quantities Chart 3, 155.
This chart shows how the price of the best coal on the London market fell from an average of 25-27 shillings per ton in 1838 to c20-21 shillings per ton in 1843.
- (76) Dunn M. op. cit. 78.
Dunn gives the following table:

<u>Coal Owner</u>	<u>Vend Basis</u> <u>(Chaldrons)</u>	<u>Actual Vend</u> <u>(Chaldrons)</u>	<u>%</u>
Lord Durham	162000	126484	78
Marquis of Londonderry	145000	121388	84
Hetton Coal Company	112000	93047	83

- (77) Dunn M. 229.
- (78) Sweezy P.M. op.cit. Appendix A. Chart 2, 155.
Between 1823 and 1827 coal prices on the
London market frequently exceeded 40
shillings per ton.
- (79) A score was a standard number of tubs of coal upon which
the earnings of the hewers and the underground transport
workers were calculated.
- (80) Harris A. "Changes in the Early Railway Age:
1800-1850," in (ed) Darby H.C.
New Historical Geography, (1976), 188.
In 1845 only 8000 tons of coal was railed
to London; by 1851 the amount had reached
248000 as the North East Coalfield began
to experience increased competition from other
coalfields.
- (81) Smailes A.E. "Population Changes in the Colliery
Districts of Northumberland and Durham,"
Geog. Journal, 91, (1938), 225.
- (82) Much of the less valuable small coal was exported to Europe,
whilst from the late 1820s increasing attempts were made by
coalowners to force it on to the London market. See
Sturgess R.W. Aristocrat in Business, 13.
- (83) Fordyce W. A History of Coal, Coke, Coalfields and
Iron Manufacture in North England (1860),
45.

Tables 3.2 to 3.6 are based upon the Statistical Account
of the Various Collieries on the Rivers Tyne, Wear and Tees,
March 25th 1843, which Fordyce drew from the First Report
of the Midland Mining Commission in which data pertaining
to the North East Coalfield had been included.

A colliery is defined as the legal/financial entity or
unit of ownership, which could, and in east Durham,
frequently did, consist of more than one mine.

A mine is the unit of production which with the exception
of Seaton and Seaham collieries consisted of two or more
shafts in east Durham.

A pit is defined as an individual shaft or sinking.

It should be remembered that 1843 was a depressed year in
the coal industry and therefore both the numbers employed
and the coal output are lower than typical of the 1840s.
The average depth of the east Durham pits has been cal-
culated from the relevant entries in the Records of Borings
and Sinkings for the Hutton seam, which was the lowest to
be exploited during this period.

CHAPTER 4

THE CHANGING HUMAN GEOGRAPHY OF EAST DURHAM,

1801-1851.

Introduction

Unlike the long-established sections of the North Eastern coalfield in the Tyne and Wear valleys, the concealed coalfield of east Durham experienced the sudden impact of coal mining colonisation and the rapid economic and social transformation of a formerly rural district into a densely populated and heavily industrialized part of the county. Collieries, with their associated surface installations, transport systems and mining settlements, were grafted onto the antecedent rural cadaster with great suddenness, to the wonder of contemporary observers. In a section written about east Durham in 1841, the Child Employment Commissioner noted that,

"where formerly there was not a single hut of a shepherd, the lofty steam-engine chimneys of a colliery now send their columns of smoke into the sky and in the vicinity a town is called, as if by enchantment, into immediate existence." (1)

Although, as shall be seen later in this chapter, the Commissioner underestimated the extent of pre-mining settlement on the concealed coalfield, the extract does convey some impression of the awe with which the advent of the coal industry must have been perceived by contemporary observers. In order to examine the impact of the process of mining colonisation on the patterns of human activity during the first half of the nineteenth century, it is proposed to examine the following elements of the changing human geography of the concealed coalfield: i) Population growth,

ii) Demographic characteristics, iii) Occupation structures, iv) Colliery settlement morphology. By this means the chapter is intended to provide a simple context which, in spatial and temporal terms, will provide a basis for the more complex analyses of the spatial outcomes of the extension of coal mining into the study area, which are incorporated in chapters five, six and seven. The chief sources examined below include the printed census volumes with their footnotes, 1801-51, the summary pages from the census enumerators books for 1841 and 1851, contemporaneous maps and plans, in particular the Tithe Plans (1838-45), and the First Edition O.S. Maps and Plans (1856), the photographic record of the colliery landscape and selected documentary evidence, drawn largely from colliery company records. (2)

i) Population growth

Table 4.1 Population growth in east Durham 1801-51

<u>Date</u>	<u>Population</u>	<u>Abs. incr.</u>	<u>% incr</u>	<u>Density(per sq. mile)</u>
1801	3763	-	-	47.3
1811	4072	309	8.2	51.2
1821	4940	868	21.3	62.1
1831	12706	7766	157.2	159.6
1841	30457	17751	139.7	382.8
1851	42091	11634	38.2	529.0

Although presented in prosaic terms, table 4.1 provides evidence of the explosive growth of population which transformed the economic and social geography of east Durham between 1801 and 1851. In more detail it is possible to distinguish three phases of population growth; a) a pre-mining period of slow population growth from 1801-1821; b) a twenty year period from 1821 to 1841 of massive population gain; c) a decade of reduced, though still

considerable growth of population between 1841 and 1851.

a) The pre-mining phase 1801-1821.

Prior to the first successful sinkings in east Durham at Hetton (1820-22), the area was essentially rural in economy and society, with no towns, a total population of under 4000, a low overall density of no more than 47.3 people per square mile and only one township, Easington, with a population over 300.⁽³⁾ In terms of administrative hierarchy, Easington, as the centre of the Ward was a large green-village, whose administrative primacy in east Durham probably predated the Norman Conquest.⁽⁴⁾ Beneath Easington in size and administrative importance there occurred a group of small nucleated villages, some, such as Castle Eden, Monk Hesleden, Pittington and Trimdon, were parochial centres in their own right; others, such as Hetton, Shotton and Hutton Henry, were significant merely at the township scale of local administration. Finally, in several of the townships true nucleated settlements were absent, the small populations in localities such as Great Eppleton, Thornley, Wingate and Quarrington being distributed solely in hamlets and in dispersed farmsteads.

Turning to the rates of population growth between 1801 and 1821 it is possible to distinguish a first decade of slow growth, in which the population increased at an average rate of less than 1% per annum, from the second decade within which a marked acceleration to an average of 2.13% per annum can be detected. The reason for this quickening of the population growth rate is apparent in table 4.4, in which the 1821 entry for Hetton township shows a decennial increase of 655. In this one township therefore occurred three quarters of the total population increase

of 868 recorded in the region between 1811 and 1821. Clearly, in the 1821 census the first demographic impact of the mining colonisation of the concealed coalfield can be detected, as by this date, the population of Hetton township had been rapidly augmented by workers attracted to the employment opportunities provided by the first sinkings at Hetton Lyons colliery, (1820-22), and by the construction of the Hetton waggonway which commenced at the same time. Elsewhere in east Durham, modest population growth rates for the rural townships as yet untouched by mining colonisation, were as characteristic of the second decade of the century as they had been of the first. (Table 4.4) (Fig 4.1).

b) Rapid population growth, 1821-41.

Within this twenty year period the population of the study area increased by 25517, from 4940 to 30457 and it was during these two decades that the profound economic and social transformation of the district was achieved. Although somewhat arbitrarily determined by the dates of the census, it is possible to distinguish within this period a pioneer phase of mining colonisation between 1821 and 1831, in which rapid population growth rates were restricted to the north western section of the study area, from the next decade, within which the rapid diffusion of coal mining over the concealed coalfield was accompanied by the addition of over 17000 to the total population. Compared with the decade 1831-41, the period 1821-31 experienced a smaller absolute increase in population, 7766 compared with 17751, but a higher relative rate of population growth, 157.2% compared with 139.7%. Whilst the very high relative growth rate of the 1820s can be related to the small initial population in 1821, the sus-

tained very high rate of population growth in the 1830s calculated from a larger population base in 1831, is a true measure of the impact of the development of the concealed coalfield upon regional population trends.

Examination of tables 4.5 to 4.7 and Fig. 4.2 demonstrates that as late as 1831 the rapid growth of population associated with the extension of colliery activity was largely restricted to that part of the concealed coalfield which lay close to the long-established Wear valley coal district from which mining activity had spread eastwards in the 1820s. Of the total decennial population increase of 7766, the addition of 4968 in Hetton township alone, accounted for 64% of the region's population growth⁽⁵⁾ (Table 4.5). Most of the remaining increase occurred in the townships of Pittington and Dawdon; in the former an absolute increase of 1328 accounted for 17% of the total growth of population; in the case of the latter, the decennial growth of 987 contributed 12.7% of the overall population increase. In both townships, the rapid augmentation of population between 1821 and 1831 was related to the development of coal mining, directly in the case of Pittington,⁽⁶⁾ and indirectly at Dawdon, where the former rural township had, by 1831, become the site of the newly-built coal exporting port of Seaham Harbour.⁽⁷⁾ Elsewhere, by 1831 in east Durham, the townships remained uninfluenced by the demographic impact of mining colonisation, with the exception of Haswell, where the decennial increase of 148 reflected the initial influx of workers who had been attracted to the sinkings at Haswell and South Hetton, both of which were begun in Haswell township in 1831.

If the 1820s can be distinguished as the pioneer phase of

mining colonisation on the concealed coalfield, there can be no doubt that the maximum impact of the extension of coal mining upon population growth rates occurred between 1831 and 1841, in particular in the second half of the decade.⁽⁸⁾ As can be seen in Table 4.6 and Fig 4.2, the overall regional growth of population is explained by the pronounced population surge in thirteen townships, in each case except Dawdon, directly attributable to the establishment of colliery undertakings. From the evidence of the 1841 census (Table 4.6) the following analysis of population change at the township scale is presented within the context of the temporal sequence of the mining colonisation of east Durham discussed in detail in chapter 3. Firstly, in the one exceptional case of Hetton township, a marked reduction of population to 4158 in 1841, in which year the village contained 228 empty houses, may be explained, at least in part, by the migration of miners to the newly-established collieries in the neighbouring townships of Haswell and Thornley.⁽⁹⁾ Secondly, the census data show that a group of eight townships had experienced extremely rapid rates of population growth in the 1830s when small rural communities had been transformed into mining settlements with populations usually in excess of 2000 in 1841.⁽¹⁰⁾ Thirdly, it is possible to distinguish four townships in which more moderate rates of population growth by 1841 reflected either the process of the initiation of colliery sinking, or the stimulus to population growth afforded by railway construction. For example, in East Murton township, the South Hetton Colliery Company was engaged in the protracted and costly sinking of Murton Colliery; Shotton township contained the site of the winning at Shotton Colliery, begun in 1841 by the Haswell Coal Company; South Wingate Colliery had been initiated

in 1840 within Hutton Henry township whilst the population increase of 314 from 1831 in Monk Hesleden township was attributed to the opening of a new colliery (Castle Eden Colliery, 1840), and the passing of the Hartlepool railway through the township.⁽¹¹⁾ By way of contrast, in those townships which were untouched by the extension of colliery sinkings, population growth rates remained low, although in some cases, such as Kelloe and Castle Eden, the population was augmented by virtue of the contiguity of collieries in neighbouring townships (Coxhoe and Monk Hesleden respectively).

c) A phase of reduced population growth rates, 1841-51.

It is fortunate, though purely fortuitous for the study of population growth rates, that the 1841 census occurred shortly before the economic depression which adversely influenced the rate of colliery sinkings in east Durham, as well as elsewhere in the Northumberland and Durham coalfield (chapter 3). This reduced rate of colliery sinkings in the 1840s is reflected in the marked fall in the rate of population growth, in both absolute and relative terms, although it should be remembered that the considerable reduction of the decennial rate of relative growth to 38.2%, does reflect the large population figure recorded at the beginning of the decade. In crude absolute terms, there was a population increase of 11614 during the 1840s, which although smaller than the rise of 17751 between 1831 and 1841, nevertheless did represent a substantial augmentation of the population on the concealed coalfield.

In more detail, Table 4.7 and Fig 4.2 indicate how at the township scale population changes resulted principally from the further diffusion of coal mining in the district. Firstly, the

continued expansion of Seaham Harbour and the sinking in the 1840s of the two collieries at Seaton and Seaham, were responsible for the rapid increases of population in Dawdon and Seaham townships. Secondly, the economic recovery of the coal "empire" of the Hetton Coal Company in the late 1840s had led to renewed immigration into the township with the consequent addition of 1506 to the population by 1851. Thirdly, in the case of the four townships in which collieries were being sunk in 1841, East Murton, Shotton, Hutton Henry and Monk Hesleden, rapid population growth by 1851 had resulted from the establishment of mining villages close to the mine workings. Fourthly, the demographic transformation of Trimdon parish and Shadforth township was directly attributable to the development of collieries during the 1840s as these locations had been purely rural in character as late as 1841. Fifthly, the censal evidence demonstrates that in the townships in which colliery settlements had been established by 1841, rates of population growth in the next decade were generally low, whilst in two cases, Thornley and Wingate, total populations actually fell slightly. Clearly, during the 1840s, the overall growth of population in east Durham was caused by immigration to the new colliery settlements rather than by the continued expansion of those already in existence. As will be analysed in chapter 7, the establishment of each new mining settlement in the 1840s stimulated complex migration patterns, with labour drawn to the new workings both from other sections of the Northumberland and Durham coalfield and from the villages which had recently been established on the concealed section of the coalfield. Each new settlement grew in part by taking labour from other neighbouring communities. Finally, the 1851 census tables demonstrate how the

remaining rural townships in east Durham had experienced only modest population growth rates during the 1840s and by mid-century contained only 3.4% of the region's population so overwhelmingly had the district been transformed by mining colonisation.

ii) Demographic characteristics in east Durham 1801-51.

Although it might appear at first sight to be a simple exercise to conduct an analysis of the changing demographic structures of the study area over the first half of the nineteenth century through the use of the printed census tables, any such attempt is rendered difficult because of the inherent limitations of the data source. As Lawton states, "the changing bases of enumeration, in terms of the organisation and range of information gathered in the pre - and post - 1841 censuses make comparisons over time difficult."⁽¹²⁾ For example, in 1801 the census was restricted to a few questions on inhabited and uninhabited houses, on the sex ratio and on the allocation of the population to three broad and rather valueless occupation categories, agriculture; trade, manufacture, handicraft; and others. In 1811 and 1821 the question on occupations was enumerated by family rather than by person, whilst the latter census included data on age structure, published at the Ward level of aggregation. In 1831 the question on age was excluded except for males over twenty years old, whilst a new nine-fold classification of occupations was introduced. From 1841, the administrative pattern of the census based upon the system of registration established by the 1837 Act for the General Registration of Births, Marriages and Deaths, coincided with the innovatory collection of household details by means of a schedule which included questions on the name, age, sex,

occupation, birthplace and residential location of each individual.⁽¹³⁾ Nevertheless, despite the inconsistencies in the early censuses, it is possible, at a simple descriptive level, to provide some numerical measure of change in four facets of the social characteristics of east Durham between 1801 and 1851 and so determine the impact of mining colonisation upon a) sex ratios, b) age structures, c) household and family sizes and d) housing provision.

a) Sex ratios

Did the development of mining communities in east Durham alter the sex ratio of the population in the study area? In Table 4.8 the overall sex ratio is given for each of the censal years, whilst Tables 4.2 to 4.7 provide detail at the township scale.

Table 4.8 East Durham townships: Sex Ratios 1801-51.

	<u>% Male</u>	<u>% Female</u>		<u>% Male</u>	<u>% Female</u>
1801	50.3	49.7	1831	53.8	46.2
1811	49.5	50.5	1841	52.3	47.7
1821	52.3	47.7	1851	52.8	47.2

There is no doubt that in general terms the proportion of males in the population of east Durham increased with the extension of coal mining onto the concealed coalfield after 1820. Furthermore this increase was proved to be statistically significant to the s.l. 0.01 by use of a chi-square test.⁽¹⁴⁾ Clearly, the rapid development of an industry, which in the North East provided labour for men and boys only, caused a reversal of the pre-mining sex ratio, as male labour, in the form of single men as well as

family groups, migrated to the new colliery villages.⁽¹⁵⁾ It would appear from Table 4.8 that male dominance reached a peak c1831 and that subsequently there was a slow if irregular movement towards parity between the sexes as the mining communities experienced the development of a mature family structure in most of the households, although as late as 1851 males continued to outnumber females. In more detail, Tables 4.2 to 4.7 suggests the following temporal analysis.

i) The pre-mining phases 1801-21.

Although the overall sex ratio in 1801 was slightly male dominant (Table 4.8), the difference between this value and that for 1811 was not statistically significant.⁽¹⁶⁾ In both years, the close proximity to an even sex distribution can probably be explained by the approximate balance seen at the township scale between the female dominance in the nucleated villages such as Easington, Trimdon and Sherburn and the greater frequency of males recorded in those townships in which the settlement pattern consisted of small hamlets and dispersed farmsteads, such as Dawdon, Great Eppleton and Cassop. Examination of the census enumeration books for later dates would suggest that the numerical superiority of females in the villages could be explained by the survival of widows, whilst in the farm hamlets and isolated farmsteads, the northern custom of farm workers, or "hinds" as they are still known, living-in with the farmer, helped to augment the male population.

ii) The pioneer mining phase.

In the early years of mining activity within any given township it is to be expected that the sudden influx of sinkers,



construction workers, craftsmen and labourers into a previously rural society would create a male dominated sex ratio. To what extent was this true in the thirty years after 1821? Certainly the evidence of the 1821 census tables (Table 4.4), confirms this expectation as in that year 59% of the population of Hetton township was male. Furthermore, the influx of men to the workings at Hetton was responsible for most of the male dominance recorded in that year for the whole study area, as 173 (74.6%) of the total excess of males over females of 232, occurred in this one township. Similarly, a pattern of masculine pioneer mining communities emerges from the censal evidence in 1831 and 1841 (Tables 4.5 and 4.6). In Haswell township for example, 67% of the population in 1831 was male; furthermore, 54% of the population were males aged over twenty years, compared with a regional average of 27%⁽¹⁷⁾. Male dominance of almost equal proportions was recorded in the same year at Dawdon, where 61% of the population was male, with 41% classed as males aged over twenty years. With the further diffusion of mine sinkings throughout the concealed coalfield by 1841, the census tables provide further exemplification of this demographic trait; in four mining townships, East Murton, Cassop, Wingate and Hutton Henry, the sex-ratio was at least 55% male, (Table 4.6), whilst from the 1851 census (Table 4.7), it is apparent that the development of collieries at Seaton and Seaham in the late 1840s, was related to the incidence of a male ratio of 68% in Seaham township.

iii) Towards a mature sex-ratio.

If there can be no doubt that the initiation of coal mining profoundly influenced the sex balance of townships, it now remains

to question the extent to which this was a characteristic associated particularly with the earliest years of these raw pioneer communities.^o From the census tables it does appear that there was a rapid reduction in the masculine dominance of most mining townships after the early years, as the villages were rapidly populated by colliery families who occupied purpose-built accommodation provided from the earliest stage in the life of the collieries. For example, by 1831, the male sex ratio in Hetton township had fallen to 53%, (59% in 1821), whilst in the same year males aged over twenty years accounted for no more than 24% of the total population, compared with the regional average of 27% (Table 4.5). These figures suggest that the township witnessed the rapid development of a family-based social structure which would include many young children of both sexes, thus augmenting the proportion of the population which was under twenty years old. We are reminded by Porteous of the similar rapid social maturation of new industrial communities in the case of the canal town of Goole, where a male ratio of 62% in 1826, recorded only two years after the foundation of the company town, had been reduced to 51% by 1851.⁽¹⁸⁾ Similarly, the frequency of males in Haswell township was reduced from 67% in 1831 to 53% ten years later as a large mining community of colliers' families came into existence during the 1830s. In the case of those townships in which mines were being sunk c1841, such as Hutton Henry and Monk Hesleden, the 1851 census tables indicate a modest reduction in the masculinity of the communities, although the ratio was persistently over 50% male because of the continued presence of male lodgers usually employed in the mines.⁽¹⁹⁾

b) Age structure

Unfortunately the printed census tables for the period 1801-51 provide only limited information about the age structure of the population, the data source being particularly defective for analysis at the township scale. The first two censuses gave no age information at all, whilst the 1821 census incorporated an age structure table but only at the Ward scale (Table 4.9). As Easington Ward was more extensive than the study area, extending as it did north and west to include ^{part of} Chester-le-Street parish and other parishes and townships between Hetton and Sunderland (Fig 1.2), the age data is of little value for this particular study. In the 1831 census a record was made of the number of males aged over twenty years (Table 4.5), whilst in 1841 there was an account of the ages of the total population in the census enumerators' books. Unfortunately, at the township scale, the 1841 printed census tables merely distinguish the number of people under twenty years of age from those over this age.⁽²⁰⁾ The 1851 census tables are even less helpful at the township scale as they include no age structure data at all, even though the enumerators' schedules for that year contained age evidence for the total population.

Because of these severe constraints it is only possible to offer a few tentative generalizations about the changing age structure of the east Durham population in the first half of the nineteenth century. There is some evidence that the population was youthful and that this characteristic probably intensified towards the middle of the century. In 1821, for example, 47.7% of the population of Easington Ward was under twenty years old (Table 4.9), whilst by 1841 the proportion in the study area had increased to 51.1%.⁽²¹⁾ At the scale of the individual township it can be seen

from the 1831 census tables (Table 4.5) that in two cases the proportion of the population which consisted of males aged over twenty years was much higher than the regional frequency of 27%. In Dawdon township, 41% of the population was enumerated in this category, whilst at Haswell the proportion was as high as 54%. In both cases, it is likely that influxes of single men to work on the new harbour and new collieries in the two townships was responsible for this demographic characteristic. How short-lived this age-sex trait was can be seen in the 1841 census tables (Table 4.6), where for Dawdon township only 50% of the total population was over twenty years old, whilst for Haswell the proportion was 47%. From these figures it is reasonable to postulate that these new industrial communities experienced a very rapid transition from a single male dominated pioneer phase to something approaching a mature family-based social structure. Further evidence of this trend can be seen in the age entries of the four townships in which new colliery sinkings were occurring at the time of the 1841 census, East Murton, Shotton, Hutton Henry and Monk Hesleden. In each case a higher proportion of the population was over twenty years than for the whole study area, markedly so in the last three. However, in three townships such as Hetton, Haswell, Pittington and Thornley, where collieries had already been established and mining settlements constructed, by 1841 there was a noticeable increase in the proportion of young people in the communities, as through the rapid immigration of largely nuclear family groups, the presence of young children reduced the overall age structure of the colliery villages. (22)

c) Household and family size

The census tables for 1801-51 each contain the data from which it is possible to calculate the mean household size of all the townships in the study area, although the mean family size can be reconstructed only from the tables for the years 1801 to 1831 as the number of families is not provided in the last two census volumes. However, by use of the summary tables for each enumeration district in the 1841 and 1851 census enumerators' books, it is possible to identify the number of families or separate occupiers and this has been done for those townships which contained mining communities at both dates. With this evidence it is proposed to seek an answer to the following question; what impact did the development of mining colonisation have upon household and family size during the period 1801 to 1851?

Table 4.10 East Durham townships: Mean household
and family size 1801-51.

	<u>Mean household size</u>	<u>Mean family size</u>
1801	4.9	4.3
1811	5.3	4.7
1821	5.6	5.0
1831	5.8	5.4
1841	5.1	5.0 12 mining townships
1851	5.3	5.2 15 mining townships

In overall terms, Table 4.10 suggests that the extension of coal mining into the study area from 1821 produced a considerable increase in mean household size which reached a peak of 5.8 by 1831. Subsequently the numbers per household declined as the pioneer phase of settlement was succeeded by a social structure

housed in purpose-built family accommodation. The impact of mining colonisation upon mean family size was similar in that an increase between 1801 and 1831 was followed by an irregular decline in average family size towards the middle of the century. At the township scale, examination of Tables 4.2 to 4.7 enables the following points to be made about household and family sizes. In association with the initiation of industrial activity within any township, there was a pronounced increase in mean household size. Within Hetton township for example, the mean household size had increased to 8.6 in 1821 compared with 5.3 in 1811. Similarly, the average number of people per household in Haswell township had risen to 8.5 in 1831, compared with 6.8 in 1821; at Dawdon the 1831 mean value of 10.6 was also very high.⁽²³⁾ It is likely that the household size in the first few years of these new communities was augmented by the residence of lodgers and relations as the sudden influx of population temporarily exceeded the housing supply. However, subsequent censal evidence demonstrates the rapidity with which family housing was provided for the immigrant population; by 1831 the mean household size in Hetton had decreased to 5.6, by 1841 it had dropped to 5.0 in Haswell and in Dawdon township (Seaham Harbour). The speed with which the population of the mining villages created in the late 1830s and 1840s, was housed in family-unit accommodation is also indirectly suggested by the relatively modest mean household sizes recorded in 1841 and 1851 for townships such as Wingate (5.1), Thornley (5.2), Quarrington (5.0) and Hutton Henry (4.7) (Table 4.7).

It is difficult to make through-time comparisons of mean family size at the township scale as there is some evidence that in the early censuses the definition of the family was imprecise,

as unrelated resident employees were included, particularly in farm-hamlet townships such as Dawdon, Little Eppleton and Cassop, thus increasing the recorded family size. All that can be said with any degree of confidence is that before the development of coal mining, the mean family size tended to be smaller in the nucleated villages than in those townships in which settlement was largely in hamlets and dispersed farmsteads, partly because of the reason given above and partly because of the frequent existence in the villages of families headed by elderly persons, sometimes widowed, at a late stage in the family life cycle with few, if any resident children. Also, it would seem that with the development of mining settlements mean family sizes in the study area increased slightly, but it is not at all apparent that the families in the colliery townships were significantly larger than those in the rural communities (see chapter 6).

d) Housing provision: demand and supply.

In this section the census tables will be examined in order to determine to what extent the great increase in the demand for housing created by the influx of population, was provided with an adequate supply by the agencies of housing provision.

Table 4.11 East Durham 1801-51. Number of families
per 100 inhabited houses.

<u>No. of families</u>		<u>No. of families</u>	
1801	111	1831	113
1811	112	1841	103 12 mining townships
1821	111	1851	101 15 mining townships

From Table 4.11 it is immediately apparent that the multiple occupation of houses by two or more families was not

common in east Durham during the first half of the nineteenth century; Furthermore, it is perhaps surprising to note that with the establishment of colliery settlements, which is known to have occurred very rapidly in east Durham, the rate of multiple occupation was negligible in 1841 and 1851.⁽²⁴⁾ There can be no doubt that within the first few years of the life of each colliery, a settlement to house the workers had been created, based upon the provision of single-family accommodation. How different from many industrial towns of the period, where the multiple occupation of former single-family town houses and the creation of tenements was the immediate response to the increased demand for housing created by large-scale immigration to inner urban areas.⁽²⁵⁾ In the rural townships, upon which coal mining was suddenly superimposed in east Durham, no such solutions were possible; instead, barrack-like company settlements were rapidly built in order to house the immigrant workforce. There are only two instances of townships in which the ratio of families to inhabited houses rose steeply during the first few years of industrial transformation, for which the details are summarised below.

Table 4.12 No. of families per 100 inhabited houses:

Hetton and Dawdon townships

<u>Hetton</u>		<u>Dawdon</u>	
1811	112	1821	100
1821	136	1831	144
1831	104	1841	104

The temporary nature of the phase of imbalance between housing demand and supply is clearly indicated in both townships as by the later dates multiple occupation had been reduced to an in-

significant frequency. These figures however, are important as an indication of the scale with which house building occurred during the early years of each settlement. In Hetton, for example, 945 houses were built between 1821 and 1831, 659 of them by 1827.⁽²⁶⁾ Altogether the number of inhabited houses in the study area increased as follows during the period of mining colonisation:

Table 4.13 The study area: number of inhabited houses 1821-51.

	<u>No.</u>	<u>Incr.</u>	<u>% Incr.</u>		<u>No.</u>	<u>Incr.</u>	<u>% Incr.</u>
1821	886	-	-	1841	6025	3825	174
1831	2200	1314	148	1851	7876	1851	31

It is difficult to imagine just how revolutionary the enormous increase in the housing stock of east Durham must have appeared to contemporary witnesses; just what agencies were responsible for the creation of these new settlements will be analysed later in this chapter.

In addition, it is possible from the summary tables in the census enumerators' books for 1841 and 1851, to obtain more detailed evidence, presented in Table 4.14 at the township scale, of the relationship between housing demand and supply as measured by the family: house ratio for those townships in which collieries had been sunk by the relevant census date.

Table 4.14 East Durham mining townships: Housing supply 1841 and 1851.

1841

<u>Township</u>	<u>Families</u>	<u>Houses</u>	<u>Ratio per 100 Houses</u>
East Murton	90	89	101
Hetton	917	917	100
Haswell	804	797	101
Shotton	118	118	100
Cassop	199	195	102
Coxhoe	771	758	102
Quarrington	145	145	100
Thornley	543	519	105
Wingate	501	489	102
Monk Hesleden	96	94	102
Pittington	432	432	100
Sherburn	399	399	100
Total	5015	4952	101

1851

<u>Township</u>	<u>Families</u>	<u>Houses</u>	<u>Ratio per 100 Houses</u>
East Murton	237	235	101
Hetton	1183	1144	103
Haswell	857	857	100
Shotton	303	284	107
Cassop	233	233	100
Coxhoe	795	781	102
Quarrington	214	213	100.5
Thornley	531	531	100
Wingate	485	485	100
Monk Hesleden	303	303	100
Pittington	477	468	102
Sherburn	441	437	101
Hutton Henry	225	225	100
Trimdon	327	324	101
Shadforth	249	244	102
Total	6832	6736	101

It is immediately apparent from Table 4.14 that the rapidly growing colliery population was almost invariably housed in single-family units of accommodation. In some townships no multiple occupation at all is recorded, whilst what is equally surprising

is the favourable supply of housing in those villages in which colliery sinking was taking place in the relevant census year. For example, in 1841 the ratios in East Murton, Shotton and Monk Hesleden indicate that an adequate supply of housing dated from the earliest years of the collieries, even before the first output of coal was achieved.⁽²⁷⁾ In addition, the speed with which housing was provided is evident from Wingate township where the 1831 housing stock of only twenty houses was increased by 1841 to 489. However, since the initial sinking of the colliery dated from 1837, with the formation in that year of the Wingate Grange Colliery Company, it can be seen that an average rate of house-building of c100 houses per year must have been achieved at Wingate between 1837 and 1841.⁽²⁸⁾ Finally, in 1851, with an overall family:house ratio of 101 and with the evidence of six townships in which no houses were shared by more than one family, Table 4.14 reinforces the conclusion that the agencies of housing provision were able to meet the demand created by labour migration to the new villages of the concealed coalfield.

iii) Occupation structures: changing patterns 1801-51

Although it is obvious to expect that the occupation structure of east Durham would be transformed by mining colonisation, any attempt to measure the economic change over this period at the township scale is rendered difficult because of the inconsistency of the methods by which information about employment was collected in the early censuses. As Bellamy and Armstrong demonstrate, the first census used a broadly-based and unsatisfactory threefold classification of the occupations of each person into agriculture; trade, manufacture, handicraft; others.⁽²⁹⁾ This method having

been considered a failure, in 1811 the occupational enumeration was adjusted to families rather than to persons. In 1821 and 1831 this revision was retained with, in the latter case, the enumerators being also required to state the number of adult male persons (i.e. twenty years or over), falling into nine major occupational categories (see Table 4.19). From 1841, the use of household census schedules incorporated the enumeration of the occupations of the total population, but unfortunately, the printed census tables derived from the 1841 and 1851 household returns contain no information about occupations at the township scale. In view of these circumstances, no occupation data is presented for 1841, but Table 4.20 has been calculated from the 1851 census enumerators' books for each household in the eight sample townships which are analysed in chapters 6 and 7.

Turning to the occupation data for the period 1801-51, Figs 4.3 to 4.9, Tables 4.15 to 4.20, the first census provided little information of value because all those not actively employed were placed in the "others" category, so making it impossible to calculate the relative importance of the occupation groups. However, in general terms, it can be seen that east Durham was largely agrarian in occupation structure with the ratio of agricultural employment to that of trade, manufacture and handicraft being 3.1 : 1. In every township except Castle Eden, numbers employed in agriculture exceeded those in trade, manufacture and handicraft, although small-scale concentrations of craftsmen were recorded in the nucleated villages such as Easington, Trimdon, Shotton, Pittington and Hetton (Fig 4.3). Only in Castle Eden did the location within the parish of a textile and sail-making factory explain why manufacturing employees out-

numbered agricultural workers.⁽³⁰⁾ (Table 4.15).

With the substitution of the family unit for the individual as the basis for the enumeration of occupations from 1811 onwards, it becomes possible to analyse the relative importance of the three occupation groups at both the regional and township scales. In 1811, 74% of the east Durham families were occupied primarily in agriculture, this being the first true measure of the economic structure of the study area, whilst just under 17% and 10% were employed in trade, manufacture, handicraft and "other" activities respectively (Table 4.16). As in 1801, the craftworkers' families were concentrated largely in the nucleated villages, whilst the "others" category was augmented by the inclusion of thirty three families in Hetton township, who probably represent the workforce employed to bore and sink the exploratory workings aimed at proving the feasibility of mining underneath the Hetton estate of John Lyon, the principal landowner in the township.⁽³¹⁾ However, in the great majority of east Durham townships Table 4.16 and Fig 4.4 indicate that agriculture provided the chief source of employment for most of the families.

The initial impact of mining colonisation upon the occupation structure of east Durham is apparent in the 1821 census with an increase in the trade and manufacture category to 28.4% and a reduction in the proportion of families supported by agriculture to 64.7%. To judge from the entries for Hetton and Pittington (Table 4.17), it would appear that in 1821, unlike in 1811, the families which were principally employed in mining, were added to the trade and manufacture category rather than to the "others" category. As mining exploration was underway in both of these townships by 1821, this change of category is largely responsible

for the recorded increase in employment in trade and manufacture from 1811 (Fig 4.5).

If the 1821 occupation table reflects the earliest pioneer phase of the mining colonisation of east Durham, then the employment statistics in 1831 (Table 4.18) represent the fuller impact of the process in the north west of the study area (Fig 4.6). It would appear that in 1831 the attribution of coal mining families was altered yet again, this time back again to the "others" category, so that by this date 56% of the families were listed in this group, compared with 23% in trade and manufacture and only 21% in agriculture (Table 4.18). This overall transformation of the regional employment structure was caused by the large-scale concentrations of mining families during the 1820s in the two townships of Hetton and Pittington, which accounted for 65% and 25% respectively of the total in the "other" employment category in 1831. Furthermore, the pioneer mining settlers in Haswell township attracted to the sinking at Haswell Colliery in 1831, are probably represented by the twelve families in the "other" occupation category. In contrast to the assignment of colliery workers to the "other" category, the attribution, by 1831, of 126 families in Dawdon township to employment in "trade, manufacture and handicraft", provides evidence of the construction workers and retailers at the new town of Seaham Harbour. Finally, for the remainder of the east Durham townships their occupation structures reflect the continued dominance of an agrarian economy, with the majority of the families supported either directly by agriculture, or indirectly through the provision of handicraft goods or services for the farm workers in the nucleated villages.

With reference to the more detailed classification of the

occupations of adult males in 1831, Table 4.21 below provides the regional employment structure, whilst Table 4.19 and Fig 4.7 give evidence at the township scale.

Table 4.21 East Durham 1831: Occupation of males
aged over 20 years.

<u>Occu- pation</u>		<u>Agric with occupiers</u>	<u>Agric with- out</u>	<u>Ag Lab</u>	<u>With machine manuf.</u>	<u>H'craft /retail</u>	<u>Caps/ bank- ers Prof.</u>	<u>Labs</u>	<u>Sts.</u>	<u>Others</u>
Total										
Number	3430	184	98	499	1	720	59	1799	24	46
%	100	5.4	2.9	14.7	-	21.1	1.7	52.8	0.7	1.4

It can be seen from Table 4.21 that over half the adult males were classed as non-agricultural labourers. That this attribution is not industry-specific can be seen from Table 4.19 in which, for example, the construction labourers in Dawdon township have been classified with the colliery workforce in the townships of Hetton, Pitlington and Haswell. However as it is probable that the great majority of the labourers enumerated in these townships did work in coal mining, the figures emphasise how revolutionary the impact of these early colliery sinkings was upon the employment structure of the region. For example, the 1004 labourers of Hetton township in 1831 represented 29.3% of total adult male employment in the study area. This provides evidence of the radically new scale of enterprise that the Hetton Coal Company brought to the concealed coalfield.

The second most important occupation group was handicraft/retail, undoubtedly a portmanteau classification embracing a variety of skills, crafts and retailing functions found both in the new colliery settlements as well as in the rural villages. The agrarian

base of the rural economy accounted in total for 23% of the adult male labour force, whilst the undiversified character of the economy of the region is emphasised by the virtual absence of employees in machine-based manufacturing industry. Furthermore the predominantly working class social structure, lacking a finely differentiated system of social gradations such as evolved in nineteenth century towns and cities, is suggested by the attenuated size of the Capitalist/Banker/Professional occupation group.

Occupation structure in 1851.

In Table 4.20 and Fig 4.8 the occupation structure of the eight sample townships, which have been totally reconstructed from the census enumerators' books, is presented using a modification of Booth's industrial classification designed to suit a set of coalfield communities.⁽³²⁾ In aggregate terms coal mining dominated the occupational structure with 61.3% of those employed directly employed in the mines and with no other occupation group accounting for as many as 10% of the total workforce. This lack of economic diversification is underlined by the modest contribution of 9.5% made by manufacturing/handicrafts to the employment structure and is further reinforced by the concentration of 45% of these workers in one settlement, Hetton-le-Hole. Within Hetton, craft workers were concentrated at Easington Lane and the neighbouring Four Lane Ends area, where many were employed in cabinet making;⁽³³⁾ a small group of engineers and enginewrights lived at Hetton Lyons, close to the engine shops of the Colliery Company, whilst several handicraft workers were found in the old village. Elsewhere in east Durham manufacturing/handicraft workers were restricted to small groups which represented a smaller proportion

of the workforce of the mining settlements than of the rural villages.

Perhaps a measure of the paucity of alternative employment opportunities on the concealed coalfield in 1851 is the observation that servants were the third most numerous occupation group, with 6.9% of the total. Overwhelmingly female, these servants were employed most frequently in rural households headed by farmers, land agents and persons of independent means. Only comparatively rarely were servants found in colliery households and in the mining communities servant-keeping was restricted largely to colliery officials.⁽³⁴⁾ Further evidence of the lack of occupational diversification in the study area is provided in Table 4.22 which shows that only twenty eight wives of household heads out of 3462 households in the sample villages were employed outside the domicile, a mere 0.8%. In addition, Table 4.20 shows the unimportance of all the remaining occupation groups, particularly those employed in construction, (1.9%) and those employed in the professions and in public service (1.3%). Whilst the latter incidence is not unexpected in a mid-nineteenth century coalfield, the small number of construction workers is surprising in an area in which the housing stock had recently risen steeply. Perhaps an explanation lies in the importance of the colliery companies themselves as housebuilding agencies in the pioneer stage of mining settlement and hence building workers may have been listed in the census books as colliery employees rather than as identifiably independent construction workers.

At the scale of the individual township, Table 4.20 and Fig 4.8 reveal a simple and obvious dichotomy between the occupation structures of the rural villages and the new colliery

settlements. Within the four townships which included both rural and mining settlement units, it was rare for coal miners to live in the former, whilst they represented at least 70% of the labour force in the latter. Correspondingly, the distribution of agricultural workers was the reverse, with c30% of the workforce of the rural villages directly employed on the land compared with between only 2-4% in the mining settlements. Clearly within these east Durham townships there was almost complete spatial segregation of the occupation groups in the rural and the mining communities. To further heighten this economic dualism a considerably higher proportion of the rural workforce was engaged in manufacturing and handicrafts compared with the mining communities; these workers generally followed traditional rural crafts which were rarely found in the colliery rows.

Only in the case of Hetton did the residential patterns of the occupation groups depart from this simple rural-urban model. From Table 4.20 and Fig 4.9 it can be seen that Hetton contained residential zones which were characterised by a pronounced degree of occupational segregation. For example, in three sections of the township, Bog Row, Hetton Downs and Brick Garth, the houses were overwhelmingly occupied by colliery families, with 84%, 78% and 70% respectively of the workforce employed in the mines. In marked contrast, a much more diversified workforce lived at Easington Lane where only 37% of the inhabitants were employed in mining, whilst as many as 25% were engaged in manufacturing and 10% in dealing. It is immediately apparent from the census books of this zone that households were occupied by a wide range of craft groups such as weavers, dyers, tinsplate workers and most interestingly a number of cabinet makers, many of whom had migrated

from Newcastle, in order to satisfy the demand for furniture created in the rapidly growing colliery villages in the vicinity.⁽³⁵⁾ In addition, Easington Lane also housed retailers, dealers and numbers of low grade service workers such as hawkers, rag and bone men as well as cadgers. These residents were frequently long-distance migrants, including the Irish, in contrast to the coal miners who were predominantly of Northumbrian origin.⁽³⁶⁾ (See chapter 7). Elsewhere within Hetton further occupational segregation was evident at Hetton Lyons where there was a small but noticeable concentration of colliery officials and skilled engineering workers. Further evidence that Hetton Lyons was the "Quality Row" of the settlement is provided by the surviving evidence of housing style and quality (Plate 7). The substantial, two-storeyed houses at the Lyons would provide a sharp visual reminder to the bulk of the colliery labour force of the real social gulf which separated them from the managerial, supervisory and skilled employees who lived in this part of the township. Finally, in the old village the pre-mining functions of the township are reflected in the occupation structure in 1851 with the proportion employed in agriculture, building, handicrafts, in the professions and as servants all being well above the average for the township in contrast to the concentration of colliery folk in the rows built in the old village of Bog Row.

In summary, it has been shown that the extension of large-scale coal mining enterprises onto the concealed coalfield of east Durham not only transformed the occupation structure within less than thirty years, but the colliery companies, as major capitalist employers of labour, contrast markedly with the organisation of other industrial activity in the region which was still

conducted along pre-industrial craft lines. Furthermore, apart from in Hetton township, there was almost total segregation, both spatially and socially, of the rural and the mining settlements.

iv) Colliery settlement morphology

In this final section answers will be sought to the following two questions;

I) What were the morphological characteristics of the mining settlements which had been established on the concealed coal-field by the mid-nineteenth century?

II) What agencies were responsible for their development?

I) Settlement morphology

a) Plan characteristics

From the contemporaneous evidence of the tithe plans (1838-45) and the First Edition O.S. maps and plans (1856), upon which Figs 4.10 to 4.12 are based, it is evident that the terrace or row was the basic plan unit in the colliery villages. However, in east Durham, in contrast to the South Wales coalfield, there were few physical constraints on the disposition of the rows, with the result that a variety of spatial arrangements can be identified. In some of the villages, the miners were accommodated in long terraces, aligned as in the case of Downs Lane at Hetton along former rural tracks.⁽³⁷⁾ More commonly, as at Murton, Shotton, Thornley, and Kelloe rectilinear grids of rows were built,⁽³⁸⁾ whilst in other villages such as Wingate, the settlement plan combined a row fronting onto a road with short terraces set at right angles to the main axis.⁽³⁹⁾ Elsewhere in east Durham, further variety of plan type was provided by the construction of court housing; at Hetton Downs the four-sided courts at High

Downs and Low Downs enclosed large open spaces, whilst at Brick Garth the houses were arranged in a parallel series of tightly-fitting three-sided courts.⁽⁴⁰⁾ Quite clearly no one type of plan dominated the colliery villages and a further plan element was sometimes present in the form of small groups of more substantial houses, usually somewhat removed from the miners' rows, which were built for colliery officials and skilled supervisory grades. Cargill's Court at Wingate Grange and Hetton Lyons, already referred to, provide examples of this feature.⁽⁴¹⁾

b) Colliery settlement plans and the pre-mining settlement pattern

From the cartographic evidence it is possible to identify a variety of spatial relationships between the mining settlements and the pre-mining cadaster and to suggest four plan responses as follows: -

i) Space infilling

Although other writers such as Smailes, Creigh and Hodgson,⁽⁴²⁾ who have examined the settlement morphology of the North Eastern coalfield, have identified a process of colliery housing being built within the plan of rural villages by means of infilling village greens and other open spaces, this response was only rarely found in east Durham. This was probably because of the paucity of large green villages and because of the large size and rapid growth of the colliery settlements on the concealed coalfield which demanded more space than could be provided within the existing village plans. The only example of colliery rows occupying vacant open spaces is at Bog Row in Hetton where thirty seven houses were crowded onto a cramped site near the Hetton Burn (Fig 4.13).

ii) Accretion

There is only one example in east Durham of the new colliery rows being simply added to the existing rural core; at Hetton there is map evidence that as early as 1827 the short rows built on the east side of the Houghton road opposite the old village, had been built (Fig 4.13).

iii) Spatial separation

By 1851 there were five parishes or townships in which the settlement pattern was characterised by the spatial separation of rural village from colliery settlement. This pattern reflected locational responses to widely contrasting sets of factors which influenced decisions concerned with the siting of agrarian settlements and mining communities. The siting of ancient rural settlements often represented the decision of 'land-cunning' Anglo-Saxon peasantry in response to environmental factors such as site drainage, soil type, aspect and water supply. In sharp contrast, the decision-making process for the location of colliery villages was determined, to judge from the evidence of chapter 5, by policy decisions made by those landowners who entered into leasing agreements with the east Durham colliery companies.

iv) Initial nucleation

Within those east Durham townships in which there were no true rural settlement nucleations, such as Wingate, Haswell, Thornley, Cassop and Quarrington, the rapid development of colliery villages represented the first nucleus of settlement, although as was mentioned above, the locational pattern of the mining settlement bore no relationship to the siting of the agrarian elements of the settlement pattern.

c) The built environment

It is intended in this section to summarise the principal characteristics of the physical fabric of the east Durham mining villages in the middle of the nineteenth century from a series of descriptive sources, namely, the photographic record, cartographic evidence, and written accounts.

i) Housing types

Most of the accommodation built for the immigrant colliery labour force fell into one of two categories which were described in the company records as single or double cottages. The single cottages were one-storeyed, two-roomed dwellings, in which the living space consisted of a kitchen and one bedroom.⁽⁴³⁾ From the evidence of the last few surviving examples found at Easington Lane, the external dimensions were fifteen feet wide by twenty nine feet deep and these cottages backed straight onto unmade lanes across which outhouses containing ash privvies were located.⁽⁴⁴⁾ The internal dimensions of the two rooms were approximately twelve feet square for the kitchen and fourteen feet by twelve for the bedroom. When it is calculated from the 1851 census enumerators' books for Easington Lane that the mean household size was 5.00, then even allowing for the likelihood that not all the housing was of the single cottage type, the occupancy rates must have exceeded two persons per room, a figure considerable in excess of the rates found by Crone in both Rhymney and Aberdare in the South Wales coalfield in 1851.⁽⁴⁵⁾ These single cottages were built from locally quarried Magnesian Limestone, the walls being roughly coursed or simply built from limestone rubble, crudely mortared. Roofed with pantiles, these low dwellings, which were no more than

seven feet nine inches in height to the eaves represented an adoption of the vernacular tradition of cottage style found in the east Durham rural villages of the time for housing the immigrant colliery labour force.

Contemporaneous with the single cottages and found within the same mining villages, sometimes built at the ends of the same rows, double cottages provided considerable more spacious accommodation for colliery families. With external ground plan dimensions typically twenty feet wide by thirty feet deep, and containing on the ground floor a front room about seventeen feet by thirteen feet and a similarly sized kitchen, double cottages also contained bedroom space on the first floor, usually divided into two bedrooms.⁽⁴⁶⁾ As these houses contained four habitable rooms, the occupancy rates were correspondingly reduced. For example, in the eighty two double cottages built by 1851 along Downs Lane,⁽⁴⁷⁾ the mean household size of 4.98 meant that the mean occupancy rate fell to 1.25 persons per room, a figure somewhat lower than was found in either Rhymney or Aberdare.⁽⁴⁸⁾

In addition to the single and double cottages which were built chiefly for the colliery labour force, the mining settlement also included larger more costly housing for the managerial and supervisory staff, which was usually segregated from the miners' rows. At Wingate Grange for example, £600 was spent on building the Viewer's house, compared with only £60 each for the double cottages and £35 each for the single cottages; at the same time the ten houses built initially at Cargill's Court for the underviewer and the overmen, cost an average of £75.⁽⁴⁹⁾ Similarly at Thornley Colliery, eighteen houses were built for £90 to accommodate the overmen, master wastemen, and master sinker;

the engineer's house was built at a cost of £180, whilst £700 was expended on the Viewer's house.⁽⁵⁰⁾ Meanwhile, in Hetton township, the fifty two houses at Hetton Lyons, which housed managerial and skilled colliery grades, provided substantial houses which were quite separate from the colliery rows located elsewhere in the township.⁽⁵¹⁾

ii) Public buildings

Summarising the photographic, cartographic and documentary evidence, it is apparent that there was a paucity of public buildings in the mining villages. However, the frequency with which nonconformist chapels had been rapidly erected was noted by the Commissioner appointed to enquire into the State of the Population in the Mining Districts, who observed,

"as soon as new works were opened and the cottages around them began to be inhabited Dissenting chapels at Wesleyans, Independents, Baptists and Primitive Methodists sprang up and Sunday schools were almost invariably opened in each." ⁽⁵²⁾

Certainly the frequent occurrence of chapels on the village plans (Figs 4.10 - 4.12) and the numerous references to their establishment in Whellan's directory (1856), confirms the Commissioner's observations. As a corollary to the vigorous early growth of nonconformism in the villages, it can be seen that the somewhat tardy reorganisation of the parochial system by the established Church in response to the rapid population growth in the district, the consecration of Anglican churches almost invariably post-dated the foundation of the dissenting chapels. There is also evidence that schools were built from the earliest years of the life of the villages, often at the expense of the colliery companies, who also paid the wages of the school staff.⁽⁵³⁾ In

some of the villages, reading rooms and small subscription libraries had been established, again usually by the companies, but perhaps a truer representation of the social activities of the mining communities is provided by the frequency with which public houses and beer shops were found, located often at the ends of the miners' rows.

iv) Mining installations and coal transport systems.

As can be seen from the maps and photographs, the villages were dominated visually by the colliery surface installations,⁽⁵⁴⁾ whilst by mid-century, the concealed coalfield had become criss-crossed by railways linking the mines to tidewater. Within the colliery yards, which could exceed fifteen acres in area,⁽⁵⁵⁾ the landscape was dominated by the twin headgear for the winding engines of the two shafts which had been sunk at each east Durham colliery. Boiler houses for the steam winding and pumping engines belched smoke from their tall chimneys; smithies and sawmills, forges, foundries and engine-fitting shops were all found within the various pityards of the collieries, whilst reservoirs to provide water for the engine boilers were located close to the colliery yards (Figs 4.10 - 4.12). Nearby, waste heaps were beginning to scar the environment, whilst many of the collieries also possessed brickfields and brick and tile works which utilise local superficial clay deposits, fired by readily available small coals. Most of the collieries contained quite extensive railway sidings where the coal wagons were shunted by horse traction until the early 1840s.⁽⁵⁶⁾ Along the rail links connecting the collieries to tidewater, a variety of means of haulage were used, including steam locomotives, stationary engines for the steeper gradients and self acting inclined planes.⁽⁵⁷⁾

II) The agencies of housing provision

Examination of the colliery company records up to the middle of the nineteenth century reveals few direct references to the problem of providing housing for the immigrant labour force compared with the wealth of detail concerning technical matters and commercial prospects, matters which were, one assumes, more central to the thinking of the colliery partnerships. However, from a series of scattered entries in various documentary collections,⁽⁵⁸⁾ it is possible to determine that it was the colliery companies themselves which were largely responsible for the construction of the early housing stock. This is in keeping with Jones' analysis of housing provision in the south Wales coalfield, where, in order to attract labour to remote valley mining sites, it was necessary, in the pioneer stage, for the colliery companies to provide housing themselves. Subsequently, the role of the colliery companies was replaced by alternative agencies such as speculative builders and self-help building clubs.⁽⁵⁹⁾ So too in east Durham, the colliery companies were obliged to estimate the cost and then construct the early rows at villages such as Hetton, South Hetton, Thornley, Wingate and Trimdon Grange, for which documentary evidence has been found, whilst there is no reason to believe that the agencies of housing provision were any different in the other east Durham villages for which the record would appear to be silent.

Evidence of the direct involvement of the colliery companies in the provision of housing and other buildings such as stables and workshops which were necessary for the initial development of the colliery, has come from a variety of sources. In the case of the Hetton Coal Company for example, a letter from the Company

to the Viewer, dated May 10 1822 specifies that,

" the pitmen's houses are to be immediately commenced,"⁽⁶⁰⁾

whilst in a valuation of the colliery a year later, reference is made to the miners' rows recently built by the company on the newly acquired Hetton Downs estate.⁽⁶¹⁾ Nearby, at South Hetton, an estimate in April 1830 of the total cost of winning the proposed colliery to the Main Coal seam was £66,668 of which £3000 was designated for building fifty workmen's houses.⁽⁶²⁾ In a footnote to the estimate, the following paragraph was added:-

"I have only calculated upon requiring fifty workmen's houses for persons whose residence immediately upon the spot is indispensable, since there are houses sufficient for the accommodation of the workmen to be taken in the neighbourhood." ⁽⁶³⁾

Two points of interest arise from this comment. Firstly, the Viewer was wrong to assume that the new workforce which was attracted to the winning at South Hetton could be accommodated in the neighbourhood, presumably at the nearest mining settlements in Easington Lane or at Haswell Colliery, as by 1851, South Hetton itself had grown to a community of 2400 in 430 households.⁽⁶⁴⁾ Secondly, the extract does demonstrate the expectation that company housing would have to be provided for the workforce of a colliery which was in the process of being sunk on a greenfield site.

Further south, in Wingate and Thornley townships, the evidence of the direct involvement of the companies as sole agents of housing provision at the genesis of the mining settlements, is even more explicit. At Wingate Grange, for example, there is evidence in a legal arbitration, of the sinking operations and the building of houses for workmen, shops, stables etc., under the

direction of the Viewer between 1837 and 1839.⁽⁶⁵⁾ Furthermore, included within the costs of the surface workings of the colliery incurred up to March 1839, which totalled £26092 the following items were identified: -⁽⁶⁶⁾

	£
225 double houses for pitmen @ £60 each	13,500
225 single houses for pitmen @ £35 each and other workmen	7,875
Viewer's house, with suitable conveniences	600
10 houses for underviewer, @ £75 each overmen etc.	750
	22,725

Similarly, at Thornley Colliery, in a report to the company from the Viewer, costs for the construction of double houses were put at £72 each, for the single houses £35 each, £700 for the Viewers house, £180 for the colliery engineer's house and £90 each for eighteen houses provided for a variety of colliery officials.⁽⁶⁷⁾

As a final example of the direct involvement of the east Durham companies in the provision of housing for their immigrant labour forces, at Trimdon Grange the colliery partnership had built thirty double cottages and 114 single cottages by 1858, as well as other necessary colliery buildings on thirteen acres of land adjacent to the pit, leased for this purpose by the company from two Trimdon landowners.⁽⁶⁸⁾

Summary

Perhaps it is appropriate to conclude this chapter, which has been designed to provide a description of the impact of mining colonisation upon the human geography of east Durham, with two contemporaneous quotations which graphically depict the typical

North-country mining village.

"The pitmen in the north of England reside much less commonly in the towns or villages than in clusters of small houses adjacent to the respective collieries and forming together little colonies, often more remarkable for the amount of the population, than the neatness or cleanliness of their domestic arrangements." (69)

Writing in part about east Durham in the 1850s, J.R. Leifchild observed that;

"At the old collieries some extremely forbidding dwellings are seen - confined and dismal. In newer collieries they are far better, as at South Hetton Taken generally, their habitations are mostly in "rows", and these again in pairs; their front doors facing each other, present a space generally clean, unpaved and without drains or channels. The space between each two rows of back doors, presents along the centre one long ash heap and dung hill - generally the playground of children in summer, with a coal heap and often a pigsty at the side of each door. Each row generally has a large oven, common to all its occupants; there are no conveniences. May not the filthy habits thus engendered operate in brutalising the pitmen and their families?" (70)

The scene is now set for the more complex analyses of the process and patterns of mining colonisation which provide the subject material for the next three chapters.

NOTES AND REFERENCES

- (1) Children's Employment Commission. Mines Part I, (1842)
Report on the coal mines of the south Durham coalfield between the Wear and the Tees, 143.
- (2) The photographic record has been drawn from the collection of photographs held at the Beamish Museum, Co. Durham, together with those taken by the author. See appendix 2. The chief documentary sources used in this chapter are as follows:-

Watson Coll N.E.I.M.M.E.
Johnson Papers N.E.I.M.M.E.
N.C.B. Coll D.C.R.O.
Liddle Coll D.C.R.O.
- (3) In 1801, the population of Easington township was 487.
- (4) There is evidence that Easington was the administrative centre of a unit of territory known as a shire, the origins of which are at least Anglo-Saxon in date.
- (5) In the footnotes to the 1831 census tables it is stated that,
"the population of Hetton has increased 4968 by the extension of the collieries. 1004 males aged over 20 years and 788 under 20 years are employed in the mines at Hetton."
Enumeration Abstract of the Answers and Returns, 1831 Census, Easington Ward, North Division, Hetton-le-Hole township, 170.
Hereafter this source is abbreviated to 'census table'.
- (6) Census table, Pittington township, 1831, 172. Footnote states:-
"There are collieries in progress in the township of Pittington, hence the great increase of population; 354 males aged over 20 years employed in the mines."
- (7) Census table, Dawdon township, 1831, 170. Footnote states:-
"the newly constructed harbour at Dawdon accounts for the great increase of the population."
- (8) See chapter 3 for details of the chronology of colliery sinkings in east Durham.
- (9) Census table, Hetton-le-Hole township, 1841, 85. Footnote states:-
"the great number of uninhabited houses and the decrease of population, arises from several new collieries having been opened in the surrounding townships, which has caused a large portion of the mining population to remove thither."

- (10) Census footnote references occur which attribute the rapid population growth in the following townships to the development of coal mines; Haswell, Shotton, Thornley, Coxhoe and Wingate.
- (11) For example, the census footnote for Monk Hesleden township states that,
"the increase of 314 persons arises from a railway passing through the township and the sinking of a new colliery."
Census table, Monk Hesleden township, 1841, 85.
- (12) Lawton R. The Census and Social Structure, (1978), 3.
- (13) Ibid, 14-17
- (14) Chi square test on the sex ratios in 1811 and 1821:
 $\sum x^2 = 6.9$
1 d.f. at s.l. 0.01 $x^2 = 6.64$
Therefore there is a significant difference at s.l. 0.01 between the 1811 and 1821 sex ratios.
- (15) See chapter 7 for a detailed discussion of the patterns of labour migration to the colliery villages up to 1851.
- (16) Chi square test on the sex ratios in 1801 and 1811:
 $\sum x^2 = 0.53$
1 d.f. at s.l. 0.05 $x^2 = 3.84$
Therefore there is not a significant difference at s.l. 0.05 between the 1801 and 1811 sex ratios.
- (17) See Table 4.5
- (18) Porteous J.D. The Company Town of Goole: An essay in Urban Genesis, University of Hull (1969), 24.
- (19) See chapter 6 for discussion of the incidence of lodging in the colliery villages.
- (20) See Table 4.6
- (21) It must be remembered that the value of this comparison is limited because the study area was not coincidental with Easington Ward.
- (22) It will be demonstrated in chapter 6 that the mining households were largely composed of nuclear family groups by 1851.
- (23) In 1821 the mean household size in Dawdon township had been even higher, at 11.7, but with only three inhabited houses in the township, the figure probably reflects the custom of farm workers living-in with their employers.

- (24) See Table 4.11
- (25) For example in the township of Bishopwearmouth in the north of Easington Ward and part of Sunderland, 3442 families lived in 2226 houses, a ratio of 155: 100 houses, in 1831. In 1851 parts of Newcastle-upon-Tyne located near the Tyne recorded over 2.5 families per house. See, (eds)
Barke M. and Buswell R.J. Historical Atlas of Newcastle upon Tyne, Newcastle Polytechnic, (1980), 27.
- (26) 'Plan of the Parish of Houghton-le-Spring Showing the Relative Situation of the Population in the Different Townships', (1827), Durham Diocesan Record, Order in Council U.D.D.P.D.
- (27) Coal was first drawn from Castle Eden colliery in Monk Hesleden township in 1842, from Murton Colliery in 1844 and from Shotton Colliery in 1849.
- (28) Infact over 450 houses were built at Wingate Grange between 1837 and 1839. See Johnson Papers, vol.9, Estimated costs of winning Wingate Grange Colliery, March 1839, 173.
- (29) Bellamy J.M. "Occupation statistics in the nineteenth century censuses," chapter 5 in (ed)
Lawton R. The Census and Social Structure (1978), 165.
Armstrong W.A. "The Use of Information About Occupation," chapter 6 in (ed)
Wrigley E.A. Nineteenth Century Society (1972), 192.
- (30) Moyes W.A. Mostly Mining, Newcastle upon Tyne (1969), 56-57.
- (31) See chapter 5 for a discussion of the early borings and sinkings on the Hetton estate, the earliest of which is recorded in 1772.
- (32) See Appendix 1 for a discussion of the problems encountered in the classification of the colliery population into social classes and occupational groups.
- (33) Nineteen cabinet makers were recorded in the 1851 census enumerators' books of Hetton township, of whom eighteen resided at Easington Lane in some cases as neighbours along the Easington road.
- (34) In Hetton for example, 34% of the colliery officials kept servants compared with only 4% of the coal miners in 1851.
- (35) See note 33.
- (36) The Irish-born formed 3.6% of the total Hetton population of which just over three-quarters lived in Easington Lane, where they formed 12% of the total population.
- (37) See Fig. 4.9.

- (38) See Figs 4.10 and 4.11 for detailed plans of Murton and Thornley townships.
- (39) See Fig. 4.12.
- (40) See Fig. 4.9.
- (41) See Fig. 4.12.
- (42) Smailes A.E. "The Development of the Northumberland and Durham Coalfield," Scottish Geographical Magazine, 51, (1935), 201-214.
- Smailes A.E. North England, second edition, (1968).
- Creigh J. "Landscape and People in East Durham," in (ed) House J.W. Northern Geographical Essays in Honour of G.H.J. Daysh, Newcastle upon Tyne, (1966), 217 - 226.
- Hodgson R.I. "Agricultural Improvement and Changing Regional Economies in the Eighteenth Century," in (eds), Baker A.R.H. & Harley J.B., Man Made the Land, (1973), 140-152.
- (43) See Plate 1 and Fig 4.14.
- (44) The dimensions were determined by a survey of surviving cottages at Easington Lane prior to their demolition.
See Fig 4.14.
- (45) Crone P.R. The Development of Working-Class Houses in South Wales, 1800-1875. Paper read to S.S.R.C. Seminar: Priorities for research on the internal structure of nineteenth century British towns. Univ. of Lancaster, April 1980, Table 1, Occupancy Rates.
- (46) See Plates 3 & 4 and Fig 4.15.
- (47) Census Enumerators' Books 1851, Hetton Township.
- (48) Crone P.R. op. cit.
- (49) Johnson Papers, Vol.9, 173.
- (50) Ibid, 177.
- (51) See Plate 7.
- (52) Parlt. Papers: The State of the Population in the Mining Districts of Northumberland and Durham, (1846), XXIV, 14.
- (53) Ibid. 19.
- (54) See Figs. 4.10 - 4.12 and Plates 9 - 12.

- (55) From the tithe plan and apportionment, Hetton colliery yard was sixteen acres in area whilst that at Eppleton colliery occupied ten acres. Hetton township: Tithe Plan and Apportionment (1839). Other east Durham colliery yards were of similar dimensions.
- (56) The use of horses to shunt the coal wagons in the colliery yards is clearly shown in various sketches by T.H. Hair, in
- HAIR T.H. A Series of Views of the Collieries in the Counties of Northumberland and Durham (1844), reprinted 1969.
- See Plate 9.
- (57) See Plates 14 - 16
Tomlinson W.W. The North Eastern Railway; its Rise and Development. Newcastle upon Tyne (1914) reprinted 1967.
- (58) See Note 2.
- (59) Jones P.N. Colliery Settlement in the South Wales Coalfield, 1850-1926, (1969), Univ. of Hull.
- (60) Watson Coll 'Hetton Colliery Reports,' Vol.45.
- (61) Watson Coll 'Valuation of the Hetton Coal Company and its Stock' 12 July 1823, Vol.45.
- (62) N.C.B. Coll 1/Th/14/(2)
- (63) Ibid.
- (64) Census Enumerators' Books 1851, Haswell township in which the mining settlement of South Hetton was located.
- (65) Johnson Papers, Vol.9 155.
- (66) Ibid. 173
- (67) Ibid. 177
- (68) Liddle Coll, D/X/498, 5.
- (69) Holland J. The History and Description of Fossil Fuel, (1835), 292.
- (70) Leifchild J.R. Our Coal and Our Coal Pits, (1835), 190.

CHAPTER 5

LANDOWNERSHIP AND THE DEVELOPMENT OF COAL-MINING,

1770 - 1850.

Introduction

The overall aim of this chapter is to examine, by means of an analysis of the relationships between the landowners and the colliery companies the decision-making process by which coal mining became established on the concealed coalfield of east Durham. The time period extends from the earliest record of active exploration for the coal reserves in east Durham in the second half of the eighteenth century, in particular from the 1770s onwards, through to the middle of the nineteenth century, by which time the majority of the collieries ultimately developed on the Magnesian Limestone, had been sunk. In order to achieve this broad aim the chapter has been planned as follows. After a brief introduction, a review of the secondary sources relevant to the theme of landownership and the development of coal mining nationally will be included, to provide in summary form the major generalisations which will be considered in the main body of the chapter by reference to the primary source material relevant to east Durham. Following this synthesis of the literary evidence, the bulk of the chapter will be concerned with seeking answers to three questions which have been designed to explore the relationships between the landowners and the development of coal mining on the concealed coalfield.

- i) To what extent were the east Durham landowners directly involved as coal masters who were actively engaged in the development

of mines?

ii) To what extent did the colliery companies become involved in the local land market?

iii) To what degree did the pre-mining pattern of landownership act as a spatial framework for the subsequent development of the coal mining landscape?

In answering the third question attention will focus upon the extent to which the siting and the locational patterns of the surface manifestations of coal mining, the mines themselves, the mining settlements and the transport lines were influenced by the decisions of the landowners.

Sources of information

In a sense this thesis in historical geography reflects, in the variety of data sources used, the gamut of methodological problems which can be encountered when historical sources are analysed geographically. On the one hand, the problems of handling and sampling the voluminous detail of the census enumerators' books which form the major data sources for chapters 6 and 7 have been raised in appendix 1. On the other hand, the documentary sources which provide most of the evidence for this chapter illustrate many of the well known problems which are inherent in the geographical analysis of historical source material outlined by historical geographers such as Baker, Hamshere and Langton,⁽¹⁾ including the random survival of documents and the need of the historical geographer to be aware of the context in which, and the motives for which the documentary evidence was compiled.

The most valuable source of information for the analysis of the process of the mining colonisation of east Durham during the

period 1770-1850 was a series of collected papers of those colliery viewers or managers who were directly involved with the planning and execution of the exploitation of the concealed coalfield. Of the many collections of manuscripts relating to the development of the Northumberland and Durham coalfield during this period, two in particular were found to be relevant to the study area, the Watson Collection and the Johnson Collection, both lodged in the North of England Institute of Mining and Mechanical Engineers in Newcastle-upon-Tyne. J. Watson and J. Johnson were both viewers involved with the sinking and management of mines in various sections of the coalfield, including east Durham. Their papers include reports and valuations of collieries, leases, arbitration case details, correspondence with landowners and colliery companies which provide a detailed insight into the complex set of processes which led to the successful exploitation of the east Durham coal reserves, although of course, much of the material consisted of technical matters not necessarily relevant or amenable to geographical analysis. Perhaps the best known of the Northumbrian colliery viewers was John Buddle, who managed the Durham mining interests of Lord Londonderry from 1819 until his death in 1843, as well as being an active advocate for the interests of the North Eastern coal owners on Parliamentary Commissions into the coal trade.⁽²⁾ Buddle's voluminous papers which are found both in the Londonderry Collection (DCRO) and in the North of England Institute, have been examined and used only selectively as the overwhelming part of Buddle's correspondence was concerned with the colliery operations and other business and estate interests of the Third Marquess of Londonderry rather than with the affairs of the neighbouring landowners on the east Durham

concealed coalfield. However, so high was Buddle's esteem as a viewer that his advice was frequently sought by other landowners and colliery companies and it is his views and reports on colliery workings in the study area that have been utilised on occasions in this chapter.

In addition to the papers of the three viewers, further documentary evidence of the process of mining colonisation in east Durham prior to the middle of the nineteenth century has been found in the estate papers of two local landowners, the rev. Edmund Shipperdson, who owned a 700 acre estate in East Murton township and the Baker-Baker family who owned 1600 acres of Pittington township based on their seat at Elemore Hall.⁽³⁾

Although both sets of papers, of which the former has proved to be more valuable, contain much material concerned with their possessions elsewhere and with non-mining estate matters, they do include correspondence, lease arrangements, reports and production and rental details which throw considerable light onto the process by which coal mining was initiated on their estates.

Further manuscript evidence of the development of the coal industry on the concealed coalfield is provided by the National Coal Board Collection.⁽⁴⁾ Of particular value amongst these papers is a series of coal lease agreements made between the South Hetton Colliery Company and various landowners in Haswell, Hawthorn and East Murton townships from the formation of the company in 1831, which were kept by the colliery company and handed over to the NCB on nationalization in 1947. Unfortunately not all the private companies were so concerned to permit the survival of the historic record and no other complete company records dating back to the first half of the nineteenth century have been dis-

covered for the concealed coalfield.

As a result of the chance creation and random survival of the manuscript evidence briefly outlined above, its geographical spread is discontinuous throughout east Durham with the richest documentary record found in the northern part of the concealed coalfield in Hetton parish (Watson Collection, Londonderry Papers), East Murton township (Shipperdson Papers, NCB Collection), Haswell township (Shipperdson Papers, NCB Collection) and Pittington township (Baker Baker Papers). For the other mining townships on the east Durham plateau, the documentary evidence is either partial as at Wingate and Trimdon (Buddle Papers, Johnson Collection) or virtually absent as at Thornley and Hutton Henry, as far as the searches of the writer can determine. Inevitably therefore, the analysis and ultimate conclusions in this chapter are biased towards the northern part of the study area, although there is no reason to suppose that this section of the coalfield experienced a process of mining development which was sufficiently dissimilar from the southern part to render generalizations invalid. To some extent, the spatial limitations of the documentary record are compensated for by the existence of the Tithe Maps and Apportionment documents for each of the townships and parishes in the study area. Through the use of the tithe data it is possible to determine the extent to which the coal companies had penetrated the regional land market by the period 1838-1845, through the purchase of land and the acquisition of leases on land in the area.⁽⁵⁾ Furthermore, the Tithe maps provide detailed cartographic evidence of the impact of coal mining on the environment of east Durham some fifteen to twenty years before the First Edition O.S. maps and plans which were surveyed in 1856-58. Unfortunately, the

Tithe evidence just pre-dates the development of coal mining in the townships of Shotton, Quarrington Hill and Hutton Henry and in Trimdon parish, where the first sinkings occurred in the years immediately following the surveying of the Tithe maps. Nevertheless it is considered that in overall terms, the historical record is sufficiently complete to permit the valid testing of generalizations concerned with the impact of landownership upon the process of mining development.

Landownership and the development of coal mining: a literature review.

It has been accurately observed that the coal industry was the earliest industrial sector in Britain in which developments in technology, in methods of capital accumulation, in entrepreneurial organisation and in labour relations were fashioned along modern lines.⁽⁶⁾ The importance of coal as the prime source of energy which powered the industrial transformation of Britain from the third quarter of the eighteenth century is well known and therefore it is somewhat surprising that, as Langton states, there are relatively few basic texts or detailed research papers on the industry, in particular on the contribution of landowning society to the development of the industry. Furthermore, the literature has been dominated by historians; very few geographers, with the important exception of John Langton, have contributed to the research effort of analysing the spatial outcomes of the impact of landowners on the development of the coal industry.

Perhaps the most useful fairly recent summary of the economic relationships between landed estates and the development of coal mining is provided by J.T. Ward and R.G. Wilson in their edited

symposium.⁽⁷⁾ Both D. Spring in his chapter on English Landowners and Nineteenth Century Industrialisation and J.T. Ward writing on Landowners and Mining, introduce generalizations that will be reviewed below and then tested in the main section of the chapter. In a further chapter R.W. Sturges examines in a regional case study of Staffordshire, the links between landownership and coal mining, to which reference will be made. In another series of edited essays, F. Crouzet considers at the national scale the extent to which the growth of what essentially was a rural industry depended upon the supply of capital from country landowners,⁽⁸⁾ whilst G.E. Mingay makes occasional reference to this theme in his works on landed society.⁽⁹⁾ Other writers have stressed the extent to which landowners participated directly in coal mining as an example of the movement of capital from land into industry from the seventeenth century onwards.⁽¹⁰⁾

Research at the scale of the individual coalfield into the economic linkages between landowners and the coal industry does not appear to be extensive. Langton painstakingly analysed the changing sources of capital which flowed into the south Lancashire coalfield in the seventeenth and eighteenth centuries,⁽¹¹⁾ whilst the contribution of one estate owner, the Newdigates of Arbury to the exploitation of the Warwickshire coalfield has been examined by A.W.A. White.⁽¹²⁾ In the case of the Northumberland and Durham coalfield, the close historic relationships between the landed aristocracy and gentry on the one hand and the development of coal mining on the other hand have been extensively researched however, with the most recent statement by P. Cromar who noted the prominence of local landowners in two major attempts by coal owners to control coal production and the coal trade, the Grand Alliance

and the Limitation of the Vend.⁽¹³⁾ (see chapter 3)

Summary of findings

Examination of the sources outlined above indicates that within the British Isles there has existed a long tradition of direct involvement by landed proprietors in coal mining as well as in the exploitation of other mineral and metal deposits. From the sixteenth century onwards, English landowners were able to claim the rights of ownership of the base minerals and metals beneath their estates, a privilege which was confirmed by Parliamentary statute in 1688 when the rights of the Crown were limited to mines for gold and silver.⁽¹⁴⁾ As a consequence of this legislation, one of the basic industries of the Industrial Revolution had direct access to landed wealth to further its exploitation, unlike the situation in several West European countries such as France, where ownership of the surface of the land did not bestow upon the landowner the right to exploit the mineral resources beneath his estate. Therefore from the seventeenth century onwards it is not surprising to find that the landed aristocracy and gentry in Britain sought to increase their incomes by the development of mining enterprises on their land. Many of the regional studies demonstrate how landed capital was used to stimulate the coal industry during the seventeenth and eighteenth centuries. Langton has shown convincingly how the small scale gentry on the south Lancashire coalfield in the seventeenth century ran a large majority of the collieries as direct estate enterprises,⁽¹⁵⁾ whilst on the Warwickshire coalfield the landed gentry also played a vital part in the early mining developments.⁽¹⁶⁾ On the small West Cumberland coalfield the ambition and drive of three landed

families was associated with the exploitation of the coal reserves as well as with the development of the three coal exporting ports of Whitehaven, Workington and Maryport.⁽¹⁷⁾

It was, however, on the Great Northern Coalfield that the largest number of landed colliery entrepreneurs was to be found in the seventeenth and eighteenth centuries. The oligopolistic control of the coal trade exerted by the coalowners of the rivers Tyne and Wear through production cartels such as the Grand Alliance (1726) and the Limitation of the Vend (1771-1845) symbolised the economic power wielded by the landed interests on the coalfield. Nevertheless it would be an oversimplification to suggest that landowners were the only coalmasters on the Northumberland and Durham coalfield, or on other British coalfields in the seventeenth and eighteenth centuries. Some of the major Durham landowners such as the Bishop and the Dean and Chapter of Durham Cathedral leased coal mining concessions to adventurers and entrepreneurs during this period. In a fascinating study of this process I. Leister analysed the spatio-temporal diffusion of coal mining in Rainton Manor within the mid-Wear exposed section of the Durham coalfield. During the seventeenth century small groups of colliers combined to sink shallow, short-life, multiple pit mines having leased the coal royalties on twenty one year leases from the Dean and Chapter.⁽¹⁸⁾ However, from the end of the seventeenth century the collier craftsmen were progressively replaced by larger scale entrepreneurs who brought either urban/ industrial capital to the industry or landed wealth. This process culminated in the early nineteenth century with the marriage of the Third Marquis of Londonderry to the heiress of Sir Henry Vane-Tempest in 1819, from which date Lord Londonderry ran the Rainton

collieries as large-scale capitalist undertakings.

However, with the development of the British coalfields there was, according to Crouzet, a general tendency for the direct working of their mineral resources by landlords to be replaced by a system of leasing the mining rights to partnerships or companies.⁽¹⁹⁾ Through this process the landowners tended to retreat to a rentier relationship with the coal industry; certainly by the second quarter of the nineteenth century most coalfield exploitation was conducted by mining interests quite divorced from the ownership of the land. Several reasons have been put forward to explain why most landowners had ceased to operate their own concerns during the nineteenth century.⁽²⁰⁾ With the increasing depth of collieries and the expanding scale of production and employment, much greater capital resources were required; landowners became increasingly unwilling to risk large portions of their capital as costs rose and as rates of profits tended to fall; a new class of viewers, managers and agents with technical, commercial and legal expertise took over the management of mines on estates and the expense of employing such men probably deterred some smaller landowners; furthermore this class of experts frequently themselves became co-partners in colliery companies operating with coal leases negotiated from rentier landlords.

Detailed regional exemplification of this temporal change in the pattern of direct involvement in coal mining is well illustrated by Langton's researches on the south west Lancashire coalfield.⁽²¹⁾ Here, although the landed gentry ran most of the collieries in the seventeenth century, they were responsible for only a small proportion of the considerable increase in output that occurred in the following century. Initially their place as

coalmasters was taken by small local men but by the time that the development of the coalfield had become influenced by canal construction from the 1730s, the expansion of the industry became increasingly financed by capitalists from outside the coalfield such as Liverpool and Cheshire coal-using industrialists in the south west section, and Bradford and Liverpool industrialists in the central area of the coalfield from the 1770s with the opening of the Leeds - Liverpool canal in 1774. As costs of mining rose and rates of profit fell, landowners withdrew from direct investment in the industry during the Industrial Revolution, being content with the possibly more secure returns from the rents of lessee coal operators. Crouzet notes a similar process on the South Wales coalfield where the landowners, who prior to the middle of the eighteenth century had dominated the development of the coal industry, subsequently began to give up working their collieries directly and increasingly leased them to English merchants and industrialists.⁽²²⁾ Similarly, by the middle of the eighteenth century on the Warwickshire coalfield a wide variety of entrepreneurs was found ranging from surviving landowners, through co-partnerships to lone colliers operating tiny, short-life pits.⁽²³⁾

In the case of the Northumberland and Durham coalfield a marked change had taken place in the extent of direct lordly involvement in coal mining by the second quarter of the nineteenth century. Compared with the situation in the eighteenth century when most proprietors worked their coal directly or through salaried agents,⁽²⁴⁾ by the late 1820s this was no longer the case. According to John Buddle, in 1829, only five of the forty one collieries on the river Tyne and three of the eighteen Wear

collieries were directly run by landowners, the rest being largely financed by partnerships.⁽²⁵⁾ Of the surviving landowning coal masters the most important included the Earl of Durham who, in the 1830s, owned six working and four dormant collieries in the Wear Valley as well as a private railway to Sunderland. In 1835 John Buddle calculated the Earl's industrial stock to be worth a little over half a million pounds although as Spring notes, the return on this capital fluctuated wildly as the estate passed through the booms and crises of the first half of the nineteenth century.⁽²⁶⁾ Another great owner-operator on the river Wear, Lord Londonderry, owned eleven collieries as late as 1853 as well as railways, an ironworks, a glass works and the port and town of Seaham Harbour which had been built between 1828 and 1835 as an outlet for the coal from his mines in the Rainton area about six miles inland. Not only did Londonderry work the reserves of coal under his estates directly as at Seaham Colliery, but he also leased concessions on the mineral resources of other landowners such as the Dean and Chapter of Durham Cathedral at Rainton.

When landowners let the mineral rights of their estates to lessee-operators, detailed leasing agreements or indentures were drawn up which according to Spring usually required the payment of a "certain" rent, being a fixed amount to be paid for an agreed number of years, whether coal was mined or not, and a royalty or "tentale" rent paid for each "ten" of coal mined in excess of the quantity specified in the certain rent.⁽²⁷⁾ Examination of the many leases entered into between the landowners and the colliery companies in east Durham confirms Spring's observations and it is proposed below to describe the character of these documents in a little more detail since they form the legal framework which

controlled the process of mining colonisation on the concealed coalfield and as such provide the essential documentary basis for the main part of this chapter. Almost all the leases followed a similar, rather tediously repetitive format: after a useful specification of the names of the landowner and the members of the colliery company involved in the lease, the following elements were found; the acreage of the concession and a description of the land; the term of the agreement (usually forty two years unlike the twenty one years referred to by Spring⁽²⁸⁾); the types of rent to be paid. This section usually included a detailed account of the types and amount of rent to be paid by the lessee such as the certain rent, the tentale rent, the wayleave rent to be paid to the landowner for coal carried over his estate by the coal company on a private railway as well as miscellaneous rents such as shaft, and outstroke rents.⁽²⁹⁾ Frequently no certain rent was paid for the first year or two of the agreement to enable the company to prove the commercial and technical feasibility of the undertaking. Almost invariably the tentale rent varied according to the seam with for example the highly-prized Hutton household coal seam commanding in the 1820s a rent of 22/6d per ten compared with the 17/6d per ten charged for the High and Low Main coal seams.⁽³⁰⁾

In addition to these crucial rental arrangements, the leases also provide detailed evidence of the decision-making process by which coal mining developed in a formerly rural part of the county and by which the elements of the colliery landscape were superimposed upon the pre-mining cadaster. References are made, for example, to the rights of the lessees to build waggonways to transport coal to specified destinations such as the river Wear

or the "German Ocean", frequently the width of the permanent way was restricted by the landlord to fifteen yards, except where cuttings or embankments occurred. Lessees were granted pit room and heap room to provide the site of the colliery installations and to enable the early pit waste to be accommodated. In addition the landowners granted the right to erect pit engines, stables, dwelling houses and other necessary surface installations. Lessees also frequently acquired the right to dig clay, make bricks and tiles, win stone, burn lime and make ponds, all processes essential to the early development of the mining industry. Also included within the leases are references to constraints imposed by the landowners upon the coal companies concerning the location of the various elements of the colliery landscape. As shall be exemplified below, the pits themselves, the waggonways, the pit heaps and the pitmen's housing were frequently positioned in accordance with clauses in the leases designed in some cases at least to minimise the visual impact of the industry upon the mansions of the landowners, a motive also identified by Sturges in his study of Landownership and Mining on the South Staffordshire Coalfield.⁽³¹⁾

Examination of subsequent cartographic evidence such as the First Edition O.S. 6" and 25" maps and plans reveals that these legal constraints had been observed by the companies and that in a very real sense "lordly" intervention was a significant factor in the evolution of the spatial patterns of human activity connected with the development of the concealed coalfield.

- i) To what extent were the east Durham landowners directly involved as coalmasters in the development of the concealed coalfield up to the middle of the nineteenth century?

In order to answer this question reference has been made to a variety of cartographic and documentary sources; J.T.W. Bell's map of landowners in the Hartlepool Coal District (1843)⁽³²⁾ upon which Figure 2.1 has been based has been supplemented by the tithe data and the appropriate coal company and estate papers. From this evidence it is immediately apparent that the generalization that by the second quarter of the nineteenth century landed proprietors played little direct part in the running of the collieries, is fully substantiated. Only four of the east Durham landowners were involved as colliery owners, Lord Londonderry, Lord Howden, George Baker and T.R.G. Braddyll and of these, only Lord Londonderry was a single owner-operator. Soon after his marriage in 1819 to Lady Frances Anne Vane-Tempest, through whom he acquired control of the Vane-Tempest collieries in the Rainton area, Lord Londonderry engrossed his estates in the county by the purchase of the 2426 acre Seaham estate from Sir Ralph Milbanke in 1821.⁽³³⁾ It was on this land that Londonderry built the port and town of Seaham Harbour after 1828 which was linked by his private Rainton - Seaham railway to his Wear valley collieries. By 1850 he was sinking a colliery on his estate at Seaham, a mile inland from the harbour. In the case of the three other landowners, Lord Howden was a co-partner in the Wingate Grange Colliery Company founded in 1837 to provide the capital for the creation of the mine in Wingate township; T.R.G. Braddyll was a co-partner in the South Hetton Colliery Company which was formed in 1831 and which by the late 1840s controlled South Hetton and Murton

collieries; George Baker had bought shares in the Hetton Coal Company from which he also received substantial royalties as a local landowner.

None of the other east Durham landowners appears to have invested directly in the burst of mining activity which characterised the period 1820-1850. For example the Lyon family at Hetton, the Shipperdson's of Murton, the Spearman family at Thornley, Rowland Burdon in Castle Eden and George Beckwith at Trimdon all preferred the same passive rentier relationship with the colliery companies that characterised much of the rest of the Northumberland and Durham coalfield by the second quarter of the nineteenth century as well as other British coalfields. No documentary evidence of the motives behind the decisions not to become directly involved in the winning of coal has been found, but it is reasonable to speculate along the following lines. Firstly, apart from Lord Londonderry and Lord Howden, the remaining landowners were chiefly small gentry rather than landed magnates; secondly, the costs of sinking shafts up to 1500 feet in depth to commercially viable coal seams, together with the attendant investment in surface installations, housing and mineral lines, could, by the 1830s cost up to £250,000 a dauntingly large sum for relatively small landowners to risk; thirdly, the safer role of rentier must have appeared very attractive as the east Durham landowners must have been fully aware of the scale of potential rental income from the example of estates elsewhere on the coalfield.

If the local landowning gentry were not actively involved in the exploitation of the coal seams beneath their estate, what type of organization was responsible for the process of mining colonisation and from what sources, social and regional, was the

necessary capital provided. For several of the collieries opened by the middle of the nineteenth century it is only possible to determine their ownership by the use of scattered references in directions and secondary sources.⁽³⁴⁾ However it is apparent that with the exception of Seaham Colliery which was run by Lord Londonderry as a sole mine operator, the mines on the concealed coalfield were all funded and operated by companies in the form of partnerships. Fortunately, for some of the colliery enterprises, such as those at Hetton, South Hetton, Murton, Haswell and Wingate, the survival of company records and viewers' correspondence permits a fuller examination of the structure of the colliery companies and the direction of capital flows into the east Durham mining industry.

In general terms, the collieries were run by partnerships, each partner investing an initial sum in order to purchase a certain number of shares. By this means the first capital was raised with which to proceed with the sinking operations. The first company so formed on the concealed coalfield, the Hetton Coal Company, was created in 1820. The survival of the initial list of partners throws an interesting light upon the type of organization, the social and geographical backgrounds of the partners and comments upon their financial status by John Buddle.⁽³⁵⁾ As the list was found in the Londonderry Collection and as Buddle was Lord Londonderry's chief viewer at the time, the disparaging tone of his references to their monetary circumstances, perhaps suggests how the formation of this new company to exploit the coal district immediately to the east of Londonderry's Rainton workings, must have presented a potential trade threat to the position of the Marquis in the Wear coal trade. From the list it is possible to

make the following observations. The eleven initial co-partners came from disparate backgrounds with landed interests only weakly represented by one minor shareholder; more frequently the first capital had been put up by Durham-based lawyers or by men already involved as viewers in the coal industry on the exposed Durham coalfield. The latter support Ward's comment on the increasing involvement of skilled agents in the ownership of collieries during the first half of the nineteenth century.⁽³⁶⁾ Although most of the partners were local to the North East coalfield, one of the major shareholders, the Hon. Archibald Cochrane was a retired Admiral with property in London, and an estate in the Home Counties in Essex. Three of the shareholders lived in Bishopwearmouth, the designated outlet for the company's sea-sale coal to which the Hetton collieries were linked by a company waggonway. It is likely therefore, that business interests on Wearside were keenly aware of the new mining venture located seven miles to the south in which capital could be risked in the search for profitable investment. Clues as to the close family networks that appear to have operated on the coalfield at this time are provided by Buddle's comments on William Stobart and Robert Darnell, whilst the instruction at the foot of the list underlines the importance of the regional banking system in the provision of a channel for the flow of capital from a variety of sources to the coal industry. By 1829, the Hetton Coal Company had grown to include nineteen co-partners holding between them thirty six shares.⁽³⁷⁾ Although biographical details of some of the new shareholders have not been found, others have been traced as follows: Mr. Mowbray and Mr. Dunn were viewers of Hetton colliery; Mr. Baker was a major local landowner at Elemore; Mr. Gully was a famous prizefighter who had

List of Hetton Coal Company 1820

<u>No. of shares</u>	<u>Name</u>	<u>First Advance</u> £	<u>Sum to be paid</u> £	<u>Comment by J. Buddle</u>
5	Richard Scruton Durham	300	950	An attorney, worth £15-20000, little loose money.
4	Hon. Archibald Cochrane, Eppleton.	600	400	Has the Langley estate £10-12000. £2000 let out on a mortgage which has been called in to go to Hetton.
3	Alex. Whalley Light, Durham		750	Worth £2-3000, but no spare money.
2	Wm. Hayton, Bishopwearmouth		500	His solvency is even questionable.
2	Thos. Horn, Bishopwearmouth		500	All his money is em- barked in business.
2	John Dunn, Durham		500	An attorney worth £4-5000 in property.
2	Wm. Stobart Jnr. Viewer, Picktree near Chester-le Street.		500	Has a pit taken of Mr. Lambton to work and sell the coals; has no money; married Hayton's daughter three months ago.
1	Hon. Erskine Cochrane		250	Have no information re- specting this Cochrane.
1	Rbt. Darnell, Bishopwearmouth		250	Mowbray's nephew; a brewer; has no money.
1	John Wood, viewer to Grand Allies		250	Can have nothing but the savings out of his salary.
1	Mr. Lynn Smart, Trewhitt, Northumberland.		250	A country esquire; no spare money.
<u>24</u>	<u>@ £250</u>	<u>£900</u>	<u>£5150</u>	
		<u>Total</u>	<u>£6050</u>	

The above sums are to be paid into the Bank of Ridley & Co. on or before the 20th December, 1820, who are requested to open an account in the name of the above firm.

Source D/LO/B 309(19).

invested some of his earnings in the ring in this colliery as well as in Thornley colliery (see note 34). As in 1820, it would seem that major injections into the colliery company of regionally derived capital were supplemented by finance from outside the coal-field.

Approximately two miles south of Hetton, in the north of Haswell township a new colliery was sunk in 1831 at South Hetton. Through the use of the South Hetton Colliery Company records and the Shipperdson papers it is possible to determine the composition and origin of the early members of the company. At its inception the company was a co-partnership of three, T.R.G.Braddyll, Matthew Forster and William Green.⁽³⁸⁾ Braddyll, who owned a 689 acre estate in Haswell township upon which the colliery was sited was a major landowner in north Lancashire and Cumberland with a seat at Conishead Priory.⁽³⁹⁾ He had the Haswell estate surveyed as early as 1821 for its potential coal wealth and subsequently became the chief shareholder in the coal company.⁽⁴⁰⁾ Matthew Forster, of New City Chambers was a London merchant, whether of coal or other commodities is not known, whilst William Green was a surgeon who lived in Durham City. The sixty four shares of the partnership were divided in the proportion 36, 18 and 10 respectively in 1831, although the monetary value of each share is not known. By 1834, the number of partners in the company had increased to eight, details of whom are listed below.⁽⁴¹⁾

List of South Hetton Colliery Company -

2nd September 1834

<u>Name</u>	<u>Residence</u>	<u>Occupation</u>
Robert Ingram Shafto	Durham City	Gent.
John Burrell	Durham City	Gent.
T.R.G. Braddyll	Conishead Priory, Lancs.	Gent.
William Green	Durham City	Surgeon
Matthew Forster	New City Chambers, London	Merchant
Thomas Rawsthorne	Lancaster	Esq.
William Clayton	Preston	Banker
William Taylor	Preston	Cotton Manufacturer

Source NCB Coll /1/d 90(15)

In the three years since the founding of the company, capital had been invested from both Durham landed interests such as the Shafto family and from another sector of the industrial economy, the cotton textile industry of Lancashire, quite possibly arranged through Braddyll's network of contacts in Lancashire. This could well provide an interesting example of an inter-regional and inter-sectoral flow of capital characteristic of the Industrial Revolution.⁽⁴²⁾

Elsewhere on the concealed coalfield the documentary record of the structure of and capital flows to the newly formed colliery partnerships is frustratingly incomplete. However, in the case of Wingate Grange Colliery a reference makes it clear that the company was initiated by two partners, Messrs. Johnson and Cargill.⁽⁴³⁾ Within months of the formation of the company in 1837 Lord Howden, the proprietor of the Wingate estate upon which the colliery was being sunk, was admitted as a co-partner with a half share,

leaving Johnson and Cargill with a quarter share each. It was further agreed that Lord Howden's share should be further divided by allotting portions to three of his agents, Mr. Horsington to receive one quarter of such a share, Mr. Richardson one eighth and Mr. Forster one eighth, Lord Howden to retain one quarter of the colliery.⁽⁴⁴⁾ It was also specified that Johnson and Cargill should be responsible for general management, Forster for sinking and Richardson for upper ground management. No duties for Horsington were mentioned, although his subsequent role in the creation of the colliery village is mentioned later in the chapter. It would appear therefore that the early colliery developments at Wingate were financed by a major contribution of capital from a landed proprietor whose principal seat was at Howden in the East Riding of Yorkshire,⁽⁴⁵⁾ and a managerial group of unknown origin, except for Horsington who in a legal conveyance granting him the lease of four fields in Wingate township, is listed as living in Tadcaster.⁽⁴⁶⁾

The dangers inherent in generalizing about the social structure and regional origins of the colliery companies are exemplified by an examination of the membership of the Haswell Colliery Company. In a lease agreement dating from 1859 the three co-owners are named as Hugh Taylor of Earsdon, Northumberland, Gent; Joseph Lamb of Axwell Park, Durham, Gent and William Maude of Selaby Hall near Staindrop, Durham, Gent.⁽⁴⁷⁾ In this case the owners came from landed estate backgrounds, there being no exemplification of the involvement of lawyers, colliery agents or other industrialists in the composition of the company as has been recorded elsewhere in east Durham.

To summarise the findings about the structure of the colliery

companies that initiated the process of mining colonisation in east Durham, despite the limitations of data sources it can be postulated that i) although local landowners were only weakly represented in the various partnerships, major landowners from elsewhere in North East England, as well as further afield in Yorkshire and Lancashire, had invested significantly in these mining ventures; ii) mining viewers and agents were actively involved as co-partners in several of the companies; iii) some examples of long-distance capital flows and the movement of finance from one industrial sector to another have been detected although it is impossible to quantify the relative contributions to the industry of the various sources of capital.

ii) To what extent did the colliery companies become involved in the local land market before the middle of the nineteenth century?

In order to answer this question it is proposed to divide the analysis into three parts: a) firstly, there will be an examination of the extent to which the colliery companies became landowners in their own right; b) secondly, the patterns of leasing the surface of the land from estate owners by the companies will be identified; c) thirdly, the chronological sequence and spatial diffusion of the acquisition of coal concessions by the colliery partnerships from the owners of the surface of the land will be reconstructed.

a) From the evidence of the tithe data and J.T.W. Bell's Landownership map (see note 32) it can be seen that by the early to mid 1840s the coal companies had made only a modest impact

upon the pattern of landownership in east Durham (Fig 5.1). The Hetton Coal Company owned an estate of 161 acres in Hetton township,⁽⁴⁸⁾ the South Hetton Colliery Company owned an eighty one acre farm in Hawthorn township close to the site of South Hetton Colliery,⁽⁴⁹⁾ whilst the Haswell Coal Company had purchased 1285 acres of land in Shotton township.⁽⁵⁰⁾ In the case of Hetton, the estate of the coal company was located at Hetton Downs in the northern part of the township and there is evidence that the acquisition of this land dates from the earliest years of the company's mining operations. For example in a colliery valuation of 1823 there is reference to the company's twenty eight acre estate at Hetton Downs,⁽⁵¹⁾ whilst by 1825 an estate plan of Hetton township indicates the ownership of a 161 acre block of land at Hetton Downs by the company.⁽⁵²⁾ This estate was identical in area to that recorded in the 1839 Tithe map and apportionment for Hetton township. It was on their Hetton Downs estate that the company built the rows and courts of workmen's houses in the years immediately following the successful sinking at Hetton Lyons. As early as 1827, 110 houses had been constructed, in two blocks at High Downs and Low Downs;⁽⁵³⁾ by 1851 the census enumerators' books record the presence of 243 households in this locality, which were headed in 198 cases (81%) by coal miners.⁽⁵⁴⁾ Quite clearly the coal company had bought this estate in its first few years of existence and had used it to locate the largest single concentration of miners' housing in Hetton.

Elsewhere on the concealed coalfield, the major land purchase by the Haswell Coal Company in Shotton township effected by 1839, the date of the Shotton township tithe map, included the 224 acre Farrowsmoor farm upon which during the 1840s the colliery and

early mining settlement of Shotton Colliery had been developed by the company. However, the company had also bought up extensive lands in the east and south of the township, as well as plots in the old village itself including Shotton Hall and its pleasure grounds (Fig 5.1). Unfortunately, as there is no documentary evidence of these property acquisitions, it is not possible to determine why the Haswell Coal Company alone in east Durham should have entered the land market so vigorously in the 1830s and purchase the surface of the land, rather than enter into the customary lease agreements for the coal concessions. Also why the company bought land in Shotton township but not in Haswell township is not clear from the record.

Finally, the only other company to have bought land, the South Hetton Colliery partnership, had by 1839 acquired the small Coup House Carr estate of eighty one acres in Hawthorn township, presumably as an agricultural enterprise.

b) Figure 5.1 also shows the distribution of land which had been leased by the coal companies up to the time of the tithe surveys from 1838-1845. As the map shows, larger sections of the northern part of the study area had been leased by the companies, but this reflects not so much a difference in company policy as the fact that in the southerly townships of Hutton Henry, Trimdon and Quarrington, the tithe data pre date the opening of the mines. The following table lists for each of the companies the township and acreage of land for which they were entered as occupier in the relevant tithe apportionment documents.

Table 5.1 Lands leased by the east Durham colliery
companies 1838-45.

<u>Hetton Coal Company</u>		<u>South Hetton Colliery Company</u>	
	<u>acres</u>		<u>acres</u>
Hetton township	487	East Murton township	303
Great Eppleton township	76	Haswell township	172
Little Eppleton township	297		<u>475</u>
Pittington township	271		
	<u>1131</u>		
<u>Thornley Colliery Company</u>		<u>Haswell Colliery Company</u>	
	<u>acres</u>		<u>acres</u>
Thornley township	453	Haswell township	342
Shadforth township	239		
	<u>692</u>		
<u>Wingate Grange Colliery Company</u>		Total acreage: 3633	
	<u>acres</u>		<u></u>
Wingate township	993		

If, as is being argued, the acquisition of leases for the occupation of the surface of the land is one measure of the involvement of the colliery companies in the east Durham land market, then it is necessary to examine the locations of these areas and to determine the use to which the companies put them, in order to understand the motives behind these transactions. In the case of the Hetton Coal Company, the enterprise which was most actively involved in the holding of land during this period, the company had, in the first twenty years of its existence, acquired the lease of a large discrete block of land extending into four contiguous townships. Within Hetton township itself, the total of 487 acres

occupied by the company was largely rented from the Lyon estate with only eleven acres leased from other landowners.⁽⁵⁵⁾ The land occupied by the company lay in an arc almost completely surrounding its own Hetton Downs estate (Fig 5.1). As might be expected, the sixteen acre site of the surface installations of Hetton Lyons Colliery was included in the area leased from the Lyon family, as was the whole of the north western part of the township. It is possible that the company had leased this section of the Hetton estate as it coincided with the exposed section of the coalfield and the company would have been aware of the sporadic attempts to sink borings to prove coal beneath this land from as early as 1772.⁽⁵⁶⁾ Possibly they hoped, incorrectly as is now known, that there might be a successful sinking in this part of the township, where the coal seams are not covered by the Magnesian Limestone. Included in the tenancy of the coal company were three farms, Lane House Farm, Houghton Way Farm and Hemels Farm; all were working farms occupied by tenant farmers in 1851, thus illustrating the diversity of the economic interests of the company.⁽⁵⁷⁾ Small pieces of land were also leased close to its colliery installations with a view to their future use for industrial purposes. For example, the field immediately to the east of Hetton Lyons Colliery, leased from R.J. Pemberton, was subsequently used as a colliery waste heap since the site of the pityard, the original area for waste disposal, had become inadequate for this purpose by the mid 1850s.⁽⁵⁸⁾ Similarly, part of the three fields lying just south of Brick Garth, which were leased from the Lyon estate, were used in the years immediately after 1839 to provide heap room for Elemore colliery.

In the neighbouring township of Great Eppleton, the Hetton

Coal Company occupied the whole of the seventy six acre estate of the Lyon family that was adjacent to their Hetton lands. Nearly twelve acres were taken up by the surface installations of Eppleton colliery and a section of the Eppleton branch of the Hetton waggonway. This territorial involvement of the coal company with the local landowners was repeated in Little Eppleton township; here, the sole landowner, G.T. Fox retained the occupance of the woods and plantations only; the coal company held all the agricultural land as well as Eppleton Hall and its associated pleasure ground and farm buildings. This arrangement clearly dated from the earliest days of the Hetton Coal Company as in a letter from G.T. Fox to the viewer John Watson dated August 22 1821, Watson is authorised to let the farm and the mansion house to the coal company, the latter to be occupied by Archibald Cochrane, one of the chief partners of the colliery enterprise.⁽⁵⁹⁾ From further information in the letter it is also possible to gain some insight into the conditions of the lease. The rent of the mansion house and the farm was fixed at £425 per annum and the land was to be cultivated by an agreed scheme which involved the traditional Durham system of working the tillage on a three year rotation and the annual manuring of sections of the grassland (see chapter 2). From this evidence it is clear that the colliery enterprise had become, from its earliest days, directly involved in the exploitation of the surface resources of the area as well as the hidden mineral reserves. The final portion of land leased by the Hetton company lay in the eastern part of Pitlington township, adjacent to its leaseholdings in Hetton township. Both agricultural and mining activities were represented in the uses to which this land was put as it embraced both the working farm of Hetton-on-the-Hill

and the surface installations of Elemore colliery.

Turning to the South Hetton Colliery Company, it, like the Hetton Company, had by the early 1840s entered into lease agreements with local landowners, albeit on a smaller scale. In East Murton township the company, by 1843, had occupied 303 acres of the estate of the chief landowner, Edward Shipperdson. This portion of Shipperdson's estate included both mining and agricultural forms of land use; a farmstead with two homestalls in the rural village worked the agricultural component of the company's leasehold but the tenancy also included the seventeen acre site of Murton colliery, the two mineral lines linking the colliery to the Durham - Sunderland railway and the early rows of colliery cottages. Furthermore, the company also held the fields to the south of the colliery upon which the extensions to the colliery settlement had been built by the mid-1850s.⁽⁶⁰⁾ Subsequent involvement of the company in the agricultural economy of the township is indicated by the evidence of an Inland Revenue document drawn up on the death of a local farmer Thomas Tate in 1861.⁽⁶¹⁾ In the description of Tate's possessions including his seventy six acre farm located immediately to the north east of Murton Colliery, it is mentioned that the whole of the farm was occupied by the South Hetton Colliery Company at an annual rent of £95. Turning to Haswell township, the 172 acre farm which the South Hetton Colliery partnership leased from the chief co-partner, T.R.G. Braddyll, included the site of the colliery with its assemblage of surface installations and the miners' rows built to accommodate the workforce in the 1830s. Similarly, in the same township, the 342 acre Haswell Colliery farm leased by the Haswell Coal Company from Sir George Shee included the site of Haswell colliery and the

attendant miners' housing. Further south, the Thornley Colliery Company had, by 1844, leased 453 acres of land from Henry John Spearman, the sole landowner in the township. Included in this tenancy was a farm house and its farm land as well as a fifty three acre plot which enclosed both Thornley colliery and the nascent mining settlement known at the time as New Thornley. Finally, in Wingate township, the colliery company is listed in the tithe apportionment as occupying the whole of Lord Howden's 993 acre estate. As with the other examples, the colliery installations and the early miners' rows were located on part of this land leased by Lord Howden to the co-partnership (Fig 5.1).

In summary, therefore, it can be maintained that, by the early 1840s, the colliery companies in operation on the concealed coal-field had entered into the local land market by taking out leases on extensive portions of land. Within the legal framework of lease acquisition there evolved the spatial patterning of the assemblage of elements that constituted the colliery landscape. The location of the mines themselves, their surface installations, the railway links to tidewater and the colliery settlements, were all located with reference to the leasing policies of the colliery companies. In no sense were the surface manifestations of coal mining ruthlessly and insensitively superimposed upon the pre-industrial landscape; indeed, rapid as the mining colonisation process in east Durham was, the pre-mining cadaster effectively controlled the spatial evolution of the colliery landscape of the concealed coalfield.

c) The acquisition of coal concessions up to the middle of the nineteenth century.

In Figure 5.2 the distribution of coal concessions acquired

Table 5.2 Acquisition of Coal Leases in East Durham
1820-1850

Hetton Colliery Company: (Hetton Lyons, Elemore and Eppleton
Collieries)

<u>Landowner</u>	<u>Acreage</u>	<u>Date</u>
J. Lyon	894	1820
G.T. Fox	335	1821
Wm. Hutchinson	88	1823
F. Mascall	526	1824
G. Baker	1600	1825
E. Shipperdson	790	1825(Lease given up in 1828: subsequently leased by South Hetton Colliery Company)
	<u>4233</u>	

South Hetton Colliery Company: (South Hetton and Murton Collieries)

J. Gregson	448	1831
J. Gregson	17	1831
E. Shipperdson	755	1831
E.S.R.B. Braddyll	718	1831
Sir M.W. Ridley	70	1833
B. Ogden	122	1835
T. Tate	76	1838
Easington Glebe	560	1838
	<u>2766</u>	

Haswell Coal Company: (Haswell and Shotton Collieries)

Sir George Shee	290	1839

Wingate Grange Colliery Company: (Wingate Grange Colliery)

R. Burdon	1060	1837
Lord Howden	1100	1837
	<u>2160</u>	

Trimdon Colliery Company: (Trimdon Colliery)

Various lessors	816	1844

Trimdon Grange Colliery Company (Trimdon Grange Colliery)

Messrs. Beckwith & Darling	163	

Total 10428

by the colliery companies up to the mid 1840s is shown for the study area, whilst the above table incorporates an outline of those coal lease agreements for which documentary evidence survives. The table is incomplete in two senses, Firstly, for some of the collieries which had been sunk by the late 1840s such as South Wingate, Thornley and Quarrington, no written evidence of the leasing of coal concessions has been found; secondly even in the case of well-documented colliery companies such as those at Hetton and South Hetton, the survival of coal lease agreements is only partial. Some measure of the incomplete survival rate of the coal leases can be seen by comparing the total acreages of the concessions given in Table 5.3 with the summation of the surviving leases given in Table 5.2.

Table 5.3 Extent of coal concessions July 1837 (Source
J. Johnson Views & Reports
Book No.9, 266).

	<u>Acreage</u>
Hetton Coal Company	5478
South Hetton Colliery Company	6327
Haswell Colliery Company	10004
Thornley Colliery Company	6140
Total	<u>27949</u>

Incomplete as the evidence in Table 5.2 is, it is likely that it contains a sufficiently representative sample of leases, similar and repetitive in format as so many of them were, to permit the subsequent reconstruction of the actual process by which the mining interests gained legal title to the resource, the exploitation of which formed the economic basis for the transformation of the area.

The first lease of coal under the concealed coalfield was

granted by John Lyon, the Lord of Hetton manor, to the newly-formed Hetton Coal Company in June 1820, some three months after the issue of the first prospectus for the creation of the partnership.⁽⁶²⁾ By the terms of this lease the company enjoyed the right to mine for coal under the whole of Lyon's land except for the seams under Hetton Hall and for a distance of thirty yards around the mansion house in order to minimise the risk of subsidence. In return, the company was to pay a certain rent of £1500 for the sixth and subsequent years of the forty two year lease, having paid a reduced rent of £1250 for the third, fourth and fifth years of the lease and no certain rent for the first two years whilst Hetton Lyons colliery was being sunk (1820-1822). Sliding scales of certain rent such as this were almost universally found in the leases examined, being designed to allow for colliery sinking, which in east Durham could take two years at the very least and for the build-up of production. In addition, the company agreed to pay the landowner a tentale rent of 22/6d per ten for Hutton seam coal, 20/- per ten for High and Low Main seam coal and half rent for small coals from these seams. These rental arrangements too, whereby the lessees paid differential tentale rents for various seams depending upon their price in the London coal market and half rents for the small coals which had passed through the colliery screens and which were not prized in the household coal trade, were invariably found in the east Durham coal agreements. It is not proposed therefore, to make individual references to such rental arrangements in the following section of this chapter.

It would be erroneous to assume, however, that this coal lease represented the earliest evidence of commercial interest in the

coal resources of Hetton township. As indicated in chapter 3 sporadic attempts to bore for coal can be securely dated to as early as 1772, whilst in 1783 an indenture drawn up between William Hutchinson and Thomas Lyon (John Lyon's father) released 120 acres of land and coal mines at Hetton from the former to the latter for £350.⁽⁶³⁾ "Coal mines" in this context refer to the coal deposits rather than to the installations required to exploit the resource. Somewhat later, in 1816, the Rt. Hon. Lady Frances Anne Vane-Tempest, who in 1819 was to marry Lord Londonderry, proposed a colliery lease with John Lyon for his coal mines at Hetton, in order to extend her Rainton coal workings.⁽⁶⁴⁾ Although the proposal was rejected by Lyon, the lease is of interest as it states that, "the lessees are to have the benefit of the pit as now sunk and standing on the Hetton estate with all the erections and houses made for the use of the colliery with no change to be made."⁽⁶⁵⁾ This unsuccessful pit which had been begun in 1811, was located in the north west of Lyon's estate on the exposed coal measures⁽⁶⁶⁾ and was the last of a series of unsuccessful sinkings in the townships before the winning of Hetton Lyons Colliery between 1820 and 1822.

Interest by Lord Londonderry in the coal reserves under Hetton township immediately to the east of his Rainton coal mines leased from the Dean and Chapter immediately after his marriage to Lady Frances Anne is demonstrated in a flurry of correspondence between the Marquis and two Hetton landowners, Messrs. Clutterbuck and Emerson, who owned a share in the coal under part of Lyon's estate.⁽⁶⁷⁾ Although offered generous rental terms in July 1820 by Lord Londonderry such as £1000 certain rent and tentale rents as high as 28/- per ten for both the Main and Hutton coal seams for

their own third share of coal under 470 acres and their one half share of 130 acres,⁽⁶⁸⁾ the joint landowners, after taking legal advice, agreed to cooperate with John Lyon and accept the lease terms on offer by the Hetton Coal Company. It is likely that Lyon exerted considerable pressure upon the two small landowners to adopt this course as we learn from the legal case that the Hetton Coal Company would only agree to a coal lease with Lyon provided that they could also obtain a concession from Clutterbuck and Emerson.⁽⁶⁹⁾ Despite Londonderry's counter-offer, the will of the Hetton company prevailed and the coal leases of the whole Lyon estate provided the initial resource base for the newly-formed colliery enterprise.

In the five years between 1820 and 1825 the Hetton Coal Company built up its coal concessions very rapidly in order to furnish the acreage of coal needed for the Lyons Colliery and the new winning at Elemore, which began production in 1826. A valuation of Hetton Colliery in 1823 lists the following coal leases:⁽⁷⁰⁾

Table 5.4: Hetton Colliery Lease Agreements 1823

	<u>Acres</u>	<u>Roods</u>	<u>Perches</u>
John Lyon: entirety*	515	3	36
Emerson & Clutterbuck*	379	2	28
Mr. Gowland	282	0	9
Mr. Lawson	127	1	7
Mr. Hutchinson*	88	1	27
G.T. Fox Esq.*	336	1	17
Hetton Coal Company	28	1	23
	<u>1758</u>	<u>1</u>	<u>7</u>

* the asterisks indicate those landowners for whom coal lease agreements with the coal company have been found.

The lease agreement with G.T. Fox in 1821 allowed the company to develop driftways eastwards from Hetton Lyons to initially prove the existence of commercial coal deposits under Fox's Little Eppleton estate and then to exploit them.⁽⁷¹⁾ The indenture drawn up with William Hutchinson in 1823 enabled the company to extend its workings south from Hetton Lyons towards the southernmost part of Hetton township.⁽⁷²⁾ A further rapid expansion of the company's coal leases had occurred by 1825 as can be seen from the following table:⁽⁷³⁾

Table 5.5: Hetton Colliery Lease Agreements 1825

	<u>Acres</u>	<u>Roods</u>	<u>Perches</u>
Mr. Lyon: entirety*	515	3	36
Emerson & Clutterbuck*	331	0	16
Lyon & Sir J. Musgrave	48	2	34
Lyon & Robinson	3	3	3
Mr. Gowland	282	0	9
Mr. Lawson	127	1	7
Mr. Fox*	336	1	17
Mr. Hutchinson*	88	1	27
Hetton Coal Company	28	1	23
Mr. Mascall*	526	1	15
Mr. Baker*	1600	1	27
	<u>3888</u>	<u>1</u>	<u>27</u>

* the asterisks indicate those landowners for whom coal lease agreements with the coal company have been found.

In the brief two year period 1823-25, the vigorous policy of coal concession acquisition from neighbouring landowners had been continued and had resulted in the acreage of coal leased to the company increasing by more than two fold. The spatial patterns of the leasing agreements related directly to the colliery sinking policy of the coal company. For example, the lease on Mr. Mascall's

Great Eppleton coal mines taken in 1824 permitted both the north-
erly extension of the underground workings of the Lyons Colliery
and also provided the initial concession which encouraged the
company to sink a winning at Great Eppleton in 1826. By the terms
of the lease agreement with Mascall, the company was allowed two
years to win this colliery;⁽⁷⁴⁾ in the event this clause proved
to be wildly over-optimistic as, because of the sinking difficulties
described in chapter 3, production did not begin until 1833. In
the case of the acquisition of the large lease for the coal reserves
under Mr. Baker's Elemore estate in 1825, the transaction provided
the bulk of the reserves of coal for the Elemore sinking which
was completed by 1826. It can be seen therefore, that within five
years of its formation, the Hetton Coal Company had gained access
to almost 4000 acres of coal reserves, giving up to 2000 acres each
to the Lyons Colliery and Elemore Colliery. By 1837 the company's
total coal royalty had been increased to 5478 acres through the
acquisition of leases east from Great Eppleton township in Seaton
and Slingley township, to provide extra resources for Eppleton
Colliery.⁽⁷⁵⁾ (see Fig 5.2) (Table 5.3).

It would be untrue to assume however that the eastward
diffusion of concession acquisition and coal workings by the
Hetton company was unaffected by the activities of other mining
enterprises on the concealed coalfield. In the mid-1820s for
example, the company declared its intention to exploit the coal
reserves to the east of Little Eppleton township by entering into
a lease agreement with Edward Shepperdson, the owner of ninety
acres in Great Eppleton and 700 acres in East Murton township.⁽⁷⁶⁾
However, it is clear from correspondence between the viewer of
Hetton Colliery and J. Watson another viewer whose advice was re-

quested by the company, that whilst the whole of Shipperdson's ninety acre Carr House estate could be worked by outstroke from the Lyons colliery without the need for a new sinking, Watson doubted whether it would be feasible to extract coal from all of Shipperdson's 700 acre Murton lands without entering into the great expense of making a new winning.⁽⁷⁷⁾ Accordingly in the lease between Shipperdson and the Hetton company no certain rent was to be paid by the lessees on the Murton estate coal for three years from 1825 to allow time for the seams to be proved by exploring driftways eastwards from the Lyons colliery and for the feasibility of extracting the Murton coal to be tested.⁽⁷⁸⁾ As it transpired, the company gave up its lease on the coal at the end of the third year of the lease (1828), suggesting that the conclusion had been reached that it was not practicable or economic to work this coal at a distance in excess of two miles from the base of the Hetton Lyons shaft. However, the rich coal seams under Shipperdson's estate were not long neglected. As early as 1829, even before the formation of the South Hetton Colliery Company in 1831, T.R.G. Braddyll who became the chief partner in the company, offered to lease the Murton estate coal for a certain rent of £500⁽⁷⁹⁾ and by 1831 a permanent forty two year lease agreement was entered into between Shipperdson and the newly-formed company by the terms of which, in return for £500 certain rent and the customary tentale, wayleave and outstroke rents, the company acquired the liberty to mine all the coal seams under Shipperdson's Carr House farm and under his Murton estate.⁽⁸⁰⁾ This transaction was followed rapidly by a series of further coal lease agreements so that by 1837 the company had acquired concessions totalling 6300 acres,⁽⁸¹⁾ the leases of 2206 acres of which have been discovered in the

various documentary collections. The year 1831, during which the two shafts at South Hetton were being sunk, saw the newly formed coal company enter into a series of lease agreements with landowners in Haswell, East Murton and Hawthorn townships in order to secure a sufficient area of coal to justify the capital investment involved.⁽⁸²⁾ In January 1831 the company acquired the coal rights from John Gregson for his 448 acre Murton estate and his contiguous seventeen acre holding in Hawthorn township in return for a certain rent of £250 and the usual tentale and wayleave rents.⁽⁸³⁾ Two months later the partnership leased 718 acres of coal lying under Haswell Town farm, Haswell Moor farm and Fallowfield farm from ESRB Braddyll,⁽⁸⁴⁾ on a forty two year term for a certain rent of £600.⁽⁸⁵⁾ By 1833 the company had acquired the coal royalty of the seventy acre Hawthorn Moor farm owned by Sir Matthew White Ridley. Through an examination of the correspondence between the landowner and John Buddle, who had been called in by Ridley to provide a valuation of the coal under the farm, a glimpse of the landowner's perception of the potential financial return from his mineral resources can be seen.⁽⁸⁶⁾ Reporting in November 1833 Buddle noted that the new mine at South Hetton had been sunk at a distance of 1060 yards from the western boundary of the farm, that three coal seams had been proved to be workable, the Five-Quarter, the High Main and the Hutton, but that at the time only the last named was merchantable. The viewer also commented that the workings from the colliery had advanced 200 yards eastwards towards the western boundary of the farm. Buddle's report continued with the calculation that if the coal was to be worked from South Hetton Colliery, as he considered any new sinking to be unlikely, at the current rate of working it would

take three years to reach the farm boundary and it would require ten years to work the coal out. In terms of the financial return to Ridley, Buddle calculated that on the known thickness of the Hutton seam of $4\frac{1}{2}$ feet and allowing for small coal and colliery consumption, the owner could expect a rental of £79 per acre, giving a total of £5530 for the seventy acre farm over an estimated ten year period. This valuation is of interest for two reasons; firstly, it provides evidence of the scale of rents that could be gained by those landowners who entered into passive rentier relationships with the coal companies; secondly, Buddle's comment that no new sinking was likely to the east of South Hetton Colliery, demonstrates both contemporary perceptions of the cost and technical difficulties of borings and sinkings on the concealed coal-field and the need for large reserves of coal to sustain the high rates of production necessary to justify the costs of development.

Two other coal leases drawn up between the South Hetton partnerships and local landowners have survived. In September 1835, Bernard Ogden, who owned 122 acres of land immediately to the east of the colliery, entered into an agreement with the company for a certain rent of £50 per annum.⁽⁸⁷⁾ Three years later, Thomas Tate, who owned a 76 acre farm in the north east section of East Murton township, fully $1\frac{3}{4}$ miles from South Hetton Colliery but adjacent to the proposed site of the company's new winning at Murton, leased his coal rights in return for a certain rent of £70 per annum.⁽⁸⁸⁾ Finally, mention is made in the Tithe File for Easington parish dated October 1838 that the rector of Easington had "lately sold the coal under his glebe to the South Hetton Coal Company."^(88a) Although no rental details are given, this evidence does confirm the extension of exploitation to the south east of South Hetton into Easington township. Although the total coal concessions

acquired by the company by the late 1830s were considerably more extensive than the sum of the leases mentioned in the text, it can reasonably be suggested that the policy of the colliery partnership was directed in the initial stages towards the acquisition of leases from the major landowners who owned land close to the sites of the collieries to permit early extraction. Subsequently, the coal resources of the smaller estates were included within the exploitable reserves of the colliery undertaking.

It is regrettable that the survival rate of the coal leases of other companies on the concealed coalfield during the period 1820-50, is low. For example, by 1837, the Haswell Colliery Company had acquired an extensive coal royalty covering 10000 acres in Haswell, Easington and Shotton townships, much larger in fact than the leases of either the Hetton or South Hetton companies (Fig 5.2)⁽⁸⁹⁾ However, the documentary search has found reference to only one lease, agreed in 1839 between the Haswell company and Sir George Shee, a major landowner in Haswell township, for the mineral rights under the 290 acre Haswell Moor farm, together with about fifty acres of adjacent land.⁽⁹⁰⁾ In Thornley township the colliery company, by 1837, only two years after the sinking of the shafts, had purchased extensive coal leases in the Thornley, Wheatley Hill and Wingate areas, totalling 6140 acres,⁽⁹¹⁾ (Fig 5.2) but no records of these transactions have been found. However, in the case of the Wingate Grange Colliery Company partial evidence of the process of the acquisition of coal leases has survived in the Johnson collection, within which the leasing arrangements between the company and two major landowners have been lodged. By the terms of a lease dated November 1837 the company acquired the mineral rights to the 1060 acre Castle Eden estate of Rowland

Burdon which lay adjacent on the east side of Wingate township. In the same month the Wingate partnership also leased the coal rights for almost 1000 acres of land owned by Lord Howden, the chief landowner in the township, who, on completion of the lease joined the partnership.⁽⁹²⁾ Through the completion of these agreements, the newly-formed coal company had acquired the legal title to approximately 2000 acres of coal located in a compact block within which the colliery itself was sited.

Finally, in the south of the study area, references to two lease agreements relating to mineral rights in Trimdon parish have been found. In a report on Trimdon colliery dated January 9th 1844, the extent of the coal held under leases by the Trimdon Colliery Company from various lessors was calculated at 816 acres.⁽⁹³⁾ Six years later, in a lease drawn up between the Trimdon Grange Coal Company and two landowners, George Beckwith and Anthony Darling, the coal company gained the right to win coal from under two sections of land, 150 acres and thirteen acres in area respectively, the former immediately to the east of the site of Trimdon Grange Colliery and the latter actually forming the site of the colliery yard.⁽⁹⁴⁾ This evidence is certainly only partial however as it is most likely that the area of coal royalties would have been much more extensive than the evidence of the documentary record.

Summary

The colliery companies began the process of the acquisition of coal leases before embarking upon sinking operations in order to ensure the availability of a reserve of coal which was sufficiently large to justify development costs. These initial leases

were rapidly augmented during the period of shaft sinking, which could take at least two years, and in the early years of coal production, by the vigorous addition of further leases. Agreements tended to be made initially with the owners of large coal concessions especially those whose estates were closest to the site of the colliery and the pattern of subsequent lease purchases reflects the directions of underground workings. In overall terms the acreages of the coal concessions were very considerable, being typically with the range of 5 - 10000 acres by as early as 1837. The acquisition of such large areas of coal was necessary in order to provide sufficient reserves to justify the development costs which could range from £60000 to £250000. In order to ensure a return on capital a large annual output was necessary, typically about 60000 chaldrons (156000 tons) for the east Durham collieries at this time. This meant that not only had the coal royalties to be extensive in order to give the collieries a life of at least the forty two year terms of the initial leases, but the mines themselves were widely spaced so as to be able to exploit these large acreages of coal. Typically during this period in east Durham, collieries were located up to two miles apart and drew upon concessions of between 5 - 10000 acres. How different was this pattern of exploitation from the coalfields of South Lancashire and South Wales, where, even as late as the middle of the nineteenth century, individual colliery coal leases frequently ranged between twenty four and 250 acres in extent, whilst on the South Staffordshire coalfield leases rarely exceeded twenty acres.⁽⁹⁵⁾

Finally, the evidence of this section demonstrates that the colliery companies, with the exception of the Haswell enterprise, became only slightly involved as landowners in their own right

during the period 1820-50. The companies did, however, take out leases on the surface of extensive areas of land some of which was used to locate the surface manifestations of their coal mining operations. In addition, they leased purely agricultural holdings, possibly to provide feedstuffs for the many horses used in and about the collieries for underground and surface haulage. There can be no doubt however, that it was as lessees of the mineral wealth of the concealed coalfield that the colliery companies were most actively involved with the local landowners and that as the lessees of coal concessions they brought considerable wealth to the rentier landlords.

iii) To what extent did the landowners influence the locational patterns of the colliery landscape during the period 1820-50?

In order to answer this question the most valuable documentary source was a series of detailed clauses in the colliery lease agreements used in the last section of the chapter. Through their use it is possible to determine the importance of the influence that the landowners could bring to bear upon the colliery companies concerning the location of the various elements of the assemblage of surface installations, transport lines and settlements that combined to create the coal mining landscape. As has already been seen in this chapter there was a close spatial relationship between the siting of the various colliery installations and mining settlements and the acquisition of land leased by the colliery companies. However, through the use of the detailed clauses in the lease agreements it is possible to determine the extent to which the evolution of the colliery landscape in east Durham was influenced by the landowners. It is proposed to test this idea

firstly in the three townships which constituted Hetton parish, namely Hetton, Great Eppleton and Little Eppleton, as this was where the mining colonisation of the concealed coalfield began and then extend the analysis to those townships in east Durham for which detailed documentary evidence is available.

Each township in Hetton parish was dominated by one landowner: by 1839 the Lyon family owned singly or jointly 955 acres or 60% of Hetton township;⁽⁹⁶⁾ Francis Mascall owned 526 acres or 76% of Great Eppleton township,⁽⁹⁷⁾ whilst G.T. Fox was the sole owner of Little Eppleton township which totalled 335 acres.⁽⁹⁸⁾ By what means did these landowners influence or attempt to control the evolution of the surface manifestations of coal mining? Firstly, with reference to the locations of the two collieries actually sunk within the parish, Hetton Lyons and Eppleton, Elemore Colliery being sited in Pittington township, it is apparent that they were both developed on the estate of John Lyon, on whose death the estate had passed to the Hon. Maria Bowes Barrington. What is of more interest is that the two collieries were located within pieces of land which had been added to the Lyon estate between 1776 and 1826 to judge from the evidence of the Land Tax Returns (Fig 2.2)⁽⁹⁹⁾. In the case of the site of Eppleton Colliery, the Lyon family had acquired the ownership of a seventy six acre section of Great Eppleton township contiguous with their Hetton lands between 1793 and 1804, upon which the colliery was subsequently sunk.⁽¹⁰⁰⁾ Similarly, Hetton Lyons mine was located on land which had passed into the ownership of John Lyon by estate engrossment just prior to 1817, three years before the shaft sinking began at the Lyons site.⁽¹⁰¹⁾ When it is remembered that the quickening of interest in the search for coal in Hetton town-

ship dates back to at least 1772⁽¹⁰²⁾ and that all the trial borings between then and 1820 were located on Lyon's estate,⁽¹⁰³⁾ the siting of the two successful winnings on land engrossed by the Lord of the Manor represents further evidence of the desire of the Lyon family to own the site of the colliery installations and then to lease the necessary land to the coal company.

Secondly, within the restricting clauses of the coal lease agreements drawn up between the Hetton Coal Company and each of the three major landowners it is possible to determine the extent to which the detailed location of the elements of the colliery landscape was influenced by "lordly" intervention. For example, in June 1820, John Lyon, even before the shaft sinking at the Lyons pit had begun, anxious not to let mining intrude too close to his house, incorporated a clause in the terms for the lease of the coal mines at Hetton which prohibited the lessees from sinking any pit within 300 yards of his mansion house and its pleasure grounds.⁽¹⁰⁴⁾ This restriction represented a tightening up of estate policy, as in an earlier proposed lease with Lady Frances Anne Vane Tempest in 1816, it was simply stated that the pits and waggonways were to be "at a proper distance from the mansion house."⁽¹⁰⁵⁾ Presumably for similar aesthetic motives Francis Mascall denied the company the right to sink shafts for coal on any part of his Great Eppleton estate and as a result, Eppleton Colliery was developed on land owned by Lyon and leased to the company.⁽¹⁰⁶⁾ In Little Eppleton township, G.T. Fox too insisted in a lease agreement that any colliery should not be nearer than 300 yards to Eppleton Hall.⁽¹⁰⁷⁾ This distaste of early nineteenth century landowners for the evidence of industrialization in sight of the Hall was, of course, not limited to County Durham. Writing on the development

of coal mining in Staffordshire, Sturgess quotes the example of Ralph Sneyd whose reluctance to allow the industrial development of his Keele estate is apparent in correspondence with his steward in which he complained of the steward's unfeeling decision, "that I am to live like a beggar for several years in order to buy some of the ugliest land I have ever beheld and the filthy coalpit it contains."⁽¹⁰⁸⁾

Furthermore, in the case of the evolution of the pattern of transport lines linking the collieries to tidewater at Sunderland, the influence of manorial policy can be detected within the coal lease agreements. John Lyon insisted that no waggonway should cross the grounds of Hetton Hall or come within 150 yards of the Hall itself,⁽¹⁰⁹⁾ whilst Francis Mascall forbade the construction of any line within 440 yards of his house at Great Eppleton.⁽¹¹⁰⁾ In the case of Little Eppleton township, G.T. Fox was even more specific in insisting that the company should not,

"make or lay any waggonway nearer to the south side of the mansion house than 150 yards, nor any such way on the north side of the mansion to the south of the beck which runs through the thicket or fox cover." ⁽¹¹¹⁾

Additionally, in the same lease agreement Fox insisted that whilst the colliery company had the right to make and erect the necessary stationary engines and,

"all other necessary erections and to lay waggonways for working and carrying on the colliery,"

the company,

"was not to build any dwelling house nor to permit any building to be inhabited or used as a dwelling house on the estate, except such houses, not exceeding six in number as shall be necessary for the residence of the engine and machine men."

Each of these constraints was duly observed by the coal company; the alignment of the rail lines built in the parish was clearly influenced by the demands of the various landowners and in the case of the last restriction, the company had by 1851 only built two such dwellings, both inhabited in the census year by railway employees.⁽¹¹²⁾

Elsewhere on the concealed coalfield ample evidence of similarly interventionist policies of landowners upon the locational decisions of the colliery companies has been found in the coal lease documents. For example, the South Hetton Colliery Company found that in the leases entered into with the landowning lessors, clauses were introduced which restricted its freedom in the siting of collieries, pit heaps, waggonways and miners' housing. In the lease of March 3 1831 drawn up between ESRB Braddyll and the company the following locational limitations were imposed.⁽¹¹³⁾ Although the colliery enterprise had gained,

"permission to sink pits, outstrokes, pitroom, to carry coals to the river Wear or to the German Ocean, to build houses and other necessary buildings,"⁽¹¹⁴⁾

two sets of restrictions were imposed. Firstly, the company was forbidden to locate any element of the colliery landscape upon garden, plantation or pleasure ground belonging to the landowner. Secondly, the partnership could not,

"sink any pit or shaft within the distance of 100 yards from any dwelling house, building, folds or farm yard then erected."⁽¹¹⁵⁾

These restrictions were subsequently adhered to and the company sank South Hetton Colliery on land owned by one of the partners, T.R.G. Braddyll, well outside the forbidden sensitive sections of Haswell township. Further evidence is available in the coal lease

drawn up between John Gregson and the South Hetton Company in January 1831.⁽¹¹⁶⁾ Gregson, who as Lord Londonderry's solicitor at the time, must have been fully conversant with the legal niceties of leasing arrangements, granted to the company the usual rights to dig shafts and outstrokes, to have pitroom, heap room and the right to dig stores, clay and gravel as well as wayleave rights, but gardens, plantations and pleasure grounds could not be despoiled. Also the lease insisted that,

"houses for pitmen are not to be built on any part of the said lands" (117),

i.e. Gregson's 448 acre estate in East Murton township and his seventeen acre property in Hawthorn township.

Again, the company respected these clauses and no colliery housing was developed on his land.

In the case of the lease agreements between Edward Shipperdson and the South Hetton Company, it can be seen that the lessor was somewhat less restrictive than the landowners already mentioned. It is true that in the October 1829 coal lease of the seams under Carr House farm the company,

"was not to sink any pit or shaft on Mr. Shipperdson's ground nor otherwise break the soil thereof without his previous agreement in writing." (118)

However, in the other lease documents between the two parties which involved the mineral rights under his 700 acre Murton estate, Shipperdson merely insisted that,

"houses for workmen are not to be built on any of the said lands or grounds, viz. gardens, plantations, pleasure grounds." (119)

The same form of words was employed in a lease dated May 13 1838 between Shipperdson and the company, which was drawn up to confirm

the coal rights of the latter over the Murton estate, this being necessary because of a change in the membership of the colliery partnership.⁽¹²⁰⁾ As a result of the less restricting locational framework agreed between lessor and lessee, the company was able to site the sinking of Murton colliery, the necessary surface installations and the early provision of miners' housing on Shipperdson's estate on land leased for that purpose by the company.

To complete the analysis of the relationships between the landowners and the South Hetton Colliery Company, examination of the lease agreements with two of the smaller estate owners reveals a contrasting attitude to the siting of colliery installations on their land. On the one hand, Bernard Ogden who owned a 122 acre farm in Hawthorn township granted the company a comprehensive set of rights in return for the normal rental income.⁽¹²¹⁾ The only spatial restriction placed upon the partnership was that it should avoid the farm house and the farm yard on the estate, but not by any specified distance as in the earlier example. Furthermore the company was permitted to erect on Ogden's land, workmen's houses, machines, storehouses and any buildings necessary for the raising of coal. In fact this privilege was not utilised by the company as they exploited the coal under this farm from South Hetton Colliery the shafts of which were only about 1000 yards from the western edge of Ogden's estate. On the other hand, Thomas Tate, for his seventy six acre farm in the north eastern part of East Murton township, insisted in the coal lease of 21 April 1841 that,

"no pit or shaft is to be sunk to the said coal mines on the estate as the lessees have access thereto by means of other shafts." (122)

And so the exploitation of Tate's coal seams was achieved through the use of the "other shafts", a reference to the winning at Murton

Colliery which was being sunk, with great difficulty in 1841.

Although the documentary record of coal lease agreements is tantalizingly incomplete for the townships further south on the concealed coalfield, it is still possible to identify the same process of landowner involvement in the spatial arrangements of mining colonisation, through the mechanism of the restricting clauses in the agreements. In the case of the Wingate Grange Colliery Company the following clause is of interest. Found in the 1837 lease of the coal rights of 1060 acres of Rowland Burdon's Castle Eden estate, it states

"With reference to the 1060 acre lease on the Castle Eden royalty, coloured red on the accompanying sketch, the lessees are to be allowed every facility for the winning of coal but they are not to build any houses on the Castle Eden estate but they shall be at liberty to build on the Hesleden estate within a part coloured yellow on the accompanying sketch." (123)

Perhaps this extract, more than any quoted so far, provides an insight into the decision-making processes which fashioned the evolution of the patterns of industrial activity on the concealed coalfield. By the means of the demarcation of plots of land on maps, which unfortunately have not survived, and their allocation for particular forms of land use, the landowner effectively controlled the location of the surface manifestations of coal mining. Rowland Burdon's wishes were carried out. No colliery housing was ever built near his mansion at Castle Eden and the mining settlement of Hesleden was built to house the workforce of Castle Eden Colliery sunk in 1840 on the Hesleden estate.

Further evidence of the close cadastral concern of the landowners with the siting of the colliery settlements is provided in the terms of a conveyance between Lord Howden, the major landowner in Wingate township and co-partner in the Wingate Grange Colliery

and George Horsington who was another member of the company. Dated 20th December 1839, when the sinking to the Hutton seam had been nearly achieved,⁽¹²⁴⁾ the conveyance granted Horsington the lease of four fields, totalling thirty nine acres, which were located immediately to the south of the colliery yard (Fig 5.3). The designated land use of these plots becomes evident when one reads that this area is,

"intended to be appropriated whereon to build a new town near to Wingate Grange Colliery." (125)

Within two years this intention had been realised as the early colliery rows had been built by 1841 when the census records the existence of 450 houses in the fourteen rows built on the specified fields. (Fig 4.12) Lord Howden however, shrewdly retained the mineral rights of this portion of his estate; Horsington's lease was solely concerned with the use of the surface of the land.

Finally, in the lease at Trimdon Grange between the colliery company and the two landowners Beckwith and Darling, dated 25th October 1850, a series of clauses were inserted which help to explain the location of the various elements of the colliery landscape in the northern part of Trimdon parish.⁽¹²⁶⁾ In return for a certain rent of £300 per annum, the colliery had full powers to extract the coal beneath the 150 acre estate of George Beckwith. For a further rent of £75 the company also acquired the use of thirteen acres of land belonging to Anthony Darling immediately adjacent to the Trimdon Grange pit for a variety of purposes including heap room. Apart from the location of the pit heap on this land, the company was also obliged by the terms of the lease to site all the necessary surface installations on this plot as well as to dig for clay and to make bricks. With the sinking of

a second shaft at Trimdon Grange during 1850, the colliery company became the lessee of another four acre field specifically for extra heap room and at the same time leased $1\frac{1}{2}$ acres of additional ground to be used, as the lease specified, for the siting of coke ovens.⁽¹²⁷⁾ Both of these plots, for which an annual rent of £54-12-0 was charged, were located immediately adjacent to the thirteen acre colliery site. This helps to explain the location of the Trimdon Grange colliery complex to the west of Salter's road and immediately to the south of the Hartlepool to Ferryhill railway line. However, as the lease subsequently makes clear, the colliery settlement of Trimdon Grange was to be sited to the east of Salter's road on part of Beckwith's estate. In fact, the thirty double cottages and $11\frac{1}{4}$ single cottages that constituted the village were built in this position, the lease terms again being complied with.

To summarise this section, it can be concluded that in every coal lease agreement examined in the various collections, the landowners large and small, were instrumental in inserting clauses designed to control the locational freedoms of the colliery companies. No clearer evidence is required to confirm the importance of the pre-mining cadaster in influencing the evolution of the colliery landscape. Shafts, pityards, associated industrial undertakings, waggonways and the mining settlements themselves were sited within the context of the pre-mining pattern of land-ownership: they were not arbitrarily superimposed by the colliery enterprises.

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enquire into the state of the coal trade in 1830.
- (3) Both sets of estate papers are catalogued and held in the
Department of Palaeography and Diplomatic, Durham University.
- (4) The N.C.B. Collection is deposited in the Durham County
Records Office, County Hall, Durham.
- (5) The dates of the Tithe plans and apportionments consulted in
this chapter are listed below.
- | | | | |
|-----------------------|------|----------------------|------|
| Hutton Henry township | 1838 | Wingate township | 1840 |
| Hetton " | 1839 | Trimdon parish | 1840 |
| Great Eppleton " | 1839 | Quarrington township | 1840 |
| Little Eppleton " | 1839 | Pittington " | 1841 |
| Haswell " | 1840 | East Murton " | 1843 |
| Hawthorn " | 1840 | Thornley " | 1845 |
| Shotton " | 1840 | Castle Eden parish | 1846 |
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- (15) Langton J. see note 11 ii), 141.
- (16) White A.W.A. op. cit. 2.
- (17) Mingay G.E. see note 9 ii), 99-101. The three landowning families were the Lowthers at Whitehaven, the Curwens at Workington and the Senhouses at Maryport.
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- (21) Langton J. see note 11.
- (22) Crouzet F. op. cit. 179.
- (23) White A.W.A. op. cit. 29.
- (24) Ashton T.S. and Sykes J. op. cit. 2-3.
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- (26) Spring D. op. cit. 35.
- (27) Ibid, 33 The ten was a measure of coal upon which the lessor's rent was paid. The weight varied under different landlords but approximated to 51 tons.

- (28) Ibid. 33.
- (29) Shaft rent was paid for the privilege of drawing up the shaft the coal worked from another royalty by outstroke. Outstroke rent was paid for the privilege of working and transporting underground the coal from an adjacent royalty. See Greenwell G.C. A Glossary of Terms Used in the Coal Trade, (1888), 67.
- (30) The ~~tenale~~ rents quoted in this example were drawn from an agreement between the Hetton Coal Company and William Hutchinson, a Hetton landowner, August 30th 1823. Watson Coll. Hetton Colliery Reports, Estimates and Valuations, 1816-24, Vol.45.
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- (32) Bell J.T.W. Plan of the Hartlepool Coal District, (1843)
- (33) The acreage and a detailed description of the eight farms that constituted the Seaham estate bought by Lord Londonderry are contained in the particulars listed in the auction advertisement of 13th October 1821. Baker-Baker Coll. Vol.4 20/94.
- Also found in the auction details was the following preamble which indicates that as early as 1821 the potential use of Seaham for the export of coal was under active consideration:
- "since the commencement of the present spirited undertaking at Hetton, it has been ascertained that the coast within the manor of Dawdon presents the greatest natural facilities for making a superior port or harbour for the reception of shipping of great burthen and that the district between this and the coalfield comprises the best line for the carriage and shipping of all coals to be won from any port of the adjacent country."
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- Whellan W. History, Topography and Directory of the County Palatine of Durham, (1856), 601, 608.
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- (36) See note 20.
- (37) List of members of Hetton Coal Company (1829) Watson Coll. Vol.47.

	<u>Shares</u>		<u>Shares</u>
Execs. of Capt. Cochrane	4	Mr. John Wood	1
" " Mr. Darnell	4	Mr. Shotton	1
Major Cochrane	1	Mr. Charlton	1
Mr. John Dunn	2	Mr. Vizard	1

	<u>Shares</u>		<u>Shares</u>
Mr. Mowbray	2	Mr. Gully	3
Mr. Smart	1	Mr. Pearson	1
Mr. Tarlton	1	Mr. Smithson	1
Mr. Baker	2	Mr. JohnWalker	1
Captain Towers	1	Mr. William Redhead	1
Rev. Mr. Dalton	1		
		Total	<u>36 shares</u>

- (38) Lease agreement between Edward Shipperdson and the South Hetton Colliery Company, 12th August 1831. Shipperdson Papers, Vol.II 3314.
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 Wilson R.G.,
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- (43) Johnson J. Views and Reports 1827-43 No.9, 154.
- (44) Ibid, 154
- (45) Fordyce W. Vol.II, 385.
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- (48) Hetton township, tithe map and apportionment,(1839).
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- (51) Valuation of Hetton Colliery, September 6th 1823, Watson Coll. Vol.45.
- (52) Plan of Hetton estate, (1825) NCB Coll P/23.
- (53) Plan of the parish of Houghton-le-Spring showing the relative situation of the population in the different townships(1827) Durham Diocesan Record, Order in Council U.D.D.P.D.
- (54) Census Enumerators' Books 1851. Registrar's District, Hetton-le-Hole H.O. 107 2393 (2).
- (55) The section of the chapter which is concerned with the distribution of landholdings is drawn from the Tithe plans and their respective apportionment documents. A separate note for each specific reference is therefore not included.

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- (62) Watson Coll. Vol.45.
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- (65) Ibid.
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- (72) Ibid. Vol.45, (1823).
- (73) Ibid. Vol.45, (1825).
- (74) Ibid. Vol.45, (1824).
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- (91) Johnson Papers, Book No.9, 266.
- (92) Ibid, 154.
- (93) Ibid, Book No.10, 1.
- (94) Liddle Coll D/X/498, 1.
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- (97) Great Eppleton tithe map and apportionment, (1839).
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CHAPTER 6

SOCIAL STRUCTURES OF THE COAL MINING TOWNSHIPS, 1851.

Introduction

In this chapter the social composition of the eight east Durham mining townships chosen to represent a sample of the population of the concealed coalfield in 1851, is analysed at three different scales by use of the census enumerators' books (see Appendix 1 for a discussion of sampling techniques). Firstly, at the inter-township level, there is an examination of the extent to which the social structures of the sample communities differed significantly, as measured by a series of single social variables discussed below. Secondly, at the intra-township scale the degree of internal social homogeneity within each of the eight townships is tested by two analyses; i) a spatial analysis in the form of a comparative study of the social structures in the mining and the rural communities within the township; ii) a social analysis designed to examine the extent to which different household characteristics within the townships could be related to the occupations and the ages of the heads of households. Thirdly, in a brief concluding section, attention is drawn to the world beyond the mining community and the household structures identified in east Durham in 1851 are compared with a small range of the social characteristics of mid-nineteenth century towns and cities.

Use of the mid-nineteenth century census enumerators' books by historical geographers to analyse the socio-economic characteristics of mid-Victorian communities dates from the 1950s with Lawton's seminal study of Liverpool.⁽¹⁾ In the 1960s a series of research projects on British towns and cities was undertaken by

social historians and historical demographers initiated by Armstrong's work on York in 1841 and 1851⁽²⁾ and soon followed by Smith who investigated the social structure of Nottingham and two neighbouring settlements, Radford and Bingham.⁽³⁾ A rapidly-growing and fast-industrializing town, Preston, was examined by Anderson in conjunction with fifteen surrounding villages.⁽⁴⁾ In each of these studies the census enumerators' books provided the principal source of data for the social analysis and a systematic 10% sample of households was employed, after statistical testing for reliability, in order to reduce the volume of material to manageable proportions. One of the chief objectives of these investigations was an examination of the composition of households and families in the mid-nineteenth century. Mean household size, mean family size and the frequency of the occurrence of resident relations, servants and lodgers were all investigated in relation to variables such as social class.

More recently, a series of studies by historical geographers has changed the emphasis of the analysis of Victorian towns and cities. Although still employing systematic sampling of the household data, geographers such as Lawton and Pooley,⁽⁵⁾ Shaw,⁽⁶⁾ and Dennis,⁽⁷⁾ have explored the use of the census books as a source of data for studying such spatial characteristics as the evolution of the dimensions of residential differentiation in towns undergoing the processes of industrialization and modernization in the nineteenth century. Additionally, the census books have yielded data concerning inter and intra-urban migration patterns as well as the evolution of the spatial segregation of immigrant groups whose very numbers help to explain the rapid growth of urban centres in Britain in the nineteenth century.

Drawing upon multi-variate statistical techniques initially employed by social scientists to analyse the complexities of contemporary western urban social structures, urban historical geographers have used techniques such as factor analysis in order to measure the degree of residential social segregation in the Victorian city. Factor analysis consists of the selection of a number of variables chosen to measure social and economic characteristics of the population each related to an area or unit of observation (an operational taxonomic unit or OTU). By the application of the data variables to the OTUs a matrix is produced, which, after computer analysis, is broken down into a number of independent dimensions known as components or factors. The relative importance of each factor can be observed from the percentage of total variance explained by it, whilst spatial analysis is conducted by the factor scores, each OTU being scored for each factor. In this way the socio-economic structure of the urban area can be explained in terms of a small number of key variables. The technique was first used by geographers to analyse modern cities such as Swansea, by Herbert,⁽⁸⁾ and Leicester, by Davies and Lewis⁽⁹⁾. However, in recent years a series of historical studies by Warnes,⁽¹⁰⁾ Tansey⁽¹¹⁾ Dennis⁽¹²⁾ and Lawton and Pooley,⁽¹³⁾ have demonstrated the feasibility of using factor analysis to distinguish social areas within nineteenth century towns. Such macro-scale analyses have been complemented recently by Royle who has employed the technique at the micro-scale in four small Leicestershire towns in the mid-nineteenth century, one of which was Coalville, a small mining community of 1449 people in 1851.⁽¹⁴⁾

In this study of east Durham mining villages however no attempt has been made to use factor analysis to study the social

and economic characteristics of the colliery settlements. Although by 1851 Hetton-le-Hole had grown to a population of 5741, most of the other villages recorded populations within the range 1300-1600 and they consisted of no more than one or two enumeration districts. Furthermore, early observation of the census books suggested that the small mining communities, some of which consisted of no more than a few rows of cottages, would be unlikely to demonstrate sufficient spatial social heterogeneity to justify the search for OTUs, either by the use of metric grids or by the identification of sub-units formed of groups of households demonstrating some degree of internal homogeneity. Royle, in his study of Coalville, did employ factor analysis in a settlement no larger than those in east Durham but in his search for thirty OTUs he subdivided the Leicestershire mining "town" into units which averaged no more than eight households plotted by relating census entries to a contemporaneous large-scale plan.⁽¹⁵⁾

When it is realised that Royle subdivided streets which had too many houses to fit into one OTU by using breaks in their built up frontages as OTU boundaries, that he used street allegiance to try to ensure some degree of internal homogeneity and that the number of OTUs was determined by the number of variables used in the factor analysis,⁽¹⁶⁾ then perhaps one is entitled to question the significance of results stemming from such minute and somewhat arbitrarily contrived areas.

Apart from Royle's work on Coalville, little material has been published at the micro-scale on the social characteristics of coal mining communities in the last century. At the national scale Friedlander has analysed the demographic and socio-economic structures of coal mining populations in the second half of the

nineteenth century and early twentieth century, some of the findings in his valuable study are tested later in this chapter.⁽¹⁷⁾

Techniques of analysis.

The approach adopted in the following pages has been influenced by the varied spatial relationships of the mining and rural communities within the sample townships. In the case of Hetton, by 1851 the pre-mining village had been physically absorbed into the greatly expanded mining settlement. Trimdon, Shotton, East Murton and Hutton Henry, all represent cases in which the rural villages were still detached from the mining rows. In the case of Trimdon two mining communities, Trimdon Colliery and Trimdon Grange had been built by 1851 within Trimdon parish to house the workers at the two collieries of Trimdon Colliery and Grange. In the townships of South Hetton, Thornley and Quarrington Hill on the other hand, no rural nucleations existed at all and the mining colonisation of the first half of the nineteenth century created the first settlement agglomerations in these districts. Within these varied spatial frameworks a series of variables has been selected from the census data to provide measures of the social structure of these communities which have been physically subdivided as follows:⁽¹⁸⁾ Hetton has been divided into eight discrete zones each one distinctive in terms of social and economic characteristics; in the cases of Trimdon, Shotton, East Murton and Hutton Henry the population has been assigned either to the mining or to the rural communities, whilst Thornley, Quarrington Hill and South Hetton have been analysed as homogeneous units of settlement.

Social variables

In the case of the first variable, persons per household, Anderson's definition of the household has been adopted which uses the entry "Head" in the census schedules to denote the beginning of a new household or co-residing group.⁽¹⁹⁾ Families are recognized as the one or two generation nuclear units consisting of a married couple or widowed person with children, including stepchildren, if any. It proved to be a straightforward procedure to assign the non-nuclear family members of the households to one of the categories of lodger, servant, relation and visitor. In the few ambiguous cases that occurred, Anderson's conventions were followed with apprentices amalgamated with servants, journeymen grouped with lodgers, the children of servants classed as lodgers (a very rare entry) and the few cooks, maids and housekeepers treated as servants.⁽²⁰⁾ Visitors have been distinguished from lodgers as it is assumed that their social and economic relationships with the household head were likely to be of a different character as they presumably did not pay for residence in the household.

In order to examine the structure of the families of the heads of households in the settlements, use has been made of Anderson's seven-fold classification to enable both inter and intra-village comparisons of family characteristics as well as to permit a concluding comparative analysis with other mid-nineteenth century communities.⁽²¹⁾ In order to allow for statistical testing the family structure classification has been collapsed into the two fundamental family types, nuclear and extended.⁽²²⁾ The proportion of households shared by two or more apparently non-

related families has been calculated in order to obtain some measure of the balance between housing demand and supply at this early stage in the development of the mining settlement. Life cycle stage as a social variable has been introduced using Anderson's modified classification of married heads of households,⁽²³⁾ whilst two final variables, the age structure of the total populations of the villages and the marital status of the household heads complete the individual measures of social structure used to test for differentiation amongst and within the mining townships. By means of the S.P.S.S. (Statistical Package for the Social Sciences) facility at NUMAC (Northumbrian Universities Multiple Access Computer) two analyses have been performed; firstly frequency tables for the variables mentioned above for each of the townships and their subdivisions were obtained;⁽²⁴⁾ secondly by use of the cross-tabulation procedure, contingency tables were produced to test for measures of association between selected variables⁽²⁵⁾. By this means, analyses of social structure were achieved at both the inter-village and intra-village scales. Two statistical tests, the Kolmogorov-Smirnov test and the chi-square test were then used to examine whether there were significant differences between the variables at these two scales of analysis. In this way a profile of the social composition of the eight townships has been achieved through the application of a series of single index measures which is considered to be appropriate to satisfy the principle objective of this chapter, namely, an inductive, basically empirical analysis of the social characteristics of a series of generally small, recently-constructed coal mining settlements. With this in mind, the remainder of the chapter consists of detailed answers to the following three questions which

are couched in broad terms:

- (i) to what extent did household structures differ amongst the eight sample townships 1851?
- (ii) Is it possible to identify social differentiation as a spatial characteristic of the townships?
- (iii) To what extent were the social characteristics of the east Durham villages similar to or different from contemporaneous communities in England.

(i) Inter-township analysis

In Table 6.1 the overall household structures of the eight townships are given together with the mean values for their combined populations.

The mean household size for the eight villages was 5.08 with a range from a minimum of 4.73 at Hutton Henry to a maximum of 5.85 at East Murton. In order to test whether the observed differences in mean household size were significant, the data were converted to persons per household by means of two tables showing relative and cumulative frequencies.⁽²⁶⁾ Once expressed in the latter form it is possible to use the Kalmogorov-Smirnov two sample, two-tailed test to determine whether the household size values demonstrate significant differences. By the use of this statistic it was found that the only significant difference of mean household size (at s.l. 0.05) occurred between the extreme cases of Hutton Henry and East Murton. No significant differences of mean household size occurred between any other pairs of villages thus pointing to the high degree of homogeneity of mean household size at the inter-village scale (Table 6.2). Perhaps this finding is not unexpected when one is reminded by Laslett of the constancy

Table 6.1 East Durham townships: household structures 1851.

	<u>Hutton Henry</u>	<u>South Hetton</u>	<u>East Murton</u>	<u>Shotton</u>	<u>Thorn- ley</u>	<u>Trimdon</u>	<u>Hetton</u>	<u>Quarr- ington Hill</u>	<u>Mean</u>
Persons/ house	4.73	4.97	5.85	5.29	5.15	4.89	4.76	4.99	5.08
Persons/ family	4.23	4.48	5.19	4.71	4.47	4.27	4.06	4.42	4.48
Household heads	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Wives/ family	0.83	0.87	0.89	0.84	0.89	0.84	0.80	0.89	0.86
Children/ family	2.41	2.61	3.30	2.87	2.58	2.43	2.26	2.54	2.63
lodgers/ house	0.13	0.10	0.15	0.05	0.18	0.16	0.15	0.13	0.13
servants/ house	0.15	0.06	0.12	0.21	0.12	0.14	0.11	0.14	0.13
relations/ house	0.16	0.22	0.30	0.29	0.34	0.27	0.32	0.26	0.27
visitors/ house	0.07	0.13	0.11	0.05	0.06	0.06	0.11	0.04	0.08
 % houses with									
lodgers	8.0	7.4	11.0	5.0	11.8	10.1	8.2	9.4	8.9
servants	7.1	5.3	8.0	12.5	9.2	10.4	8.5	8.9	8.7
relations	10.7	13.6	16.5	17.8	22.6	18.0	20.0	15.5	16.9
visitors	6.2	7.8	8.0	4.3	4.7	4.3	6.2	2.8	5.5
No. of households	222	435	237	303	532	327	1205	213	3474

of mean household size over several centuries in England,⁽²⁷⁾ in pre-industrial as well as in industrializing societies. However, it should be remembered that a constant mean household size can mask a variety of household components at different periods, and it is necessary to examine the structures within the households to establish whether the overall similarity of mean household size masks the existence of contrasting household components.

Observation of the mean family sizes in Table 6.1 shows an overall average of 4.48 and varies between a minimum of 4.06 in Hetton and a maximum of 5.19 at East Murton. Statistical testing of the data in Table 6.3 demonstrated that the mean family size in East Murton was significantly larger than all other villages except Shotton, which had the second largest mean family size; in addition Shotton's mean family size was significantly larger than that of Hetton. This greater degree of heterogeneity of family size compared with household size would appear to be attributable largely to the variation in the mean number of children per family. With an overall mean value of 2.63 children per family, the range of values varied from a maximum of 3.30 at East Murton, a very high figure by comparison with other mid-nineteenth century communities,⁽²⁸⁾ to a minimum of 2.26 in Hetton, a value more in line with other Victorian communities. Again statistical testing of the evidence in Table 6.4 indicated that there was a significant difference between East Murton and all the other villages except Shotton, whilst the mean number of children in Shotton differed significantly from the three villages with the smallest mean number of children, Hetton, Hutton Henry and Trimdon. In addition, it is already possible to distinguish from this initial numerical analysis that, with almost 70% of families consisting of five

persons or less, the sample townships at this date did not consist of very large family groups contrary to popular opinion about the high fertility levels of coal miners. (Table 6.3).

With reference to the non-nuclear family members of the households in the eight villages, an overall mean frequency of 8.9% of households with lodgers masked a range from a minimum of 5.0% in Shotton to a maximum of 11.8% in Thornley (Table 6.1). Not only was the incidence of lodging somewhat infrequent in these colliery settlements compared with other nineteenth century communities,⁽²⁹⁾ but with the exception of Thornley and Shotton, the other six villages deviate little from the expected frequencies calculated by the chi-square test.⁽³⁰⁾ Similarly, the frequency of households with servants varied little amongst six of the villages. An overall mean frequency of 8.7% a somewhat lower value than that found in most other Victorian settlements,⁽³¹⁾ was calculated with a range from a minimum of 5.3% in South Hetton to a maximum of 12.7% in Shotton. Chi-square testing again demonstrates the manner in which the frequencies in the villages with the extreme values contrast with the marked homogeneity of the frequency of servant-keeping in the remaining six settlements.⁽³²⁾ However, the frequency with which resident relations were found in the villages is more varied with an overall mean frequency of 16.9% of households with relations, a minimum frequency of 10.7% at Hutton Henry and a maximum value of 22.6% in Thornley. There is a highly significant (s.l. 0.001) overall difference in the frequency of resident relations amongst the villages due largely to the deviations from the expected frequencies in Thornley, Hutton Henry and South Hetton.⁽³³⁾ Table 6.1 also shows the incidence of visitors in the households on the day of the census,

but because of the presumed transient nature of their residence, they are not included in the analysis.

Following this description of the distribution of the individual components of the households in the sample townships, the next section examines the internal structures within these residential groups initially through an analysis of the structures of the families of the heads of households, based upon Anderson's classification.⁽³⁴⁾ In Table 6.8 it is evident that all eight villages housed families which were overwhelmingly nuclear in structure (82.7% of all family types). As might be expected, the most frequently found category of family structure, the married couple or widowed person living with unmarried children, was encountered with an overall frequency of 70.2%, whilst 10.1% of the households were occupied by married couples without children, these usually being young recently-married couples or elderly spouses from whose home children had presumably departed. In only 2.4% of cases was a single person found in a household either alone or living with unrelated residents. Within the overall category of extended family groups, "stem" families, consisting of two or more lineally related persons and their nuclear families, if any, were found only infrequently in the townships, with an overall mean frequency of 3.7%. Much more common was the incidence of "composite" families with an overall mean value of 15.7%, particularly the category of "other combinations of kin", a portmanteau term for a wide range of family groups commonly characterised by the residence of grandchildren, nephews and nieces, possibly orphaned, with quite elderly couples.

In order to test for significant differences of family structure amongst the east Durham villages, the chi-square test

has been applied to each village with the seven-fold family type classification reduced to the two fundamental types, nuclear and extended.⁽³⁵⁾ Statistical Table 6.9 demonstrates that in overall terms there was a highly significant (s.l. 0.001) difference of family structures amongst the villages. The presence of extended family groups was recorded more frequently than expected in Thornley, whilst both Hutton Henry and South Hetton underrecorded the extended type of family. These findings correspond with the respective frequencies of occurrence of resident relations in the three villages outlined in Table 6.1.

On examination of the frequency with which households were shared by two or more unrelated nuclear families, usually in the form of lodging families living with host families, Table 6.10 indicates a low overall frequency of 4.5%, with a minimum of 2.7% of households recorded in Hutton Henry and a maximum of 6.2% at Hetton-le-Hole. Together with the relative infrequency of lodgers living in the villages in 1851, the rarity of multiple-occupance suggests that there was little pressure on the housing supply in the mining townships at this date. In the case of Hetton, the more frequent occurrence of shared households was concentrated in Easington Lane, a section of the settlement in the southern part of the parish characterised by the residence of long-distance, non-coalmining migrants, including an Irish minority, who lived frequently in overcrowded multiply-occupied houses along the road to Easington (see chapter 4). Testing of the frequencies of shared households showed that there was no significant difference amongst the villages at s.l. 0.05 (Table 6.11). With reference to the relative frequency of the marital status of the household heads, Table 6.12 provides the expected confirmation of the pre-

ponderance of married males in these coal mining communities with an overall mean value of 86.1%. Apart from Hetton township, the incidence of married males as heads of households in the remaining communities is very close, but the lower than expected frequency in the oldest-established mining community explains the overall significant difference calculated in Table 6.13. It is probable that the lower frequency of married males as household heads in Hetton is related directly to the greater incidence of widowed persons in this village with the oldest age structure, compared with the other more recently-created mining communities.

Following Anderson's classification of Life cycle stages into six categories,⁽³⁶⁾ the calculations of this index of household structure are given for the eight townships in Table 6.14. In his study of mid-nineteenth century Preston, Anderson used Life cycle stage as a key explanatory variable of social differentiation when correlated with family income levels as families passed through the various stages from newly-married couples to ultimate widowhood.⁽³⁷⁾ Within the context of the east Durham communities, the Life cycle stage is considered in relationship to family size and the mean number of children. Significance testing of Table 6.14 is not possible by either the Kolmogorov-Smirnov or the chi-square tests,⁽³⁸⁾ but observation of the table would indicate that in East Murton, the village with the largest mean household size, the largest mean family size and the greatest mean number of children, the proportion of households in Life cycle stages 3,4, and 5, at 87.1% is the highest of all the mining communities. In Shotton, which recorded the second largest mean household, family and children values, the proportion is 84.2%, whilst in Hetton and Hutton Henry, the two villages with the smallest households,

the proportions are 75.3% and 73.2% respectively. Even so these last frequencies which represent the minimum values for the eight sample villages, exceed the 68.3% recorded for Preston in 1851.⁽³⁹⁾ This suggests that the mining settlements recorded the incidence of families with domiciliary children very frequently compared with older multi-functional towns and cities, probably due to the recent influx of mining families into the east Durham townships.

Table 6.15 shows the age structures of the eight townships with the total populations grouped into five-year age groups and the ages expressed by both percentage frequencies and by cumulative percentages. Very youthful age structures characterised all the villages, with the proportion of the population in the age range 0-14 ranging from a minimum of 39.7% in Hetton to a maximum of 46.0% in East Murton. In all the villages the great majority of the population were under 50 years of age with Hetton again having the lowest proportion, 87.0% and East Murton the highest with 93.8%. As a direct corollary, few of the inhabitants had attained ages of more than 65, frequencies ranging from 4.3% in Hetton to only 1.3% in East Murton. In order to examine whether there were significant differences in age structure amongst the mining settlements, Table 6.16 has been constructed in which the villages are ranked from oldest to youngest in overall age along both axes and then the incidence of significant difference at s.l. 0.05, as calculated by the Kolmogorov-Smirnov test for each pair of villages, is indicated by the appropriate symbol. The Table shows that significant differences were recorded in twenty one out of fifty six possible pairings and that the differences obviously occur between pairs of villages near the extremes of the age-structure rankings. East Murton for example revealed a significantly more

youthful age structure than five of seven other villages; Hetton's overall population was significantly older than four of the seven remaining communities. Conversely, Thornley and South Hetton, both in the middle of the age ranking, demonstrated significant age structure differences with only one other settlement, East Murton and Hetton respectively.

Finally in this section on inter-township demographic and social structures, Table 6.17 indicates the overall sex ratios found in the east Durham settlements. Although less male-dominant than might have been expected in communities based for employment very largely upon the coal industry, in each of the villages males outnumbered females with a maximum male ratio of 54.1% in East Murton compared with a minimum of 51.7% in Hetton (see Chapter 4). Chi-square testing revealed that there was no significant difference of sex-ratio amongst the villages, although it can be noted that the 'older' mining communities such as Hetton, South Hetton and Thornley created in the 1820s or 1830s tended to have closely balanced sex-ratios whilst the mining settlements initiated in the 1840s such as Hutton Henry, Shotton and East Murton tended to demonstrate a greater degree of male dominance. Probably this pattern reflects the rapid development of family life in the villages after a brief pioneer colonisation phase in which a heavily male-dominant sex ratio can be explained by the temporary residence of gangs of construction workers employed at the collieries and on the railways, some of whom lodged for a brief period in multiply-occupied houses. This process can be well illustrated in Hetton for which the 1821 census tables indicate a sex-ratio of 59.4% male to 40.6% female in the year after sinking operations began at Hetton Lyons colliery.⁽⁴⁰⁾ By 1851 the male

ratio had dropped to 51.7% with the development in the thirty year period of a stable nuclear family-based social structure with the slight excess of males largely attributable to the presence of male lodgers. Within this context, in his analysis of Goole, Porteous found that the male sex ratio in this new canal company town had fallen to 51% by 1851, some twenty five years after its foundation, after having been as high as 62% in 1826.⁽⁴¹⁾

Summary of the inter-township analysis

The stereotyped image of the social geography of colliery communities stresses the homogeneous uniformity of their social structure and within the preceding section evidence has been brought forward to support this generalization. In the sample communities a population largely grouped in nuclear families, living in separate households, with few lodgers, can be explained at least in part in terms of the function of the colliery companies in providing their workforces with single-family accommodation from the earliest days of the mining operations (Chapter 4). Furthermore, the youthful age structures and the concentration of families in Life cycle stages 3,4 and 5 with children living at home, probably reflects the recent immigration process by which young coal miners in particular were attracted to the employment opportunities in the new mines of east Durham. The high frequency of families with employed children living at home can be explained by the tradition of young males working in the mines with occupations graded according to age from ten years upwards after 1842.⁽⁴²⁾ However, it is also possible to demonstrate a measure of social heterogeneity amongst the townships which has not previously been recognized. Of course the 1851 census books provide

no more than a static glimpse of household structures which were the product of complex demographic, social and economic processes, but within such limitations it is possible to suggest that the age of the colliery village is an important factor in seeking to explain some of the measureable differences between them. For example, those villages still at a pioneer stage of development with collieries sunk less than ten years before 1851 such as East Murton and Shotton, tended to have larger mean family sizes, a greater mean number of children, a more youthful age structure and a higher proportion of families in the child-rearing stages of the Life cycle stages than some of the longer-established villages such as Hetton. Because of its arduous nature coal mining tended to attract a youthful labour force; recently opened collieries provided employment for such migrants and therefore one can distinguish the demographic and social characteristics of the pioneer communities from the somewhat more mature social structure of Hetton which by 1851 had been established for thirty years.

(ii) Intra-township social analysis: a) Spatial survey.

In order to identify whether the mining townships contained social structures characterised by a degree of residential segregation, the settlements have been subject to two different analyses at the intra-township scale, a) a spatial analysis and b) a social analysis, each of which will be described in turn. The spatial analysis has been based upon a comparison of the pre-mining rural nucleations and the mining settlements in the four townships where the two units were physically separate i.e. Hutton Henry, Trimdon, East Murton and Shotton. In addition, Hetton, which was by far the largest and most complex settlement in 1851,

has been subdivided into eight zones which from the examination of the household details in the census books, appear to offer a measure of social distinctiveness, if not complete internal homogeneity and which can be distinguished as discrete units of settlement within the parish.⁽⁴³⁾ For each of the units of settlement the same variables as used in the inter-township analysis have been calculated through the use of the 'select if' facility of SPSS ⁽⁴⁴⁾. Then the relevant frequencies have been tested for significant difference by the same statistical tests, Kalmogorov-Smirnov and Chi-Square. Table 6.18 summarises the extent to which significant differences were found between the rural and mining communities of the four townships, whilst Table 6.19 provides the same information for the eight zones of Hetton.

In the case of the first variable, mean household size, only one pair of settlements, Trimdon Colliery and Trimdon Village demonstrate a significant difference. Although in all the townships except Hutton Henry, mean household sizes are actually greater in the mining zones than in the rural cores, the differences could not be proved to be significant. In the light of what has been said earlier in this chapter on the constancy of mean household sizes in history, this finding is not surprising and it is necessary to look within the households to examine whether there were important structural differences in kinship and residence arrangements between the mining and the rural communities.

With reference to mean family sizes, examination of Tables 6.18 and 6.19 demonstrates that in only one township, Shotton, was there a significant difference between the rural village and the colliery settlement with the latter containing larger families (mean family size 4.93 compared with 3.83). This finding must be

regarded as unexpected in view of the generalizations about high fertility rates and large mean family sizes amongst colliery folk in the nineteenth century,⁽⁴⁵⁾ as must the next observation that in only two townships, Trimdon and Shotton, did the colliery rows contain households with significantly larger mean numbers of children than the rural cores. Meanwhile in Hetton parish, a significantly different mean number of children could be proved only between two of the eight zones, Hetton Downs and the East Side of the Houghton road, in which coal miners represented 77.2% and 45% of the working population respectively. It would appear therefore that up to 1851 it is not possible to adduce that all colliery communities contained differentially large family units with larger mean numbers of children than other sections of society, as had become apparent on a national scale by the end of the nineteenth century.⁽⁴⁶⁾

Turning to the patterns of residence of the non-nuclear family members of the households in the mining and rural settlements, testing indicated that there was no significant difference in the frequency with which lodgers were found. Similarly, within the zones of Hetton township there was very little deviation from the expected frequencies.⁽⁴⁷⁾ This result is also somewhat unexpected as it might have been anticipated that there would have been a more frequent occurrence of lodging in the mining rather than in the rural communities because of the greater attraction to immigrant labour that the collieries would offer. Furthermore the uniform distribution of lodging cannot be explained by coal-miner lodgers living in the rural villages as well as in the mining settlements as they were concentrated in the latter. It is probable that the explanation is twofold; firstly the product of

colliery company policy in the provision of single-family accommodation for the workforce and secondly the lack of pressure on the housing stock as witnessed by the virtual stagnation or decline of population experienced in several of the townships in the 1840s⁽⁴⁸⁾, thus reducing the need for the multiple-occupance of houses which was so common in rapidly-growing contemporaneous Victorian towns.⁽⁴⁹⁾

In contrast to the distribution of lodgers, the occurrence of servants provides a fundamental dimension of social differentiation between the mining and rural communities and also within the eight sections of Hetton. With the exception of East Murton, in which significance testing is not possible,⁽⁵⁰⁾ the rural cores contained significantly higher proportions of households with servants than did the mining rows.⁽⁵¹⁾ Within Hetton, the higher than expected frequencies of servants in Hetton Lyons and the 'old' village contrasted markedly with the deficits found particularly in Brick Garth and Hetton Downs.⁽⁵²⁾ Clearly the colliery officials and skilled engineering workers of Hetton Lyons and the farmers, craftsmen and retired annuitants of the 'old' village, were much more likely to keep servants than were the colliery folk of the mining rows and courts of Brick Garth and Hetton Downs. Moreover, most of the few servants in the colliery zones were quite elderly housekeepers employed in widowers' households. As servants were very rare in the colliery households, with only 3.9% and 3.4% of the Downs and Brick Garth household containing them, Hetton and the other townships support the commonly accepted view that servant-keeping was an accurate and sensitive measure of social class within mid-nineteenth century society.⁽⁵³⁾

With reference to the distribution of households with resident

relations there would appear to be some tendency for the rural villages to record significantly greater frequencies than the colliery communities.⁽⁵⁴⁾ This finding applied within Hutton Henry and Shotton township and amongst the zones of Hetton in which low incidences of resident relations were recorded in those sections such as Brick Garth and Hetton Downs where colliery folk were concentrated. As the presence or absence of resident relations determines whether a family should be classed as nuclear or extended in structure, it is to be expected that the distribution of the different types of household structure reflects the findings of the last section. Therefore, although no significant difference of household structure can be distinguished between the rural and mining sections of East Murton and Trimdon, in Hutton Henry and Shotton the mining communities record a significantly greater frequency of nuclear family structures. In addition, within Hetton parish the mining hamlet of Hetton Downs recorded more nuclear families than expected and Hetton Lyons more extended kinship groups than anticipated.⁽⁵⁵⁾

For the purposes of intra-settlement analysis, very little use can be made of the frequency of shared households as a measure of spatial differentiation. In the cases of East Murton and Hutton Henry, too few of the rural households were shared for significance testing to be carried out, whilst within Trimdon parish no significant differences were found between either Trimdon Grange or Trimdon Colliery on the one hand and the rural village on the other hand.⁽⁵⁶⁾ Only in Hetton were statistically reliable differences obtained with the major deviations from the expected values occurring in Easington Lane and Hetton Downs.⁽⁵⁷⁾ The former was the zone which was characterised in 1851 by the

relatively frequent occurrence of multiply-occupied and shared households (11.3% of households), which sheltered a high proportion of non-coalmining long-distance migrants: Hetton Downs, in which only 3.9% of the household were shared, was, by way of contrast, overwhelmingly inhabited by Northumbrian pitmen and their families.

Perhaps it is with the social variable of Life cycle stage that one of the more clear-cut distinctions can be drawn between the mining and the rural settlements. As in some earlier tests, East Murton's rural core, which totalled only twenty three households, provided too few cases for the chi-square test to be effective. Of the remaining villages only within Shotton township was no significant difference recorded and even here there was a tendency for the rural unit to contain households in which the family of the head had attained the later stages of the Life cycle. However, in Hutton Henry and Trimdon there were significant differences between the settlement zones, with in each case the rural cores housing families at later stages of the Life cycle. In particular it was in Life cycle stage 6 that the major discrepancies occurred with the ancient agrarian-based villages heavily over-represented with households containing married couples in which the wife was over forty five years old and in which either there was no child at home, or the sole remaining child was over twenty years old. The colliery settlements were more likely to contain households within which the families included working children, almost invariably boys employed at the neighbouring mine.⁽⁵⁸⁾ Within the more complex social fabric of Hetton, the overall chi-square test demonstrated a highly significant difference (s.l. 0.001) of Life cycle stages amongst the eight zones. Table 6.31

reveals that Brick Garth, consisting solidly of coal miners' cottages, as might be expected from the evidence drawn from the other east Durham villages, under-recorded households in stage 6. A similar pattern was found in Hetton Downs, which in addition registered a considerable over-recording of stage 4 i.e. relatively young families in which under half the children were in employment. Hetton Lyons significantly under-recorded families in stages 1 and 2 and correspondingly contained more families than expected in stage 6. Predictably, the old rural core of Hetton contained fewer families than expected in the first two stages of the Life cycle.

Finally it will be demonstrated below that there was a considerable measure of difference in age structure between the various units of settlement. Apart from East Murton township, significant differences of age distributions existed between the mining and the rural folk, whether measured in overall terms by the Kolmogorov-Smirnov test, or by the chi-square test using five age-groups.⁽⁵⁹⁾ In Table 6.34 which shows the overall age distributions of the eight zones of Hetton it can be observed that in the sections occupied largely by colliers' families, the age-structures were correspondingly youthful. Brick Garth, Hetton Downs and Bog Row for example demonstrated age-structures with the following characteristics: 42-43% of the population under fifteen years of age, 89-91% under fifty years and only between 1-3½% over sixty five years. By way of contrast, Hetton Lyons, the 'quality row' of the village and the old rural core housed an older population with the following age distributions: 32% and 36% respectively of the population under fifteen, 80% and 84% of the population under fifty years and 7% and 5% of the residents

aged over sixty five years.

On examination of the chi-square table of Hetton's age-structure,⁽⁶⁰⁾ a highly significant overall difference of age distributions amongst the sub-divisions (s.l. 0.001) can be observed to be the product of major deviations from the expected frequencies in the following cases. Easington Lane contained more observations than expected in the 50-64 age group; Brick Garth, Hetton Downs and Bog Row more than expected in the 0-14 age group and fewer in the 65+ age group; Hetton Lyons with less than expected in the youngest age group and more in the 50-64 and 65+ age groups, and the old village with over-representation in the 65+ category. Further analysis of the spatial variations of age structures within Hetton has been pursued by conducting the chi-square test on each pair of zones. In Table 6.36 the results of these tests show that in fourteen of the twenty eight zonal pairings, significant differences were calculated. Three sections in particular deviated most frequently from the other areas within Hetton, Brick Garth, the streets east of the Houghton road and Hetton Downs. Brick Garth's age distribution was significantly younger than all the other zones except Hetton Downs and Bog Row; the Hetton Downs age profile was significantly younger than all the other units of settlement except Brick Garth and Bog Row, in the streets east of the Houghton road, the age structure was significantly older than in all other parts of the parish with the exception of Hetton Lyons and the old rural core.

Although correlation does not prove causation, it would appear reasonable to infer that the key explanatory variable for the observed pattern of age distributions is the differential frequency of coal miners' households in the various parts of Hetton.

In Table 6.37 a Spearman rank correlation coefficient test for the eight zones ranked for age structure and for the proportions of the households headed by coal miners, produced a correlation coefficient of + 0.798, a strong indication of the association between youthful age profiles and the coal mining population.

Turning to the four smaller colliery townships, in three cases, Trimdon, Shotton and Hutton Henry, the mining section of the community was significantly younger than the population in the rural core.⁽⁶¹⁾ Within Trimdon parish for example, the age structures of both Trimdon Grange and Trimdon Colliery were significantly younger than that of Trimdon Village (s.l. 0.001), with the two colliery communities severely under-represented in the 65+ age group. In Hutton Henry and Shotton townships similar age structure patterns were found, with the rural villages heavily over-represented with the elderly and the colliery rows inhabited by highly significantly more youthful populations (s.l. 0.001). Only in East Murton township was no significant difference found in age distributions between the rural and mining sections. In this case the observed differences in age profile, with a more youthful colliery population, could not be proved to be statistically significant at the s.l. 0.05.

Summary

The major dimensions of social differentiation between the mining and non-mining units of settlement within the townships would appear to be as follows. A tendency for the colliery communities to record larger mean family sizes and more children per family was only weakly developed and was not as universal as might have been expected particularly in the light of Friedlander's findings that as late as the early part of the twentieth century

relatively high rates of marital fertility in colliery districts produced a situation in which coal miners' families contained an average of one additional child compared with all other families.⁽⁶²⁾ Perhaps the relatively weak differentiation of this variable within the east Durham townships in 1851 reflects the fact that it was only in the later part of the nineteenth century that the contrast in marital fertility and birth rates between colliery districts and other areas developed. Coal mining areas appeared to experience a slow transition to the small-family system compared with the rest of the country; in 1851 however this divergence had not yet begun.

With reference to household structures, evidence has been brought forward to show that resident relations were somewhat less likely to be found in the mining rows than in the rural cores, and that conversely more of the households in the mining zones were likely to be headed by men with nuclear families. Detailed examination of the census entries suggests that the explanation of this spatial variation is related to the observation that the more commonly found elderly household heads in the agrarian communities tended to live with young kin, such as grandchildren, nephews and nieces, more frequently than was the case within the colliery households. Here, younger, tightly-knit nuclear families predominated. The incidence of servants was, as might be expected, much more frequent in the rural than in the mining communities. Farmers, craftsmen, tradesmen and annuitants in the former kept servants with frequencies similar to the equivalent social groups in other mid-Victorian settlements, whereas in the mining households resident servants were rare except in two circumstances; firstly, widowed middle-aged coal miners with dependent children

occasionally employed resident housekeepers; secondly, colliery officials were much more likely to keep servants than the bulk of the colliery labour force. In Hetton for instance, whilst only 4% of the miners' households contained a servant, 30% of the higher-status and higher-income officials employed one or more domestic servants.

The social variable Life cycle stage exhibited considerable spatial differentiation between the respective types of community, with the colliery zones generally over-represented in the earlier and middle stages of the Life cycle. This must reflect the attraction provided by the recently sunk mines as sources of employment for a youthful colliery labour force characterised by an early marriage age and by high rates of marital fertility. Correspondingly, very few of the coal mining families had reached the last stage of the Life cycle stage, partly for the reason mentioned above and partly because of the high death rate amongst coal miners which left many widows but relatively few older married couples. On the other hand the rural villages contained a significantly older population including more older surviving married couples whose children had left the family home.

Compared with the simple contrasts in social structure which have been demonstrated between the rural and the mining sections of East Murton, Shotton, Trimdon and Hutton Henry in 1851, material has been introduced which suggests that in Hetton a more complex spatial differentiation of social structure had evolved in the thirty years since the opening of the collieries in, or close to the parish. In chapter 4 reference was made to the varied frequency of coal miners as heads of household amongst the eight zones of the settlement and examination of the distribution of the social

variables would seem to indicate that occupation was the key determinant of the household structures. For example, the three units of housing occupied almost exclusively by coal miners, Brick Garth, Hetton Downs and Bog Row, demonstrated the following characteristics compared with the expected values for the whole settlement: a tendency to have more children per household, to have fewer servants, to have fewer resident relations, to have a greater frequency of nuclear families, to have fewer shared households (only Hetton Downs) and to have more youthful populations with families less likely to be in the last stage of the Life cycle. These were social characteristics shared by the colliery rows in the other east Durham mining settlements. Compared with the mining rows and courts housing the bulk of the labour force, Hetton Lyons, as described in Chapter 4, was the "Quality Row" of the parish with colliery officials and men of inspectorial grade living next to skilled engineering and other craftsmen. Their households displayed the following significant social characteristics: a greater frequency of servants than expected for the settlement, a tendency for more resident relations to live there with the converse under-recording of nuclear families; an older age structure than the average for Hetton with fewer than expected families in stage 1 and 2 of the Life cycle and many more in stage 6. Greater average age, higher social status and higher incomes would appear to be the variables which help to explain the social distinctiveness of this zone.

Easington Lane with its widely diversified occupation structure (see chapter 4), was inhabited by numerous long-distance migrants who shared households much more frequently than was recorded in any other part of Hetton with a frequency of 11.3% of

households compared with an average for Hetton of 5.4%. In the two zones of the parish in which the frequency of coal miners approximated to the average for the whole settlement, Four Lane Ends and the rows in the village east of the Houghton road, the social characteristics of the households conformed very closely to the values of the whole settlement. However, the social structure of the households in the old village, occupied in only 21.7% of the cases by coal miners, differed significantly from the other zones in several respects. In particular, the village households contained a higher proportion of servants than any other part of the village 20.5%, compared with the Hetton average of 9.6%. Furthermore there was a tendency for the households to contain fewer than expected families in the early stages of the Life cycle and following from this the population was over-represented in the age ranges from fifty years upwards.

(ii) Intra-village analysis: b) social survey.

In order to complement the spatial analysis and to include data drawn from the three mining townships not included, Thornley, Quarrington Hill and South Hetton, the social structures of each of the villages has been analysed by means of a series of computer-generated cross-tabulations, each tested for significance by the chi-square test.⁽⁶³⁾ Table 6.38 summarises the results of this analysis by indicating for each of the cross-tabulations whether i) a significant association existed (at s.l. 0.05) ii) there was no significant association iii) the chi-square test was invalid owing to contravention of the rule concerning the values of expected frequencies. As it was soon found that the use of birthplace of household head as a variable was not possible in most of the

villages because of contravention of the chi-square test rule two fundamental variables, occupation and age of household head were chosen in order to examine their association with a range of social characteristics. After some experimentation with the cross-tabulation procedure it proved necessary to reduce the number of categories in some of the lists of variables to accomplish the statistical tests. Full details of these recodings are given in Appendix 1.

Using occupation as the first key variable, the heads of household were simply categorised as coal miners or other gainfully-employed persons. This status variable proved to be a strong indicator of social differentiation with reference to the following household characteristics: in all eight villages colliery households were highly significantly less likely to employ resident servants; similarly in all eight townships coal miner heads of household were significantly younger than all others and as should be expected in a male-dominated industry coal miners' households were more likely to be headed by a married male. Seven of the eight villages recorded a significant difference between occupation of household head and birthplace region, a topic fully analysed in Chapter 7; in five of the communities the family size of the coal miners was significantly larger than that of the other employed household heads. Finally, there were only infrequent significant associations recorded in the eight villages in the tests of association between occupation and variables such as persons per household (Hetton only), shared households (Hetton and Shotton), the number of children per family (Hetton and Thornley), the frequency of lodgers (Hetton, South Hetton and Shotton) and the frequency of relations. In each of these named cases the direction

of the significant difference confirmed the findings of the intra-settlement analysis. For example, in Hetton and Thornley the colliery households recorded more children per family, whilst in Hetton and Shotton the non-colliery households returned a greater frequency of resident relations, thus broadly confirming the findings of the intra-township findings.

On examination of the cross-tabulations in which age of head of household is employed as the key variable, Table 6.38 reveals how this factor produces significant differences from a wide range of social characteristics. Firstly, seven out of the eight villages record a significant difference between age and household size; there is a tendency for the younger household heads (up to 29 years) to be over-represented in the category of small households with a maximum of three persons, for the middle-age range household heads (30-64) to be over-represented in the category of large households with six or more persons and for the elderly households heads (65+) to live in small households of under four residents. This pattern is repeated, for all eight villages, in the association between age of household head and size of family and neatly reflects the Life cycle stages in which the number of children rises and then falls from marriage to eventual widowhood. Unfortunately, it has not been possible to test by the chi-square statistic the likely explanation that the significant associations between age and household/family size was the product of differences in the number of children in relation to the age of the head of household. However, empirical observation of the contingency tables indicated that household heads in the middle-age group (30-49) did have more children than those in both the younger and older age ranges.

Related to this association is the finding that in six of the eight villages there was a significant correlation between the age of the head of household and the structure of his family.⁽⁶⁴⁾ In each case the nuclear family was more common in the age group 15-29, whilst with the older age group the extended family was increasingly well-represented, particularly in the age group 65+. The probable explanation of this pattern lies in the finding that in the same six villages there was a significant association between age and the incidence of resident relations. Older heads of household, particularly those over fifty years of age, were more likely to have offered accommodation to relations outside the nuclear family unit, such as unmarried grandchildren, nephews and nieces, as well as widowed daughter or sons sometimes with their own children. By way of contrast, the younger household heads, especially those under thirty, rarely lived with kin more distant than the nuclear family.

Apart from the predictable finding of a significant association between age and marital status of heads of households in all eight villages, the other cross-tabulations did not record very frequent significant correlations. There was a tendency in three of the six villages where the chi-square test was possible, for the older household heads to keep servants more frequently than the younger ones, but the variable of age did not associate significantly with the frequency of shared households, the incidence of lodgers or the birthplace of the head of household in more than a few cases.

iii) Beyond the mining community.

It is proposed in this final section to compare some of the social characteristics of the east Durham mining communities with

the findings of some of the research into the nature of mid-nineteenth century society in selected English towns and cities. No more than a brief survey is intended, to act as a summary, which will use as a basis some of the tables included by Anderson in his work on Preston.⁽⁶⁵⁾ For purposes of comparison, the figures in the following tables under the heading of East Durham, are the mean values for the aggregation of the eight townships.

Table 6.39 Mean Household Size and Composition Sample Comparisons 1851

Mean no. per household	<u>East Durham</u>	<u>York</u>	<u>Preston</u>	<u>Rural</u> ¹	<u>England</u> ² <u>1564-1821</u>
Heads	1.0	1.0	1.0	1.0	1.0
Wives	0.9	0.7	0.8	0.7	0.7
Children	2.6	1.8	2.5	2.5	2.1
All nuclear family	4.5	3.5	4.3	4.2	3.8
Relations	0.3	0.3	0.4	0.5	0.2
Lodgers	0.1	0.5	0.6	0.2	0.0
Servants	0.1	0.3	0.2	0.6	0.6
All household	5.0	4.7	5.4	5.5	4.7

1 "Rural" refers to fifteen villages surrounding Preston which were analysed by Anderson in conjunction with his work on Preston.

2 "England 1564-1821" refers to Laslett's findings on household structures in 100 villages over almost three centuries.

Table 6.40 Frequency of Households with Relations, Lodgers and Servants Sample Comparisons 1851.

Percentage of households with:	<u>East</u> ¹ <u>Durham</u>	<u>York</u> ²	<u>Preston</u>	<u>Rural</u>	<u>England</u> ³ <u>1564-1821</u>
Relations	17.0	22.0	23.0	27.0	10.0
Lodgers	9	21(c15)	23	10	
Servants	9	20	10	28	29

1 For East Durham the percentage values are rounded to the nearest whole number.

2 For York Armstrong's revised estimate of lodger frequency is given in brackets.

3 For the 100 villages 1564-1821 much doubt exists as to the exact incidence of lodgers.

With reference to Table 6.39 the most striking observation relates to the contrasting rank of the east Durham villages between family and household sizes. The colliery townships record the largest nuclear family sizes, averaging one person per family more than York in the same year. This difference is largely explained by a greater mean number of children per family compared with all the communities, but particularly York, where in 1851, families averaged 0.8 of a child less than in the east Durham villages. The much smaller difference in nuclear family size between the colliery settlements and Preston together with its neighbouring rural villages is the product of a slightly smaller mean number of children and a lesser frequency of wives in the latter communities.

In contrast to family size, the mean household size of the Durham townships was smaller than that recorded both for Preston and the fifteen Lancashire villages. In conjunction with Table 6.39, Table 6.40 offers an explanation with the relative infrequency with which the colliery households included relations, lodgers and servants. With reference to relations, the frequency in the Durham households is broadly intermediate between Laslett's findings for pre-industrial England and that found in the three 1851 samples. Perhaps the somewhat low incidence, by mid-nineteenth century standards, in the Durham villages is a function of the provision of company housing for nuclear families by the colliery owners and of the limited attractiveness to migrants, other than those seeking work directly in the mines, of the colliery villages themselves. The low frequency of lodging in the Durham settlements compared with York and Preston in 1851 again probably reflects differences in the agencies of housing provision with the universal and rapid provision in the former of company housing contrasting with the

private landlord-dominated rented housing market in the latter through which a balance between supply and demand would be more difficult to achieve thus necessitating multiple occupancy and lodging. It should also be remembered that in the east Durham coalfield the economic problems of the 1840s referred to in Chapter 3 reduced the demand for housing: as has been mentioned earlier in this chapter in several of the townships populations stagnated between 1841 and 1851, whilst Hetton, by the latter date, although recovering from the demographic decline of the late 1830s and early 1840s, had not quite returned to its 1831 population level.⁽⁶⁶⁾

As could have been expected, the colliery settlements contained few servants compared with the pre-industrial communities, with York and with the Lancashire rural villages, in which the high proportion of servants was largely explained by the presence of the farm servants.⁽⁶⁷⁾ However the frequency of households which included servants was very similar in Preston to the Durham mining communities. In Preston, employment opportunities in the cotton mills made it difficult to recruit young people into service; in the mining villages the almost invariable domiciliary role of the miners' wives reduced the need for resident domestic service even if it could have been afforded. Also, the servant-employing middle classes were only infrequently found in the mining communities.

Finally, Table 6.41 exemplifies the structure of the families of the heads of households for the sample populations. As can be seen, the mining populations were characterised by the greater frequency of nuclear families than either Preston or the sample Lancashire villages, although fewer than Laslett's 100 pre-industrial villages. Whilst the east Durham villages contained

more extended kinship groups than these earlier societies, they did not reach the frequency found either in Preston or the Lancashire villages in the middle of the nineteenth century. Although explanations are difficult to adduce for the observed contrasts between the pre-industrial and the mining villages, it can be suggested that the greater frequency of nuclear families in east Durham compared with Lancashire stems from the observed social characteristics of coal mining communities with youthful age structures, early marriage ages and purpose-built family accommodation.

Table 6.41 Structure of the Families of Heads of Households
Sample Comparisons 1851.

<u>Type of family %</u>	<u>East Durham</u>	<u>Preston</u>	<u>Lancs. Villages</u>	<u>England 1564-1821</u>
No related person	2.4	4	5	{ 90
Married couple only	10.1	10	12	
Parents unmarried children	70.2	64	56	
Stem families	3.7	10	6	{ 10
Composite families	13.6	13	21	
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

In summary, it can be concluded that the sample mining communities on the east Durham concealed coalfield consisted overwhelmingly of simple nuclear families, usually without servants or lodgers, living in single family housing with only infrequent extended kinship groups or shared households. Since these settlements had been created almost entirely by the immigration of colliery families, it is proposed to examine in the next chapter, those patterns of labour mobility, which to judge from the evidence

of this chapter were created by the movement of pitmen with their families rather than by the large-scale migration of single workmen.

NOTES AND REFERENCES

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- (2) Armstrong W.A. The Social Structure of York, 1841-1851. unpubl. Ph.D thesis, Univ. of Birmingham, (1967).
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- (3) Smith R.J. The Social Structure of Nottingham and Adjacent Districts in the Mid-Nineteenth Century. unpubl. Ph.D thesis, Univ. of Nottingham, (1968).
- (4) Anderson M. Family Structure in Nineteenth Century Lancashire. unpubl. Ph.D thesis, Univ. of Cambridge, (1968).
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- (6) Shaw M. "Ecology of Social Change: Wolverhampton 1851-71," Trans. Inst. Brit. Geogs. New Series, Vol.2, No.3, (1977) 332-348.
- (7) Dennis R.J. Community and Interaction in a Victorian City unpubl. Ph.D thesis, Univ. of Cambridge, (1975).

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- (8) Herbert D.T. "Principal Components Analysis and Urban Social Structure: a Study of Cardiff and Swansea," in (eds) Carter H. & Davies W.K.D., Urban Essays: Studies in the Geography of Wales, (1970), 79-100.
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- (11) Tansey P.A. Residential Patterns in the Nineteenth Century City: Kingston-upon-Hull, 1851. unpubl. Ph.D thesis, Univ. of Hull, (1973).

- (12) Dennis R.J. See note 7.
- (13) Lawton R. & Pooley C.G. See note 5.
- (14) Royle S.A. Aspects of the Social Geography of Leicester-shire Towns 1837-71. unpubl. Ph.D thesis Univ. of Leicester, (1976).
- (15) Ibid, 148.
- (16) Ibid, 149.
- (17) Friedlander D. "Demographic Patterns and Socio-economic Characteristics of the Coal Mining Population in England and Wales in the Nineteenth Century." Economic Development and Cultural Change, Vol.22, (1973-74), 39-51.
- (18) Figure 4.9 indicates the subdivisions referred to in the text.
- (19) Anderson M. "Standard Tabulation Procedures for the Census Enumerators' Books, 1851-1891," in (ed) Wrigley E.A. Nineteenth Century Society, (1972), 142-143.
- (20) Ibid, 144.
- (21) Anderson M. Family Structure in Nineteenth Century Lancashire, (1974).
Table 8, page 44 lists the seven-fold classification as follows:
 - 1) Head alone, or only with unrelated persons.
 - 2) Nuclear family with no children.
 - 3) Married couples or widowed persons with unmarried children.
 - 4) Stem families; two or more lineally-related ever-married persons with their nuclear families if any.
 - 5) Ditto plus other kin.
 - 6) Composite families: unmarried siblings only.
 - 7) Other combinations of kin.
- (22) For the use of the chi-square test of association in certain cross-tabulation procedures involving structure of family as a variable, the number of categories had to be reduced in order to comply with the requirements of the test concerning the minimum values of expected frequencies, viz. no expected frequencies less than 1 and fewer than 20% to be less than 5.
- (23) Anderson M. Ibid, 202, Life cycle stages.
 - 1) Wife under 45, no children at home.
 - 2) Wife under 45, one child under 1 year old at home.
 - 3) Children at home but none in employment.

- 4) Children at home, under half in employment.
 - 5) Children at home, half or over half in employment.
 - 6) Wife 45 and over, no children, or only one aged over 20 at home.
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- (24) See Appendix 1 for the list of frequency tables.
 - (25) See Appendix 1 for the list of cross-tabulations.
 - (26) See Table 6.2
 - (27) Laslett P. Household and Family in Past Time, (1974), 158.
 - (28) Anderson calculated a mean number of children per family of 2.50 in Preston in 1851: Smith's values were 1.82 for Nottingham 2.30 for Radford and 2.01 for Bingham in the same year. In York, Armstrong computed the mean number of children as follows: Class I 1.85, Class II 1.37, Class III 1.93, Class IV 1.52, Class V 1.94. Anderson (1974), 234, Smith (1968), 272, Armstrong (1967), 171.
 - (29) Preston recorded 23% of its households with lodgers, York c15% after Armstrong's recalculations following his redefinition of the household, Nottingham 22%. Radford 14% and Bingham 17%.
 - (30) See Table 6.5
 - (31) In 1851 one or more servants were recorded in 10% of Preston's households, 20% of York's, 12% of Nottingham's and 8% and 12% of Radford's and Bingham's.
 - (32) See Table 6.6
 - (33) See Table 6.7
 - (34) See Note 21 above.
 - (35) The reason for this reduction of the variable, structure of family of household head, from seven to two categories is given in note 22.
 - (36) See note 23.
 - (37) Anderson M. Family Structure in Nineteenth Century Lancashire, (1974), 31.
 - (38) These two tests are inappropriate i) the Kolmogorov-Smirnov test, as the data is not at the interval scale of measurement required by this test ii) the chi-square test, because the number of expected frequencies in the contingency tables would contravene the chi-square test limits.
 - (39) This value is calculated from Table 3, page 31, in Anderson M., (1974).
 - (40) Census Tables, (1821): Hetton-le-Hole, township

- (41) Porteous J.D. The Company Town of Goole: an essay in Genesis.
Univ. of Hull, (1969), 24.
See chapter 4 for a fuller discussion of the
impact of mining colonisation upon sex
ratios in east Durham.
- (42) Employment of Children in Mines Act, 5 & 6 Vict. C.99, (1842)
- (43) See Fig. 4.9 which shows the distribution of the eight zones
into which Hetton has been subdivided.
- (44) By means of the "select if" procedure of S.P.S.S. it is
possible, by the use of an additional control card, to
limit the analysis to a specified sequence of households;
i.e. to select a group of households numbered consecutively
100 - 170 the control card would read, "select if house not
less than 100 and not more than 170."
- (45) Friedlander D. (1973-74), 39-51.
- (46) Ibid, 39-51.
- (47) See Table 6.20 and Table 6.21 which show the chi-square
calculations for the four townships and Hetton respectively.
- (48) For example in Thornley township the 1841 population of
2730 had only increased by 1851 to 2740: in Hetton parish
the population in 1851, 5664 had not yet recovered to the
1831 maximum of 5887 after the decline to 4158 in 1841.
- (49) In Newcastle-upon-Tyne for example in 1851 there were on
average 2.5 households per house in Sandgate Ward close to
the river Tyne. See (eds) Hist. Atlas of Newcastle upon
Tyne, (1980), 26-27 M. Barke & Buswell R.J.
- (50) Because of the small numbers of households with servants
in East Murton township it was not possible to apply the
chi-square test of association.
- (51) See Table 6.22
- (52) See Table 6.23
- (53) Armstrong W.A. (1967), 163.
- (54) See Table 6.24.
- (55) See Tables 6.25, 6.26 & 6.27.
- (56) See Table 6.28.
- (57) See Table 6.29.
- (58) See Table 6.30.
- (59) See Tables 6.32 and 6.33 which indicate the results of the
testing of age-structures by the Kolmogorov-Smirnov and
Chi-square tests respectively.

- (60) See Table 6.35.
- (61) See Table 6.33.
- (62) Friedlander D. (1973-74), 42.
- (63) See Appendix 1 for a discussion of the use of the computer to produce cross-tabulations and statistical tests.
- (64) See Table 6.38.
- (65) Anderson M. (1974).
- (66) See note 48.
- (67) Anderson M. (1974), 221.

CHAPTER 7

PATTERNS OF MIGRATION

It is clear from the evidence introduced in chapter 4 that the development of the concealed coalfield in east Durham during the thirty years after 1820 stimulated large-scale migration to the new collieries as the pre-mining population was too small to provide more than a small fraction of the labour requirement. In this chapter it is proposed, through the use of the 1851 and 1871 census books, to examine the nature of the labour migration that was created by this spatial extension of mining operations through an examination of the following questions:

- i) a) Did the pattern of the birthplaces of the population in the eight townships reveal distance-decay characteristics?
b) Were there significant differences of origin amongst the populations of the sample townships?
- ii) a) Were there significant differences of birthplace between the populations of the mining and the rural communities?
b) Were there significant differences of origin within the settlement units of Hetton?
- iii) Were there significant differences of birthplace between the coal miner heads of households and the others?
- iv) What does the distribution of the birthplaces of the children of the coal miners reveal about family migration patterns up to 1851?
- v) Did the population of the mining townships exhibit significantly different migration trends in 1871 compared with 1851?

Before answering these questions in detail it is important to

examine previous work which has been attempted on nineteenth century migration within the British Isles, in order to provide a contextual framework for the findings from east Durham and to propose generalizations some of which will be tested against the censal evidence for the sample villages.

In the hundred years or so since Ravenstein published his papers on migration⁽¹⁾ a considerable body of literature has been produced which will be discussed selectively in four sections. Firstly, an initial review of research based upon the use of the printed census tables will be followed by a survey of the more recent studies of migration drawn from the birthplace evidence of the census enumerators' books for the period 1841-1871. Then, a summary of the work concerned with migration patterns to and within British coalfields will preview an analysis of the extant literature of labour mobility within the Northumberland and Durham coalfield in the first half of the nineteenth century.

A valuable recent survey of Ravenstein's three seminal papers has been provided by Grigg who offers a succinct restatement of his "laws" or "principles" of migration which are subsumed into the following eleven statements:⁽²⁾ the majority of migrants go only a short distance; migration proceeds step by step; long-distance migrants usually go to one of the great centres of industry or commerce; each current of migration produces a compensating counter-current; the natives of towns are less migratory than those of rural areas; females are more migratory than males within the British Isles but males are more prone to emigrate; most migrants are adults, families rarely migrate out of their county of birth; large towns grow more by migration than by natural increase; migration increases in volume as economic development

occurs; the major direction of migration is from agricultural to urban/industrial areas; the major causes of migration are economic.

Ravenstein's "laws", which were derived from the place of birth tables published in the British censuses of 1871 and 1881, have provided a cornerstone for migration studies, but subsequent investigations have demonstrated that their universality varies from law to law. Whilst empirical evidence has supported the assertions that most migrations are short-distance, that the volume of migration does increase with the development of industry and commerce and that each current of migration produces a counter-current, Ravenstein's emphasis upon rural to urban migration and his law relating to the greater internal mobility of females do appear to be specific to period and place. Rapid urbanization in the nineteenth century and the large-scale migration of young rural females into fields of employment such as domestic service or the retail trades in towns and cities were characteristic of the British Isles at the time of Ravenstein's investigations. Also, with reference to Ravenstein's eleventh "law", we are reminded by White and Woods that any normative explanations of migration such as the response to wage-rate fluctuations, are only partial as they neglect consideration of the perceptions prevalent amongst potential migrants.⁽³⁾ It is the individual's perception of the spatial differences of opportunities between places which is important in the search for an explanation of the decision to migrate rather than a simple push-pull mechanism. However, at the time of writing, long before the adumbration of behavioural explanations of human activity, there can be little doubt that Ravenstein was correct to recognise the importance of economic development and employment opportunities as stimulants of migration since the

levels of the volume of rural-urban migration in the second half of the nineteenth century would appear to be related not to price levels and prosperity in agriculture, but to the higher demand for labour in industry from the middle of the century onwards.⁽⁴⁾

Writing some forty years after Ravenstein, Redford accepted his principles of migration and he developed Ravenstein's "law" that migrants did not proceed immediately to their destination but arrived at their ultimate residence by a series of steps. Redford recognized "wave-like patterns of migration",⁽⁵⁾ which resulted from migrants from distant locations filling the gaps vacated by the migration to towns of the inhabitants of the country districts closer to the centres of urban development. Grigg is critical of Redford's extension of Ravenstein's original hypothesis and he suggests that there are doubts as to whether migrants did, in aggregate terms, move up through the settlement hierarchy as well as spatially.⁽⁶⁾ This issue will be returned to later in the chapter.

In the period since World War II a third important contribution to the analysis of nineteenth century migration by Cairncross, stressed the importance of the building of the railways and the subsequent revolution in patterns of transport and industry as the principal causes of rural depopulation and rural-urban migration, rather than the phases of prosperity and depression in agriculture itself.⁽⁷⁾ However, this explanation has been challenged by Saville who considers that railways were an accelerating rather than an initiating factor of migration.⁽⁸⁾ More recently, Cromar, in an analysis of the process of nineteenth century industrialization in Britain, considers that an improved transport system might act as an immediate cause of rural depopulation for

which deeper structural economic reasons existed.⁽⁹⁾ Also in the post-war period writers such as Lawton and Friedlander and Roshier have used the printed census tables to examine the question of labour mobility in nineteenth century Britain. For example, the former in a study of population movements in the West Midlands between 1841 and 1851, noted the predominance of short-range migration to the expanding urban centres from surrounding rural areas,⁽¹⁰⁾ whilst in a later study Lawton was able to identify examples of Ravenstein's special class of highly skilled long distance migrants who had been attracted to employment opportunities in Birmingham.⁽¹¹⁾ Friedlander and Roshier in a major study of migration distances based on the census tables, came to the somewhat surprising conclusion that the average distance moved between adjacent counties only increased from forty five miles to fifty three miles between 1851 and 1911 and that movement between all counties and all non-adjacent counties increased only between 107 and 114 miles during the same period.⁽¹²⁾ As Grigg states,⁽¹³⁾ this finding is unexpected in the light of earlier suggestions that the relative importance of long-distance migration increased in the second half of the nineteenth century as railway construction and urbanization developed.

In the last fifteen years, the use of the census tables for the analysis of migration in the nineteenth century has been complemented by the development of research based upon the census enumerators' books, which from 1851 onwards provide birthplace evidence for the total population of the British Isles. Most of this research has taken the form of macro-scale sample-based ecological studies of Victorian towns and cities conducted by geographers, although early use of the censal data was also made

by economic and social historians. Armstrong, in his pioneer study of York,⁽¹⁴⁾ using a 10% sample of the households in 1841 and 1851, confirmed that most of the migration into York was short range in both years. In 1851, 36.6% of the population of York had been born elsewhere in Yorkshire, chiefly in rural areas and only 11.8% had originated from elsewhere in England, Wales and Scotland.⁽¹⁵⁾

Armstrong was also able to support Ravenstein's principle that large towns grew more by migration than by natural increase with the finding that of the adult population in York in 1851, 65% of the heads of households were immigrants as were 71% of their wives.⁽¹⁶⁾ Furthermore, Armstrong found that higher class migrants were more likely to have travelled significantly greater distances than were lower class migrants.⁽¹⁷⁾

Using a similar methodology to that of Armstrong, Smith's analysis of migration into Nottingham, Radford and Bingham in the middle of the nineteenth century broadly confirmed several of Ravenstein's generalizations.⁽¹⁸⁾ Most of the working class immigrants had been recruited from a restricted geographical area around Nottingham,⁽¹⁹⁾ whilst a higher proportion of the upper social classes had been born outside the three contiguous counties of Nottinghamshire, Derbyshire and Leicestershire.⁽²⁰⁾ Many of the immigrants were youthful, with at least 40% of the people who had moved into Nottingham in the 1840s being still under twenty five years of age in 1851.⁽²¹⁾ Furthermore the majority of the migrants were female, with 63.4% of Nottingham's immigrants being girls and women attracted to the employment opportunities offered in the lace industry and in domestic service.⁽²²⁾

Additionally, in an important study of Preston in the mid-nineteenth century, Anderson's analysis of the origins of migrants

to the town from the 1851 census books demonstrated the predominance of short-distance mobility as 42% of the immigrants into Preston had moved less than ten miles, whilst only 2% had migrated more than 100 miles, if the Irish are excluded.⁽²³⁾ However, Anderson also found that 24% of the immigrants had been born in other towns, which suggests that even as early as the 1840s rural-urban migration was complemented by urban-urban migration in accordance with the development of the urban system during the nineteenth century.⁽²⁴⁾ The observation that migrants were concentrated in the younger age groups, particularly single men and women in their late teens and early twenties, is confirmed by Anderson who comments that the rate of immigration of these age-groups into Preston was so great that the number of girls aged 15-19 and 20-24 resident in the town in 1851 exceed the number between ten and fourteen years old by 12% and 11% respectively, despite an annual mortality rate of 1% per year of life in the latter age groups.⁽²⁵⁾ This exemplification of the old tradition of teenage migration to find work in English towns was supplemented by the immigration into Preston of young married couples, whilst there is some evidence from Preston that families with older heads and more children were less likely to migrate.⁽²⁶⁾

Perhaps one of the most ambitious studies of Victorian society in England involving the use of the census books was that of Lawton and Pooley whose findings on the social geography of Merseyside in 1871 include some valuable comments on patterns of immigration into the rapidly growing conurbation.⁽²⁷⁾ In brief, Lawton and Pooley argue that most migration to Liverpool was either over short land distances or alternately, migrants had passed through few intervening opportunities for the employment of migrants, as eluci-

dated by Stouffer;⁽²⁸⁾ migrants from Scotland fell into this category. After short distance migration from Lancashire, the largest component was from Ireland. The evidence from Liverpool also shows that long-distance migration was male-dominant whilst females dominated the patterns of migration over shorter distances.⁽²⁹⁾ Lawton and Pooley also discovered that young migrants were more likely to have been born in urban areas whilst older migrants had more frequently originated in the countryside. Three possible explanations for this age differential were postulated:

- i) if migration was in steps as Ravenstein suggested, then it would be likely that children would have been born in different places from their parents and these places would be likely to be urban as families migrated up the settlement hierarchy. Perhaps here is support of Redford's extension of the original step-by-step principle of Ravenstein;
- ii) by 1871 the majority of English people lived in towns and therefore strong urban-urban migration flows were likely to have developed;
- iii) by 1871 the local rural communities could have been nearly emptied of potential migrants. Amongst other very interesting findings Lawton and Pooley noted that short-distance migrants were more likely to be single or young married couples without children than long-range migrants,⁽³⁰⁾ whilst few long distance migrants had come from rural areas,⁽³¹⁾ thus tending to support Ravenstein's principle that most movements were by short stages and in aggregate terms up the settlement hierarchy: longer distance migrants tended to be higher status professional, commercial and skilled men moving into Liverpool in response to specific employment opportunities.⁽³²⁾

The findings of Lawton and Pooley are reflected in Royle's work on the four much smaller Leicestershire towns of Lutterworth, Hinckley, Melton Mowbray and Coalville in the middle of the last century.⁽³³⁾ Through an examination of the 1851 and the 1871 census books, Royle concluded that strong distance-decay factors had operated and that most of the migration to each of the four towns had been short-distance:⁽³⁴⁾ the upper classes had tended to have travelled significantly greater distances than the lower social groups,⁽³⁵⁾ whilst those families headed by non-manual workers had migrated more frequently than parents in the lower classes.⁽³⁶⁾

Further light on labour mobility in mid-Victorian England, in particular, consideration of the relationships between levels of skill and distance and source of origin, is provided by Cromar, who in a study of movement into the two Sheffield suburbs of Walkley and Brightside in 1861 and 1871, came to the following conclusions.⁽³⁷⁾ He found that patterns of mobility were related significantly to occupation; in Walkley, which contained a higher proportion of skilled metallurgical workers than Brightside, migrants were more likely to have been born in or close to Sheffield than the predominantly semi-skilled and labouring work force in Brightside. Furthermore, the latter were more likely to have come from rural origins whilst the Walkley workers tended to have been less frequently mobile probably as a result of their more regular and secure employment.

Finally, in this review of studies of nineteenth century migration based upon the census books, Bryant has given a timely reminder that labour mobility was by no means restricted to urban and industrial regions. In a study of population trends in south Devon in the mid-nineteenth century, Bryant found that only 58% of

the population of his study area were natives of their parish of residence in 1851;⁽³⁸⁾ most of the migrants to the study area were local, with 85% from birthplaces in Devon, and a Ravenstein-type distance-decay pattern was discernible.⁽³⁹⁾ The ample evidence of large-scale population movements in the middle of the nineteenth century within the rural society of south Devon probably reflected a search for agricultural employment which was often seasonal in character.⁽⁴⁰⁾ In addition, the frequent movement of agricultural labour to the villages of the Yorkshire Wolds in the first half of the nineteenth century has been demonstrated by Sheppard.⁽⁴¹⁾

In order to bring this review of the research into nineteenth century migration patterns into sharper focus with relationship to coalfield regions, it is proposed in the next section to examine the findings of those who have studied coalfield migrations at the national scale; a final section will review the limited published research on migration into and within the Northumberland and Durham coalfield.

Writing on labour mobility in the first half of the nineteenth century, Redford considered that there was little evidence of large-scale immigration into coalfields as a large part of the increased demand for labour due to the extension of coalfield exploitation came from, "the natural increase of a notoriously prolific section of the population."⁽⁴²⁾ This belief that natural increase more than net immigration was responsible for population growth in the colliery districts of the British Isles was also supported by Cairncross who calculated that for the period 1841-1911 only $\frac{1}{6}$ of the four-fold increase of population in the colliery districts was due to migration,⁽⁴³⁾ the rest being the product of persistently high birth rates which even as late as

1901-1911 were 33% above the national average.⁽⁴⁴⁾ Of the groups who migrated into the coalfields in search of employment in the collieries, Redford considered that the most important source was from declining areas of lead mining, particularly in the 1830s;⁽⁴⁵⁾ coal mines also attracted some labour from distressed industries such as hand loom cotton or linen weaving, but in general, the arduous and dangerous nature of colliery employment deterred any large-scale occupational switches from manufacturing industry in general.⁽⁴⁶⁾ Redford also claimed that large numbers of mid-nineteenth century Irish migrants sought work in coal mining, a finding that will be critically examined later in this chapter.⁽⁴⁷⁾

With reference to the migration patterns of specific British coalfields, Trueman discovered that migration into the south Wales coalfield in the second half of the nineteenth century tended to be short-distance, with 25% of the immigrant population of Merthyr Tydfil for example having been born elsewhere in Glamorganshire and 33% in other counties within south Wales.⁽⁴⁸⁾ P.N. Jones also stressed the importance of short-distance migration in the later part of the nineteenth century into the south Wales coalfield,⁽⁴⁹⁾ whilst Brinley Thomas related the volume and distance of migration into the Glamorganshire coalfield between 1861 and 1911 to growth rates and trade fluctuations in the coal industry itself.⁽⁵⁰⁾ For example in the decade 1861-71 a quite small net migration of 18981 into Glamorganshire was predominantly short-range, with 70% of the migrants coming from neighbouring counties in Wales.⁽⁵¹⁾ However, with the phenomenal growth of the coal industry in South Wales in the late nineteenth and early twentieth centuries, not only did net rates of immigration increase, but the proportion of distant migrants rose as workers were attracted to highly paid

occupations in the coal industry. For instance, net migration into Glamorgan was 30309 between 1871 and 1881 and in the decade 1881-1891 the figure reached 77417,⁽⁵²⁾ whilst for the two decades the proportion of immigrants from neighbouring counties had declined to 38% and 37% respectively.⁽⁵³⁾ This trend of an increasing proportion of long-distance chiefly English born migrants entering Glamorgan during the period 1871-1911 is explored further by Jones. In an article primarily addressed to an analysis of the cultural impact upon Glamorgan of the anglicisation brought by these migrants, Jones points to a difference in the patterns of settlement adopted by folk entering from England as opposed to Wales. In 1891 he found that the orientation of the Welsh-born migrants into Glamorgan was largely to the coalfield section of the county, whilst the English migration was significantly related to the coastal centres such as Cardiff and Swansea.⁽⁵⁴⁾ However, by 1911 the proportion of long-distance English migrants into the coalfield had risen greatly, by which date the cultural anglicisation of this part of Glamorgan had, according to Jones, largely been achieved.⁽⁵⁵⁾

Thomas considered that there was evidence of occupational as well as spatial mobility of labour attracted to the Glamorgan coalfield with agricultural workers from South Wales and from rural parts of south west England seeking employment in the coalfield particularly during periods of peak demand for labour such as the mid-1880s.⁽⁵⁶⁾ Perhaps a parallel can be drawn here with agricultural workers from the arable districts of East Anglia migrating to sources of employment such as the Durham coalfield during the 1880s due to the push factors related to the agrarian depression of the late nineteenth century.

Little detailed research appears to have been attempted on patterns of migration into and within other British coalfields. With reference to the South Staffordshire coalfield, Lawton noted a report to the Midland Mining Commission of 1843 that much labour for the collieries was recruited from the neighbouring rural areas.⁽⁵⁷⁾ In the case of the Leicestershire coalfield, Royle's work on Coalville revealed that not only were the great majority of the immigrants to the new mining settlement short distance movers in 1851, but by 1871 mean migration distances had decreased even further. A mean migration distance of 20.45 miles in 1851 had declined to 14.75 miles by 1871. Put another way, in 1851, 75% of the population had moved 14.5 miles or less, whilst by 1871 the same proportion of the inhabitants had migrated only 9.5 miles or less.⁽⁵⁸⁾ Royle explains this tightening of Coalville's migration field by the occurrence of a serious slump in the local coal trade in the 1860s which reduced the demand for labour. Whether a similar restriction of the sources of colliery labour for the east Durham mines occurred between 1851 and 1871 will be examined later in this chapter.

Finally, it remains necessary to examine the few references to migration to and within the North Eastern coalfield by means of a summary of the generalizations drawn from the census tables by Redford,⁽⁵⁹⁾ Smailes⁽⁶⁰⁾ and House.⁽⁶¹⁾ There appears to be general agreement with Redford that for the first thirty years of the nineteenth century the considerable increase of population (60%) within the coalfield section of North East England was largely the product of natural increase rather than by immigration from outside North East England.⁽⁶²⁾ Quoting the 1834 Parliamentary Commissioners Report Redford observes that,

"pitmen must be bred to their work from childhood their numbers cannot be recruited from any other class the increase of the pit population solely from internal sources has in consequence been such that 125 families attached to a single colliery were capable of annually supplying twenty to twenty five youths fit for hewers." (63)

However, between 1831 and 1851 the population of the coalfield increased even more rapidly from 300,000 to almost half a million as a result of major phases of mining extension and colonisation in sections of the coalfield such as south west Durham, east Durham and the section of the Northumberland coalfield to the north of the ninety fathom fault (Fig 3.5). This rate of population increase exceeded the natural increase and a large balance of inward migration entered the coalfield from outside.⁽⁶⁴⁾ It is generally agreed that within this movement to the coalfield were included an influx from the Pennine lead dales, linen weavers from the North Riding of Yorkshire and some long-distance migrants from coalfields in Lancashire, Staffordshire, Nottinghamshire and Wales, as well as groups of Irish, some of whom were brought in as strike breakers during the periods of industrial unrest on the coalfield in 1832 and 1844. Of particular importance to the Northumberland and Durham coalfield was the movement of lead miners from locations such as Swaledale, Allendale, upper Weardale and Alston Moor, pushed by depression and falling lead prices in the 1830s⁽⁶⁵⁾ and attracted towards colliery employment which offered wages up to twice the levels found at this time in the lead industry.⁽⁶⁶⁾ In fact, according to House, the decade 1831-1841 witnessed the largest relative contribution by immigration to the overall population growth of the whole of North East England, during this period nearly half of the interdecennial increase of 103,055 was the product of net migration, a truly amazing contribution at a

time when the railway system of the country was still at a rudimentary stage of development.⁽⁶⁷⁾

At the same time much internal migration amongst the various sections of the Northumberland and Durham coalfield continued to characterise the patterns of labour mobility as much of the population of new or expanding mining settlements were drawn from those which were what Smailes described as, "on the downgrade of a population cycle"⁽⁶⁸⁾ as a result of production problems and pit closures. House noted that there has at all times been a high mobility of place amongst the Northumbrian mining folk, usually associated with a low mobility of occupation; he also recognized that the patterns of growth and the changing distributions of the mining population were very sensitive to economic changes in the industry.⁽⁶⁹⁾ House also made the valuable comment that although the course of migration was related to economic factors in aggregate terms, the process of migration was the result of many individual perceptions, appraisals and decisions to move, a prescient statement to have been written in 1959 and one supported by the lack of evidence of large-scale planned immigration to provide the labour force for new mines.⁽⁷⁰⁾ Some measure of the net migration flows between the major sections of the North Eastern coalfield for the period 1841-1931 is given by House, based upon the census tables.⁽⁷¹⁾ For example, he demonstrates that the east Durham concealed coalfield experienced a sharp net inflow of population in the 1840s of 6560, which represented 24.9% of the 1841 population; this migration trend resulted from the mine sinkings and the creation of new colliery villages during the decade described in chapter 4. According to Smailes, at least part of the increases of population during this period in east

Durham represented a movement of colliery workers from the neighbouring mid-Wear section of the coalfield where population was decreasing.⁽⁷²⁾ This statement will be tested later in the chapter.

Finally, as the population of North East England grew rapidly in the second half of the nineteenth century from 743,652 in 1851 to 1,995,283 by 1901, the proportion of the increase of population due to immigration fell, although in absolute terms the greatest net immigration into the region occurred during the decade 1861-1871 when a net figure of +75,130 migrants coincided with a decreased natural increase of 175,104. Clearly a youthful and fertile population was increasingly capable of providing the bulk of the labour force and by the decade 1881-1891 North East England experienced net outmigration for the first time, a pattern which has continued to the present. Although in the second half of the nineteenth century many of the migrants into Northumberland and Durham were short distance migrants from adjacent countries, the census tables do show that the influx did contain many long-distance migrants from areas of economic distress or decline such as Ireland in the middle of the century, south west England in the 1860s and East Anglia during the 1880s.

Having examined some of the generalisations concerning labour migration in the British Isles in general and in North East England in particular during the nineteenth century, it remains to examine the birthplace and family mobility characteristics of the population in the sample villages in 1851 and 1871. By seeking answers to the questions posed at the beginning of this chapter it is hoped that generalizations concerning migration patterns in the nineteenth century can be tested and by means of this regional case

study, a small contribution to the national overview can be provided.

- 1) a) Did the pattern of birthplaces of the population in the eight townships reveal distance-decay characteristics?

In order to answer this question it is necessary to examine Table 7.1 which records, for each of the mining townships, the percentage of the total population born within the various sections of the Northumberland and Durham coalfield, the rural parts of the two counties, the remaining northern counties, the rest of England and Wales, Scotland, Ireland and abroad. The extreme right hand column contains the average figure for the aggregate population of the sample communities. In overall terms it can be seen that the population was very largely composed of short-distance migrants, with 70% of the birthplaces occurring in county Durham and 87% in the two North Eastern counties together. A further 7.43% had originated from the rest of the northern counties, leaving only just under 6% as truly long-distance migrants from the remainder of the British Isles and abroad. A recent study of the mining settlement of Crook in south west Durham in 1851⁽⁷³⁾ based on the census books provided the following birthplace frequencies which enable us to compare settlements drawn from different parts of the coalfield: Durham 66.7%, Northumberland 7.8%, Yorkshire (chiefly the North Riding) 9.4% out of a total for the northern counties of 16.46%, the rest of the British Isles 9.05%. Possibly due to the proximity of Crook to the North Riding and its relative isolation from Northumberland compared with some of the east Durham villages, the frequency of migrants from these two areas differs somewhat, but in general terms the relative infrequency of truly long-

distance migrants is common to both sections of the coalfield.

A more detailed analysis of birthplaces demonstrates that as expected, only a small minority, nearly 17%, had been born in the township of residence in 1851, thus reflecting the scale of the influx of population onto the east Durham plateau with the extension of mining operations from the 1820s onwards. However, a further 16%, mainly coal miners' children, had birthplaces recorded in neighbouring parishes and townships on the concealed coalfield, whilst just over 19% of the population originated from the mid-Wear valley section of the Durham coalfield just to the west and north west of the Magnesian Limestone escarpment. As stated above, Smailes noted that this area was a source of labour for the new east Durham collieries from the 1820s onwards.⁽⁷⁴⁾ The only other part of the Durham coalfield to contribute much labour to the concealed coalfield was lower Tyneside, which like the mid-Wear area, had experienced a decline in colliery activity from the 1820s. Table 7.1 also shows that relatively few birthplaces were recorded in those sections of the Durham coalfield which were also expanding in the years before 1851 such as south west Durham and the north west Durham plateau, because of their own buoyant demand for labour, whilst it can also be seen that the rural parts of the county too had made only modest contributions to the populations of the east Durham townships. Only 1.69% had originated from Pennine Durham and 3.69% from South Durham; these figures suggest that spatial rather than occupational mobility characterised the labour force of at least this section of the Durham coalfield in the middle of the nineteenth century, an issue which will be examined in more detail subsequently.

The majority of the birthplaces within Northumberland occurred

on lower Tyneside (6.71%), either in locations such as North Shields, Wallsend and Benton, or in Newcastle itself (2.89%). In the case of the former, the birthplace entries in the census books indicate the great frequency with which the population had originated from colliery settlements close to the Tyne downstream from Newcastle in that section of the coalfield which by the 1830s had begun to witness the exhaustion of the accessible reserves of the much-prized High Main "Wallsend" household coal. With reference to Newcastle, the census books frequently refer to birthplace locations such as Fawdon, Coxlodge and Gosforth, all settlements with collieries sited in or close to the town. A smaller proportion of the east Durham population had been born in the more recently developed section of the Northumberland coalfield north of the ninety fathom fault (1.69%) as it too had developed from the 1830s and consequently was less likely to act as a source of migrant labour. As in county Durham, the rural parts of the county provided relatively few birthplaces (2.68%). It would appear from the table therefore that the great majority of the population of the east Durham townships were not only of Northumbrian origin, but that their birthplaces were concentrated in old-established colliery districts; few appear to have brought rural traditions with them to the new mining settlements.

Only about 13% of the population had been born outside the North East of England and of these just over a half, 7.43%, had come from the remaining northern counties. Within this region, the majority of the birthplaces occurred in either the North Riding (2.69%) or Cumberland (2.13%), thus further emphasising the distance-decay pattern of origins, as fewer had been born in the more distant parts of Yorkshire or in Lancashire. Within the North

Riding, there were small-scale but interesting concentrations of birthplaces in Swaledale in or close to areas of lead mining activity which was in decline from the 1830s; in Cumberland most of the migrants had been born either in the Pennine lead dales centring on the Alston area or on the west Cumberland coalfield. It is likely therefore that few of the work force derived from the North Riding or Cumberland had come from purely rural origins and wholly agrarian employment. The strong distance-decay pattern of the birthplaces is further demonstrated by the infrequent incidence of origins in the rest of England and Wales (2.06%). Although the overall numbers involved were small, there were significant concentrations of birthplaces on coalfields in Nottinghamshire, south Lancashire, north Wales and south Staffordshire. It is possible that some of these long-distance migrants had been brought into the North Eastern coalfield as strike-breakers by the major coal-owners either in 1832 or in 1844. With reference to the import of strike-breaking labour, there is direct evidence of this process at Hetton Colliery in 1832. A contemporary comment on the migration of strike-breaking labour is provided in the Newcastle Journal, which on June 30, 1832 reported that at Hetton upwards of 700 strangers had been taken on in the mines and that great numbers of lead miners had passed through Richmond from Swaledale on their way to find work in the Durham pits. A much fuller account of the search by the Hetton Coal Company for "black leg" labour to work their collieries during the 1832 strike is provided by entries in the diary of J. Dunn, one of the colliery viewers at the time.⁽⁷⁵⁾ From the extracted entries in the diary, it can be seen that the company was sounding out the likelihood of using lead miners as strike breakers even before the dispute began (see the entry for

March 27 1832 concerning the anticipated refusal of the Hetton men to accept the new colliery binding terms). Also the diary makes it clear that Dunn took personal charge of the search for replacement labour and that he travelled considerable distances over a short period of time in Teesdale and Swaledale to advertise the need for labour. There is further evidence that arrangements had been made by early June 1832 to transport long-distance migrants from Wales and that the company's pits were rapidly re-opened with the new mixed labour force.

Few of the inhabitants of the villages in 1851 were of Scottish or Irish extraction. The former accounted for less than 1% of the aggregate population, whilst perhaps surprisingly, only 2.06% had come from Ireland, a figure below the proportion of Irish-born in county Durham (4.5%) and in the whole of England and Wales (2.9%). Whilst the Irish by 1851 had concentrated in large numbers in many large industrial towns and cities,⁽⁷⁶⁾ there would appear, from the east Durham evidence, to be little support for Redford's assertion that many Irish immigrants adopted coal mining as an occupation because of the dislike of the native English of such employment.⁽⁷⁷⁾ Furthermore, there is censal evidence that the Irish sought work more frequently outside the mines than within. In Hetton, for example, only thirteen of the ninety three employed Irish adult males were recorded as coal miners. Similar evidence from the study of Crook revealed that the Irish were more likely to be employed in rough labouring jobs at the coke ovens rather than be accepted as members of the skilled underground colliery labour force.⁽⁷⁸⁾

b) Were there significant differences of origin amongst the populations of the sample townships?

A series of significance tests has demonstrated that there were statistically significant differences of birthplace region amongst the villages (Tables 7.2 to 7.5) and it is proposed in the next section to note and explain some of the more important contrasts. Firstly, highly significant differences occurred amongst the townships for the proportion of the population born in the township of residence (Table 7.2.) This appears to be related to the date of the sinking of the colliery as a greater percentage of inhabitants had been born in the "older" established villages such as Hetton, South Hetton and Thornley, than in the more recently created communities such as Quarrington Hill and Hutton Henry. In the few cases where this relationship did not apply, as in the case of Trimdon, the explanation probably lies in the existence of a rural core within which continuous residence from birth was more likely to be found. Secondly, there was some tendency for the earlier mining settlements, particularly Hetton and Thornley, to contain fewer people born elsewhere on the concealed coalfield than the newer colliery villages, since by the time of the creation of the latter, labour mobility had become well-established between the collieries of the east Durham plateau (Table 7.3). Thirdly, it would appear that other differences of birthplace frequencies would seem to be related to distance factors. For example, the three settlements nearest to the southern margin of the concealed coalfield, Hutton Henry, Trimdon and Quarrington Hill received a greater proportion of their migrants from the adjacent rural area of south Durham and from the North Riding than did communities further north. As a corollary, these three villages received

fewer people from lower Tyneside than did settlements closer to the river Tyne such as Shotton, Murton and Hetton. As a result, the overall proportion of the population born in Northumberland and Durham differed significantly from a minimum of 79.66% in Hutton Henry to a maximum of 93.9% in the case of Shotton (Table 7.4), whilst there was an observable tendency for the southern townships located peripherally to the Northumberland and Durham coalfield to record higher proportions of birthplaces in the other northern counties. Finally, the significantly different occurrence of long-distance migrants amongst the villages would appear to be attributable largely to the varied frequencies of the Irish-born (Table 7.5). In summary, therefore, it would appear that the two variables of age of colliery settlement and location within east Durham relative both to the other sections of the coalfield and to adjacent rural areas, were responsible for most of the significant differences of birthplace origin amongst the population of the eight villages.

- ii) a) Were there significant differences of birthplace between the populations of the rural and mining communities in Hutton Henry, Shotton, Trimdon and Murton townships?

In order to answer this question, the birthplace frequencies for the respective sections of the four townships have been tested for significance by the use of the chi-square test. Unfortunately detailed evidence of birthplace origins was lost as it proved necessary to reduce the twenty eight birthplace regions to the eight shown in Tables 7.6 to 7.9 so that the requirements of the test could be fulfilled. Nevertheless even at this broader scale of analysis, each of the tests indicated that highly significant differences of birthplace occurred between the rural and the mining

communities in 1851; the principal contrasts will be discussed below.

Firstly, in each township the proportion of the population in the mining communities which was native-born was considerably smaller than expected, whilst the reverse was found in the rural cores. Clearly, the very recent creation of the mining rows meant that few of the inhabitants, other than children, would have been born in the township of residence in 1851. However, what is rather more unexpected is the small percentage of the folk living in the rural nuclei who had been born there, with frequencies ranging from a maximum of 39.67% in East Murton to a minimum of 22.86% in Hutton Henry. So, although the mining rows were overwhelmingly settled by strangers to the township, even within the rural nucleations, natives of the parish were outnumbered by incomers, a result of variance with Bryant's findings from south Devon, in which 58% of the inhabitants of the parishes that he studied were resident in their parish of birth.⁽⁷⁹⁾ Although no obvious explanation of this relatively mobile rural population is available, it is noticeable that farm labourers were more likely to be immigrants than were the farmers, probably because of annual hiring arrangements, and that the servants, both on the farms and in the professional and petit bourgeois village households, had frequently moved into the village from neighbouring townships.

On examination of the relative frequency with which the inhabitants of the two types of community had originated from elsewhere in east Durham, it can be seen that Tables 7.6 to 7.9 indicate a small measure of deviation from the expected values and a lack of uniformity amongst the four townships. In East Murton the proportions are identical for the two sections of the township;

in Trimdon Grange, Trimdon Colliery and Shotton Colliery, the observed frequencies exceed the expected values slightly, whilst the opposite is true for Hutton Henry. It would seem possible that these weakly differentiated results stem from two separate migration processes tending to cancel each other out. On the one hand, the migration of farm labourers and servants from neighbouring rural townships to the rural cores has been broadly balanced in terms of relative numbers by the movement of mining families to the mining settlements, bringing with them children, some of whom had been born in other east Durham mining townships.

In the light of the evidence presented in the first section of this chapter, it would be reasonable to assume that, with reference to the rural and mining settlements, there would be highly significant differences in the frequency of birthplaces recorded in the rest of the Durham coalfield. Indeed, the tables do demonstrate that in each of the townships the colliery communities record many more birthplaces than expected within the coalfield. Detailed examination of the household entries in the census enumerators' books reveals the frequency with which colliery families had originated in the old-established mining villages in particular in the mid-Wear valley and on lower Tyneside. By way of contrast, the origins of the inhabitants of the agrarian cores were more widely dispersed.

There was also a significant tendency for the folk of the colliery settlements to have been born on the Northumberland coalfield, particularly in the section to the south of the ninety fathom fault, more frequently than the population of the rural villages. The tables also indicate that there was a weakly developed tendency for the inhabitants of the rural villages to have been born

more frequently in the adjoining northern counties, a pattern largely explained by the migration of farm labourers particularly from the North Riding outnumbering the movement from distressed lead mining and linen weaving areas to the colliery villages of east Durham. The tables also show that the inhabitants of the colliery villages, with the exception of Trimdon Grange, had been born with greater frequency in the rest of the British Isles, a pattern largely attributable to the virtual absence of the Irish from the rural cores.

b) Were there significant differences of origin within the settlement units of Hetton?

The answer to this question can be found in Table 7.10 which gives the chi-square test statistic of birthplaces for the eight zones into which Hetton was divided in chapter 6. In overall terms, the summed chi-squared statistic suggests the existence of highly significant differences of birthplace region amongst the sections of the parish in 1851. This highly generalized finding however, needs to be disaggregated in order to examine the reasons for this differentiation of origin and it is proposed to select major deviations from expected values in order to seek explanations for the different patterns of origin.

In the southernmost section of the township, Easington Lane, housed a multi-functional population some of whom lived as lodgers either in lodging houses or in normal households. A concentration of long distance migrants, including Scots and more particularly the Irish (5.87% of the population of Easington Lane), account for the greater than expected frequency of residents in the "rest of the British Isles" category. In nearby Brick Garth, 70% of the

207 households were headed by coal miners. This zone of Hetton is of interest as it contained a colliery labour force which had originated less frequently than expected from the Northumberland and Durham coalfield. Birthplaces were located more frequently than expected in the adjacent northern counties with just over 10% from the North Riding, Cumberland and Westmorland and in the rest of the British Isles, particularly Ireland, which provided 6.08% of the population.

The streets to the east of the Houghton road in the centre of the village contained 1004 persons in 241 households of which 100 (41.49%) were headed by coal miners, the others containing persons employed principally in retailing and handicraft manufacturing activities. More of the population of these streets than expected had been born in the Durham coalfield, a finding which might appear to be at variance with the below average frequency of coal miners, but it should be remembered that many of the non-mining element in the population, in particular the shopkeepers, publicans and small-scale craft manufacturers had also originated in Durham colliery settlements and that they too would find an economic incentive in migration to rapidly-growing new mining villages such as Hetton. Within the remaining sections of Hetton, the most notable deviations from the expected pattern of birthplace origins are as follows: Hetton Downs, in which 80% of the 256 households were headed by coal miners, contained many more people than expected who had been born in the Northumberland coalfield, with 19.78% recording birthplaces in lower Tyneside alone. Two parishes, Benton and Longbenton, were the sources for many of these migrants who included mature miners over fifty years old, and younger pitmen as well as young children, suggesting a sustained flow of labour over at

least two decades to Hetton. Very few of the inhabitants of Hetton Downs had migrated long distances; only thirty (2.4%) had come from the northern counties, twenty from the rest of England and Wales (1.59%) and only three (0.24%) from Ireland. By way of contrast, the 377 inhabitants of the old rural core of Hetton who lived in eighty three households, headed only on eighteen occasions (21.7%) by coal miners, revealed a birthplace pattern more typical of the other rural nucleations in the study area, with a greater frequency of births in Hetton itself (37%), fewer birthplaces than expected in the coalfield sections of Northumberland and Durham, more birthplaces in the rural parts of the two counties and fewer than expected in the rest of the British Isles. For examples, only one inhabitant of the old village in 1851 had been born in the rest of England and Wales.

iii) Were there significant differences of birthplace between the coal miner household heads and the others?

Analyses at two different spatial scales have been employed in order to seek answers to this question. Firstly, by the use of the SPSS cross-tabulation procedure, contingency tables relating occupation of head of household to birthplace region have been produced for each township (Tables 7.11 to 7.14) to permit analysis at the national scale. As with the social analysis in chapter 6, the occupation groups have been reduced to two, coal miners and others, whilst the twenty eight original birthplace regions have been reduced to seven in order to comply with the statistical requirements of the test.⁽⁸⁰⁾ Secondly, at the regional scale, the birthplace of each household head in Northumberland and Durham has been plotted (Figs 7.1 to 7.9) and for each of the sample

townships a distance-decay analysis explores differences between the two occupational groups.

At the national scale it can be seen that in all the villages except Murton there were highly significant differences of birth-place region between the coal miners and the other heads of household and even in East Murton the significance level was just outside the 0.05 value. How did the pattern of birthplaces differ between the two groups of heads of households? There was a tendency for the non-coal miners to have been born more frequently than the coal miners in either the village of residence or elsewhere in east Durham. This trend was particularly true in the townships which included rural cores within the settlement pattern, with the exception of Murton, and is only to be expected in view of the greenfield site nature of the mining settlements in east Durham. However, in the three townships without rural nucleations, South Hetton, Thornley and Quarrington Hill, it is not possible to distinguish any significant differences between the miners and the others as both groups had migrated equally to create these new communities.

On examination of the frequency of birthplaces in the rest of the Durham coalfield, in each of the villages, except Murton, there was a pronounced tendency for the coal miner heads of household to have been born on the coalfield and for the others to have originated more frequently in rural locations such as south Durham or the Pennine dales. A similar pattern is evident when one compares the frequency of birthplaces within and outside the Northumberland coalfield, although there was a weaker tendency for the non-miners to have been born more frequently in extra-coalfield locations. In fact, some of the townships contained a higher proportion of

coal miners born in rural Northumberland than they did non coal miners. Perhaps explanations for this somewhat unexpected finding occur in the very weak pull exerted by the east Durham villages for rural labour from Northumberland as most of this labour was provided locally and in the possibility that some of the miners born in rural Northumberland had in fact been employed in coal mining prior to their migration in one of the small pockets of mining found in such essentially rural localities as Scremerston near Berwick or in the North Tyne valley.

With reference to the proportion of the two occupational groups born in the rest of the north of England, no overall pattern is discernible from the tables as the different townships display varied characteristics. Similarly with the frequency of birth-places elsewhere in the British Isles no uniform pattern emerges and in fact some of the villages display marked contrasts. In Hetton for example, a considerably higher proportion of the other heads of household, 12.8% (69 cases), had been born in the rest of the British Isles than was true of the coal miners of whom only 5% (33 cases) had been born outside the north of England. As mentioned above many of these long-distance non-coal miner migrants to Hetton included Irish folk who headed households which were concentrated in Easington Lane and who were employed in a wide variety of low grade service and retailing functions. Thornley, on the other hand, provides an example of a contrasting pattern of origins with a higher proportion of long-distance migrants amongst the coal miners 12% (45 cases) than amongst the non coal-miners, 5.8% (9 cases). Some twenty four of the long-distance migrant colliers had come from Ireland, an uncommon occurrence in east Durham at the time.

In order to complement the large scale analysis of the birthplace patterns of the two occupation groups, a detailed study at the county scale concentrates on the places of origin in Northumberland and Durham. Maps 7.1 to 7.9 show for both the coal miner heads of household and the others, all the birthplaces within the two counties which could be identified. The number of those which could not be traced to a particular locality, or which were merely given as county of birth, is indicated as a grouped county total, but they are excluded from the accompanying distance analysis as this obviously cannot be calculated. Concentric lines at distances from five to twenty miles have been drawn from each of the townships and the number of household heads in the two occupational groups born within each of these five mile wide bands has been summed. By the use of a chi-square test, a search for significant differences of distance of origin from village of residence has been calculated as shown in Tables 7.15 to 7.18 for the two groups. Before an examination of the contingency tables however, it is interesting to comment descriptively upon the birthplace patterns of the two groups of heads of household (Figs 7.1 to 7.9). For most of the villages, but particularly in the cases of Hetton, Shotton and Thornley the dense distribution of coal miners' birthplaces in the mid-Wear valley and in lower Tyneside is most apparent as is the paucity of birthplaces north of the ninety fathom fault in Northumberland, in north west Durham and in the south western section of the Durham coalfield. Coal miners' birthplaces were only infrequently located in the rural parts of the two counties and east Durham itself was not commonly the origin of a coal miner household head in any of the sample villages. In contrast, the pattern of the birthplace of the other heads of

household was characterised by the absence of locational concentration, by greater frequency in east Durham and by a greater likelihood of occurrence in rural rather than in mining sections of North East England.

On examination of the numerical analysis of the relationship between occupation group and distance of birthplace from township of residence in 1851, Tables 7.15 to 7.18 indicate that for six of the eight townships significant differences occurred between occupation group and distance, four of the differences being highly significant (s.l. 0.001). In the two cases of East Murton and Quarrington Hill no significant differences were recorded. The tables of the six other townships demonstrate that the coal miner heads of household were less likely to have been born close to the village of residence than the others. With the exception of the marginal case of Hetton's values for birthplaces within the range 0-5 miles, the frequency of the birthplaces of the coal miners was under-represented for a distance of up to ten miles from the township of residence; in the cases of Thornley, Hutton Henry and Trimdon, the same trend was evident for a distance of up to fifteen miles. For distances between ten and twenty miles the relative frequency of the birthplaces of the two occupational groups varies from township to township, principally because of the various distances of the townships from the two chief sources of mining labour, the mid-Wear valley and lower Tyneside. In the case of Hetton for example, the high proportion of coal miners born between ten and fifteen miles from the township, can be attributed largely to the latter concentration; Trimdon, on the other hand, located eight miles to the south of Hetton, demonstrates a pronounced concentration of colliers' birthplaces located over twenty

miles distant from the parish because of the greater distance of this southernmost locality from the reservoir of colliery labour provided by the mining area of lower Tyneside.

To summarise, although there are individual deviations, it is generally found that the coal miner heads of household tended to record birthplaces within Northumberland and Durham at greater distances from their village of residence than did the others, who had been born more frequently either in the rural core itself or in the neighbouring villages of east Durham. It is not necessary to explain the different distance-decay patterns in terms of the social status levels of the two occupational groups as has been attempted elsewhere;⁽⁸¹⁾ the reason is bound up with the stage of evolution of the exploitation of the Durham coalfield reached by the middle of the nineteenth century. In the thirty years before 1851 a formerly rural area, the concealed coalfield, had been colonised by a labour force drawn largely from the mid-Wear valley and from lower Tyneside. Up to 1851 east Durham could not generate its own mining communities; they were the product of migration of labour from birthplaces frequently between ten and twenty miles distant.

iv) What does the distribution of the birthplaces of the children miners reveal about family migration patterns up to 1851?

So far this chapter has been concerned with what has essentially been a static, cross-sectional analysis of the birthplace distributions of the population which happened to be living in the eight villages on the date of the census. Useful as such a reconstruction may be in providing a pattern of origins, it does not provide any detailed insights into the dynamic aspects of the

process of migration of which the 1851 census books provide no more than a "still" photograph. Clearly the rapid establishment of the collieries on the east Durham plateau between 1821 and 1851 stimulated a complex process of labour mobility; it is proposed to examine this process by seeking answers to the three following questions:

- a) what was the overall birthplace distribution of the children of the coal miners?
- b) were there significant associations between the ages of these children and their birthplace regions?
- c) what were the spatial characteristics of the migration paths of the families of the coal miners?

a) In answer to the first question, Table 7.19 demonstrates vividly that in overall terms the children of the coal miners had been born overwhelmingly in Northumberland and Durham (93.97%), with the remainder originating from either the rest of the north of England (3.81%) or from the rest of the British Isles (2.58%). Nothing could exemplify more cogently the local short-distance nature of much of the movement of labour into the new east Durham colliery villages. Four of the eight communities contained no Irish-born coal miner's child, including Hetton, the largest settlement with as many as 1636 miners' children; three of the villages included no Scottish-born children, whilst in four of them less than 1% of the children had originated from the rest of England and Wales. Furthermore, Table 7.19 also indicates the overriding importance of the Northumberland and Durham coalfield as a location for the children's birthplaces. Only 1.8% of the total number of children had been born in the extra-coalfield parts of the two counties. As this represents merely 1.93% of the Northumbrian born

children, it is quite evident that since the great majority of coal miners' families were living on the coalfield at the time of the birth of these children, it is reasonable to conclude that the heads of most of these families were engaged in coal mining and that little occupational mobility had occurred to provide the new labour force for these collieries. From this evidence it is very difficult to provide support for House's finding from the printed census tables that during the decade 1831-41 nearly half of the net decennial increase of population in North East England was the product of net migration from outside the region.⁽⁸²⁾ If the census tables are accurate, then it must reflect considerable compensatory long-distance immigration either into other sections of the Northumberland and Durham coalfield or, more likely, to the rapidly growing urban centres along the river Tyne and at Sunderland.

The table also shows considerable variations in the origins of the children living in the eight townships. Some of the differences can quite reasonably be explained by the age of the village. For example a higher proportion of the children living in the older villages had been born in these earlier foundations such as Hetton, South Hetton and Thornley than in the mining communities created in the 1840s such as Shotton, Quarrington Hill and Hutton Henry. In the case of the children born elsewhere on the concealed coalfield, there is a tendency for the reverse to apply with a smaller proportion of such births found in the older villages as they were pioneer mining communities created before family mobility between the colliery villages in existence by 1851 was possible. On the other hand, some of the disparities defy ready explanation such as the wide variation of birthplaces in the Northumberland

section of lower Tyneside. Possibly local factors such as the contact field of the colliery viewer, the official charged with the responsibility of labour recruitment, might explain why, for example, 20% of the children in Shotton had been born in this section of the coalfield, but only 1.78% of the children in neighbouring Thornley.

b) In order to uncover the dynamic qualities of the process of migration prior to 1851 experienced by the families of the coal miners, two forms of analysis have been employed. Firstly, the children of the coal miners have been placed in three age-groups, 0-9, 10-19 and over 20 years of age and for each village the birthplaces of the children in the various age-groups have been mapped (Figs 7.10 to 7.17). Attention has been restricted to Northumberland and Durham since the two counties account for almost 94% of all birthplaces and therefore include the great majority of family movements. Secondly, by means of a chi-square test, associations between birthplace region and age have been tested for significance (Tables 7.20 to 7.23). As can be seen from the tables, in order to fulfill the test requirements the age groups have been reduced to two, 0-9 and 10-19 years, whilst the birthplace regions exclude the village of residence in 1851 as this would bias the results in favour of the younger age-groups. In this way it is possible to concentrate upon the temporal variation of the sources of colliery labour as demonstrated by the birthplace patterns of the children of the coal miners.

With reference to the maps of the children's birthplaces, it can be seen that although the sample villages exhibit some variety in the patterns of the birthplaces, broad tendencies can be discerned in relationship to the distribution of birthplaces and the age-groups. Firstly, the older "children," aged twenty or over

and still living in the parental home, showed a pronounced likelihood to have been born in the old-established sections of the North Eastern coalfield, either in the adjacent mid-Wear vallery or on both banks of the river Tyne downstream from Newcastle. This is particularly true of the earlier colliery settlements such as Hetton and South Hetton; in some of the villages built in the 1840s such as Trimdon, Shotton and Hutton Henry, a few of this age-group had been born in the earliest of the east Durham mining villages such as Hetton and their residence in the newer villages by 1851 testifies to labour mobility within this recently-developed section of the coalfield, as some coal miners moved to new collieries as, or soon after, they opened.

This tight relationship between the origin of the older children and zones of the coalfield known to have been important areas of coal production at the time of their birth, supports the idea that the spatial mobility of existing pit labour provided the bulk of the workforce for the new east Durham mines. Further evidence is provided by the patterns of the birthplaces of the children in the age-group 10-19 for which the maps show a broadening distribution of places of origin largely in accordance with the spatial extensions to the coalfield which occurred in the 1830s, the birth decade of this group of children. For example, a greater frequency of births was found in the steam coal section of the Northumberland coalfield north of the ninety fathom fault; similarly a significant proportion of the birthplaces of the 10-19 age group had occurred on the concealed coalfield itself, in particular for children aged between ten and fifteen, thus emphasising the growth of very short range migration amongst the newly-established settlements on the east Durham plateau from the mid 1830s onwards. One

clear example of this is provided by Murton, where in 1851, twenty four children aged 10-14 years (16% of this age group total) had been born in the neighbouring settlement of South Hetton. As South Hetton colliery had opened in 1835, after four years of sinking operations, this group of children provide evidence of a very short distance movement of labour to the new winning at Murton, a move probably arranged by the South Hetton Colliery Company which owned and operated both of the mines.

On examination of the distribution of the birthplaces of the youngest age-group 0-9 years, the maps reveal an anticipated concentration in the village of residence and a much greater frequency of births in the villages of east Durham than was the case with the older children. Clearly, once the group of large collieries had been successfully established on the concealed coalfield, a large-scale circulation of labour amongst them had been initiated. However, the occurrence of the birthplaces of even very young children in other parts of the North Eastern coalfield indicates that migration had continued between its various sections, with mining folk continuing to move from the Wear valley, lower Tyneside and south east Northumberland for example, to east Durham during the 1840s. Unfortunately, the census is silent on rates of out-migration from the concealed coalfield at this time, but doubtless counter currents would exist to new employment opportunities in the exposed coalfield, to judge by the scale of mobility within the concealed coalfield.

Although the maps give a visual impression of the kaleidoscopic nature of labour mobility within the Northumberland and Durham coalfield in the thirty years or so before 1851, it is necessary to complement their descriptive quality by means of a statistical

analysis of the significance of the relationships between birthplace frequencies and age-groups. In order to conduct this analysis a series of contingency tables (Tables 7.20 to 7.23) has been constructed to show the frequency of the birthplaces of children in the two broad age-groups 0-9 and 10-19 which had been recorded in the regional sub-divisions of the coalfield.

The tables demonstrate that in overall terms each village recorded a significant difference of birthplace distribution between the two age-groups although in the case of two of the smaller settlements, Hutton Henry and Quarrington Hill, infringements of the chi-square requirement concerning expected frequency values probably render the significance finding invalid. Having established however that for the remaining six villages, the contrasting pattern of children's birthplaces had not occurred by chance, it can be seen that; i) the younger children were more likely to have been born in east Durham (excluding the village of residence in 1851) than those in the 10-19 age-group; ii) the older age-group were more likely to have originated in the mid-Wear section of the Durham coalfield; iii) the older age-groups were more likely to have originated in both the Northumberland and Durham sides of lower Tyneside; iv) only insignificant differences occurred between the two age-groups and the frequencies of birthplaces in other sections of the North Eastern coalfield. These results confirm the map evidence by highlighting the not unexpected finding that the manner in which the frequency of birthplaces of the younger children in east Durham increases in temporal association with the extension of coal mining onto the concealed coalfield. Furthermore, the small scale of the contribution of mining labour from the more distant parts of the coalfield such as south west

and north west Durham and the Northumberland coalfield north of the ninety fathom fault is again underlined, as in absolute terms is the importance of the mid-Wear valley and lower Tyneside as recruitment areas for the east Durham colliery labour force up to the middle of the nineteenth century.

c) Whilst the analysis of the children's birthplaces in relation to their ages has offered some insight into the process of migration that was stimulated by the development of the new collieries, little impression has yet been created of the nature of the migration process at the scale of the individual family. Although the census books provide what is essentially a static picture of society, it is possible to use them at the household scale in order to reconstruct, at, least in part, the migration path of a sample of the population drawn from the east Durham mining families. The method employed involves mapping the birthplace of the head of household and then those of the children in the family (if any), linking these locations together by lines in chronological sequence. This technique is somewhat similar to that employed by Bryant who, however, initiated the migration trace by plotting the birthplace of the wife rather than that of the head of household.⁽⁸³⁾ In this study, however, it is considered that the pattern of labour mobility is likely to be better simulated by employing the birthplaces of the coal miner heads of household as family movements were closely related to economic conditions within the coal industry. It must be admitted however, that the adoption of this technique cannot completely recreate actual family migration patterns; the method assumes the residence of the family in the recorded birthplace of the child at the date of birth; there is no knowledge of birthplaces of those children who had died or left

home prior to 1851; the method also assumes that there were no changes of residence between the recorded birthplaces of the children. Similarly, no allowance can be made for the possibility of fostering, of adoption, or of the presence of step-children, although the last group can usually be identified within the census books by the designation of "in-law" or some descriptive term such as "child of first wife".⁽⁸⁴⁾ Nevertheless, despite these caveats, it is considered that the method does provide a reasonably valid representation of family migration traces and three maps have been accordingly constructed for three of the villages, East Murton in the north, Shotton in the centre of the study area and Trimdon near the southern limit of the concealed coalfield. Forty miners' households were selected by the use of random numbers for each of the villages and the maps were constructed by locating each birthplace with a dot and then joining them by lines drawn to represent family mobility. (Figs 7.18 - 7.20).

Although by no means identical in pattern, the migration traces of the three villages display certain common characteristics. Firstly, one can note the paucity of birthplaces outside Northumberland and Durham; secondly, the infrequency of extra-coalfield birthplaces contrasts emphatically with their concentration in the Wear valley and on lower Tyneside; thirdly, very short-distance movements within east Durham of recent origin before 1851 can also be detected. So much could have been deduced from the earlier analysis of children's birthplaces, but what the maps do reveal is the complexity of the frequent short-distance movements made by the sample mining families, both before their assumption of residence in east Durham and in many cases subsequently as well. At the scale of the individual family this can be illustrated by the

following examples, the first of which illustrates movement from the Wear valley to the concealed coalfield. In case number 28 on the Shotton map, a forty seven year old miner born in Houghton-le-Spring in 1804 was also living there in 1833 when his first recorded son had been born, although he could of course have lived elsewhere during this period and subsequently returned to live in Houghton. Three years later he had moved to Penshaw near the river Wear (1836); three years subsequently he had migrated to Haswell (1839) on the concealed coalfield soon after the opening of Haswell colliery in 1835; then at some time before 1843 he had migrated to Shotton, where his eight year old son had been born. In the second exmple, the complex migration path of a Tyneside-born coal miner can be traced in case number 25 in Shotton, which involves periods of residence on both banks of the river Tyne between 1827 and 1831 followed by movement to a colliery village immediately to the north of the ninety fathom fault in which to judge from the ages of his children residence lasted during the 1830s for at least eight years. Subsequently migration to Shotton had occurred at some date after 1841. Thirdly, from the East Murton map, case number 22 reveals how a miner born in Durham City in 1812 was living in Lambton close to the river Wear in 1835; by 1838 he had moved to Haswell three years at most after the opening of the colliery. Proof of residence at South Wingate Colliery in 1846 in Hutton Henry township postdated the opening of the colliery here in 1843, whilst by 1847 the family had been attracted to Murton approximately three years after the opening of the colliery. Of course, not all the family migration paths were as closely related as these to the spatial development of the coalfield. For example, case number 30 on the Trimdon map shows how

a miner born in Biddick in the mid-Wear valley section of the coalfield in 1798, had moved to Earsdon in south east Northumberland by 1827. However between 1831 and 1835 it is likely that he had been living in Ireland before returning by 1838 at the latest to Thornley, where he resided until at least 1840. By 1842 his sixth surviving child had been born in Wingate where the colliery had opened in 1839; by 1844 he was living at South Wingate and from there he had moved to Trimdon by 1851. Such a family migration record would appear to be uncommonly footloose, but even so, the maps do at least hint at the frequency and the directions of the movements of the colliery workforce in the twenty years or so before 1851.

- v) Did the population of the mining townships exhibit significantly different migration trends in 1871 compared with 1851?

So far this chapter has been concerned with an interpretation of the patterns of labour mobility in the years which witnessed the initial mining colonisation of the east Durham plateau, a process which was well on the way to completion by the mid-nineteenth century. By lengthening the temporal analysis to 1871 it is intended to seek answers to the question posed above and to discover whether the migration flows into east Durham by the later date confirm the evidence of Thomas and Jones from south Wales where the proportion of long distance immigrants to the Glamorganshire coalfield increased significantly as the second half of the century progressed. In order to explore these questions three of the townships, East Murton, Shotton and Trimdon have been chosen as they were of similar populations by 1871 and are located in the north, central and southern parts respectively of the study

area. The birthplace of each inhabitant has been recorded; with populations of 3012, 3105 and 3266 the total size of the 1871 sample was 9383. From the birthplace entries the following descriptive tables have been constructed (Tables 7.24 and 7.25):

i) Birthplaces of the total population; ii) Birthplaces of the coal miner heads of households; iii) Birthplaces of the other heads of households. Additionally, for each township, Tables 7.26 to 7.28 include the following significance tests using the chi-square statistic i) Birthplace test for the total population of the townships 1851-1871; ii) Birthplace tests for the rural and mining sections of the townships 1851-1871; iii) Birthplace tests for the coal miner heads of households 1851-1871.

Bearing in mind the observation that the purpose of this section is to examine the nature and significance of differences of origin between 1851 and 1871 rather than to conduct inter and intra township birthplace analyses for the later date alone, an initial observation of the tables for the total population suggests that noteworthy differences existed between the two census years. When tested for significance (Tables 7.26 to 7.28) it can be seen that the birthplace patterns of the total populations of the three townships each exhibited highly significant differences which resulted from the following factors:

In 1871: - i) a higher proportion of the population had been born in the township of residence; - ii) a smaller proportion had originated from elsewhere in the Northumberland and Durham coal-field; - iii) except for Murton, birthplaces were more frequently recorded in the rest of the northern counties; iv) in each case long distance migrants were much more strongly represented in 1871 compared with 1851.

By disaggregating the data to the level of the rural and mining settlement components of each of the townships, it is possible to test whether the overall differences of birthplace noted above were common to both units or were restricted to one. In fact, Tables 7.26 to 7.28 demonstrate that for the rural cores of Trimdon and Shotton highly significant differences of birthplace occurred between the two dates largely as a result of the much greater frequency of long distance migrants in 1871; in East Murton no such difference occurred. With reference to the mining communities, Tables 7.26 to 7.28 record highly significant birthplace contrasts between 1851 and 1871. In each case the nature of the difference in the patterns of birthplaces is similar to those listed above which refer to the total populations of the villages.

Having established the existence of significant differences of origin between the two dates it now remains to examine the nature of the contrasting patterns of birthplaces in more detail and to seek explanations for the change in population mobility patterns over the twenty year period. Firstly, it can be argued that the higher proportion of township-born residents in 1871 simply reflected the growth and maturation of the settlements between the two dates. In 1851 each of the mining units had only recently been founded and of necessity the bulk of the population were immigrants but by 1871 a new generation of village-born folk had come into being. Secondly, the reduced relative contribution of migrants from the other sections of the Northumberland and Durham coalfield reflects the increasing self-sufficiency, in terms of labour provision, of the concealed coalfield itself as the population grew rapidly in this developing section of the coalfield. The fact that there was no overall diminution in the

relative importance of the rest of east Durham as a place of origin between 1851 and 1871 suggests that the twenty year period witnessed a large absolute increase in the migration flows amongst the new communities on the concealed coalfield that had been initiated from the earliest days of the mining colonisation of the area.

Thirdly, however, the most dramatic contrasts in birthplace region between 1851 and 1871 occurred with reference to more distant locations; in the case of Trimdon and Shotton significantly more people had been born in the northern counties in 1871, whilst in all three villages very many more birthplaces were recorded in more distant parts of the British Isles by the later date. Turning to Trimdon in order to exemplify these important contrasts, the census books reveal that three distinct streams of long-distance migrants had settled in the three settlements units within the parish between 1851 and 1871. A group of Irish migrants, numbering 124 (25.57% of the village population) were recorded in the rural village of Trimdon, living in close proximity to each other, in a row of cottages built at right angles to the north row of the village between 1856 and 1871.⁽⁸⁵⁾ Spatially segregated from the rest of the village community, the Irish were principally employed in quarrying and in general labouring, although a few, unlike in 1851, had found employment in the coal mines. Personal knowledge of the writer confirms that even up to the present the descendants of these immigrants still form a distinct religious and occupational minority within the village, as many are in Roman Catholic families, the men of which work at the large limestone quarries at nearby Coxhoe.

One mile to the north of Trimdon village, the mining community of Trimdon Colliery housed 175 migrants from Lancashire in 1871

(10.07% of the population), who had originated chiefly from locations on the south Lancashire coalfield, such as Ince and Wigan. Unlike the Irish however, the Lancastrians appear to have become rapidly integrated into the host community in social and occupational terms, as their houses were distributed randomly throughout the mining rows and in many cases they worked as coal miners. Similarly in Trimdon Grange a large minority of long-distance Welsh migrants existed in 1871 by which date 13.14% (137 people) of the population recorded Welsh birthplaces. Unfortunately the census book entries frequently refer only to "Wales" as the place of birth, but from the few parishes actually recorded it would appear that the great majority of the Welsh had been born on or close to the North Wales coalfield and that they were overwhelmingly employed in coal mining. In terms of patterns of residence they tended to share the integrative characteristics of the Lancastrians at Trimdon Colliery rather than the segregation of the Irish in Trimdon village. Of the thirty two Welsh households, of which thirty one were headed by coal miners, nineteen were surrounded by non-Welsh neighbours and on only one occasion did as many as three Welsh households occur as a contiguous cluster.

Further proof of the increased contribution played by long-distance migrants to the population growth of the mining communities by 1871 is afforded by the evidence of the census books for both Shotton and East Murton townships. In the rural core of Shotton immigration from Scotland of people largely employed in agriculture meant that by 1871 more households were headed by Scots (8) than by natives of the village (5). The colliery rows at Shotton also housed an influx of long-distance migrants, chiefly

from Ireland (162, 5.75%) or from distant English counties, in particular Staffordshire (64, 2.27%) and Cornwall (53, 1.88%). Within these two counties, parishes of birth were frequently located in coal mining and tin mining areas respectively.

Finally, in the case of East Murton township, there is evidence of an important influx of very long-distance migrants from south west England which, to judge from the ages and birthplaces of the children in these migrant families, seems to have occurred from the mid 1860s onwards. Restricted entirely to the colliery settlement at Murton, the 145 Devon-born migrants (4.81%) contributed, with the eighty one Cornish migrants (2.69%), to provide the majority of the 299 immigrants from the English and Welsh counties outside the north of England. The Devon and Cornish migrants had found employment almost entirely in coal mining with only one of the forty heads of household employed outside the industry. Examination of the parishes of origin of this distinctive group reveals the frequent occurrence of birthplaces in either the tin mining areas of Cornwall such as Calstock and St.Germain's or in areas of copper mining in south Devon such as Ashburton and Buckfastleigh. To judge from the infrequency of intervening birthplaces for many of the children, it seems likely that migration occurred directly from the south west peninsula to either East Murton itself or to some other colliery settlement on the Northumberland and Durham coalfield, prior to a short distance move to East Murton. A memory of this pattern of labour mobility is provided by the discovery that the name "Cornwall" is still given to part of Murton Colliery. Further evidence of Cornish influence in the villages of east Durham in the second half of the nineteenth century was found in Wingate where the "Cornish" chapel was supported, at least initially, by a Methodist congreg-

ation attracted from south west England. The survival of the colliery debt book of Wingate Colliery for 1866 demonstrates how the owners of the colliery advanced each of the immigrant Cornishmen about £4 to pay for the transport of themselves and their families to Durham, the money being repaid in instalments deducted subsequently from their wages; forty seven Cornish families were assisted by the company to move to Wingate by this process in 1866 alone.⁽⁸⁶⁾

In summary, it can be seen that by 1871 the colliery villages contained significantly higher proportions of long-distance migrants than they had twenty years earlier. Facilitated by the development of a coherent national railway network, interesting examples of long-distance migration flows have been demonstrated which augmented the rapid population growth of the three sample villages. This evidence confirms the larger scale analyses of Thomas and Jones in Glamorganshire⁽⁸⁷⁾ and conforms to the generalizations concerning the greater incidence of long-distance occupation-specific movements of labour within the British Isles in the second half of the nineteenth century.

Summary.

Evidence has been presented in this chapter which proves conclusively that short-distance migration predominated to the concealed coalfield of east Durham up to the middle of the nineteenth century in keeping with Ravenstein's first principle. Not only had nearly 87% of the population of the eight villages been born in Northumberland and Durham, but also almost 94% of the coal miner's children had originated from the two counties, being overwhelmingly born on the coalfield itself. However, by 1871,

significant long-distance migrations had occurred to the three villages sampled, thus confirming the evidence of the patterns of labour mobility to the south Wales coalfield. Examination of the children's birthplaces revealed a characteristic step-by-step pattern of migration by the coal miners, although there was no hierarchical component to this movement as families shifted simply from pit village to pit village rather than up through an urban system.

In 1851 it is not possible to distinguish any significant difference between the two occupation groups and the frequency of long-distance migration; in both cases such movements were infrequently encountered. However, by 1871, the long-distance migrants with the exception of the Irish, were overwhelmingly employed in the mines. At the regional scale however it was apparent that the coal mining families had migrated significantly greater distances within Northumberland and Durham than had the rest of the communities as east Durham itself provided only a very small proportion of the colliery labour force in 1851, whereas by 1871 the more mature mining villages on the concealed coalfield could furnish an increased volume of manpower. Contrary to Ravenstein's principle that migration was dominated by females, the overall sex ratios of all the villages in 1851 suggests that the opposite was true for the mining communities. Although the great majority of the immigrants came in family groups, the sex ratios of the villages were male-dominant largely because of the presence of single male coal miner lodgers who outnumbered the relatively small number of female servants attracted to the settlements. Ravenstein's assertion that family groups rarely migrated out of their county of birth is generally supported by

the censal evidence of the Northumberland and Durham families, but the principle should perhaps be qualified in the light of the finding that the long-distance migrants found in the three sample villages in 1871 were predominantly members of family groups. For example, 200 of the 226 inhabitants of East Murton born in south west England lived within forty Devonian or Cornish family units; twenty five were single migrants who lodged with families from south west England whilst only one lived in a household not headed by a person from one of the two counties.

Finally, it seems reasonable to conclude that the migration of labour to east Durham was overwhelmingly occupationally-linked as there is little evidence that migration was accompanied by a transfer from either agricultural or truly urban occupations, at least up to 1871, the terminal date of this analysis. Many of the migrants who had been born in extra-coalfield locations either in the northern counties, or in south west England had in fact originated from regions with metalliferous mining traditions. The economic causes underlying much of the labour mobility examined in this chapter cannot be over-emphasised as almost invariably there is a close chronological relationship between patterns of migration and the decline of the mining activity in question, be it lead mining in the north Pennines in the 1830s or Cornish tin mining in the 1860s. Of course it should not be forgotten that even as late as 1871, it was local labour, provided by this notably prolific section of the population, which accounted for most of the labour mobility within the coalfield.

NOTES AND REFERENCES.

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- (34) Ibid. 306.
- (35) Ibid. 309.
- (36) Ibid. 331.
- (37) Cromar P. op. cit. 142-146.
- (38) Bryant D. "Demographic trends in south Devon in the Mid-Nineteenth Century," chapter 8 in, (eds) Gregory K.J. & Ravenhill W.L.D. Exeter Essays in Geography in Honour of Arthur Davies, (1971), 125.

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- (40) Ibid. 139.
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- (56) Thomas B. op. cit. 287.
- (57) Lawton R. see note 10, 168.
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- (59) Redford A. op. cit.
- (60) Smailes A.E. a) "The Early Industrial Settlement in North East England," The Advancement of Science, 6, 24, (1950), 325-331.
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- (62) House J.W. North East England. Population Movements and the Landscape Since the Early Nineteenth Century, Univ. of Durham, King's College, Newcastle upon Tyne, Department of Geography, Research Series No.1, (1959).
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Smailes A.E. op. cit. (1938), 222.
- (63) P.L.C. Report (1834), App. A, Pt I, No.5, 130.
- (64) Smailes A.E. op. cit. (1938) 223.
- (65) Redford notes (p.58) that on Alston Moor the population declined by a quarter between 1831 and 1833 and that between 4-500 houses had been vacated by lead miners who were obliged by the depression to migrate to Canada and the west Cumberland coalfield. As shall be seen later in this chapter, some also moved to the concealed coalfield of east Durham.
- (66) Hammond J.L. & B The Skilled Labourers, 1760-1832, 37,38.
- (67) House J.W. op. cit. Table 1, 56.
Further comment on the topic of immigration in the 1830s into North East England is included later in this chapter.
- (68) Smailes A.E. op. cit. (1938), 223.
- (69) House J.W. op. cit. 40.
- (70) Ibid. 8.
- (71) Ibid. Table 4, 57.
- (72) Smailes A.E. op. cit. (1938), 223.
- (73) Smith H.J. et al Crook and Billy Row in 1851 (1974).
unpublished monograph produced by Durham University extra-mural Department of Local History.
- (74) Smailes A.E. See Note 72.
- (75) Extracts from the Diary of J. Dunn, Hetton Colliery Viewer, concerning the Search for Strike-Breaking Labour.
Date March 27th 1832 "Mr. Robson went off to the lead mines in search of men provided ours will not be bound."

Date April 10 1832	"At a meeting of the committee of the Hetton Coal Company over the strike, item two on the agenda was concerned with the need to send up to the lead mines for additional hands."
April 12 1832	"I crossed the county to Middleton-in-Teesdale where I found a number of men willing to come but who wish some time for consideration."
April 13 1832	"to Reeth from Middleton-in-Teesdale with hand bills to seek for labour, with an assistant."
April 26 1832	"at Middleton- all day collected a good many miners some also collected at High Force by Messrs. Brandling and Brown."
May 7 1832	"the lead miners are gradually arriving."
May 12 1832	"forty lead miners put to work in Elemore pit."
May 15 1832	"at the George pit, Elemore now beginning work with a mixed crew of Yorkshiremen, Lancastrians and lead miners."
May 16 1832	"one hundred miners arrived from Swaledale."
May 31 1832	"began reworking the Lyons Minor Pit with strangers."
June 9 1832	"went to Haydon Bridge to meet forty Welsh people coming for Hetton Colliery escorted by soldiers to the Barley Mow" (a public house of unknown location).
June 26 1832	"great numbers of men coming from Sheffield and Derby capital good hewers."

Source: M/10/2 D.C.R.O.

- (76) A considerable literature exists about the residential patterns of the Irish in mid-nineteenth century towns and cities in Great Britain. For a valuable summary of this topic see: Lawton R. "Population and Society 1730-1900," in (eds) Dodgshon R.A. & Butlin R.A., An Historical Geography of England and Wales, (1978), 313-366.
- (77) Redford A. op. cit. 59.
- (78) Smith H.J. et al op. cit. 27. Although the Irish only formed 4.88% of the population of Crook in 1851, they provided forty eight (37%) of the 129 persons employed over 15 years of age at the coke works.
- (79) Bryant D. op. cit. 132.

- (80) The number of birthplace regions has been reduced to seven for this series of tests rather than the eight regions employed earlier in chapter 7 because the small number of coal miners born in their village of residence in 1851 necessitated the amalgamation of the village with the rest of east Durham.
- (81) In the work of others on the migration to Victorian towns and cities it was commonly found that people of higher social class had migrated greater distances than workers from semi-skilled or unskilled occupations. Such a distinction is less feasible to analyse in mining communities and hence the two occupation groups are employed to explore different migration patterns rather than social classes.
- (82) See note 67.
- (83) Bryant D. op. cit. 141.
- (84) It is obvious from the census schedules that the term "in law" was sometimes used to describe a step-child.
- (85) This row of cottages must have been built after the survey for the first edition 6" map of the village (1856) as it does not appear on this edition.
- (86) Moyes W.A. Mostly Mining, (1969), 116.
- (87) Thomas B. (1930), op. cit.
 Jones P.N. (1969), op. cit.

CHAPTER 8

CONCLUSIONS

It remains in the final chapter to summarise the principal findings of the study. To return to the questions posed in the Introduction:- what light has been thrown on the nature of the pre-mining rural cadaster? What factors influenced the siting and spacing of the collieries and their settlements? What type of community had become established in these new villages by the middle of the nineteenth century? What were the migration patterns of the immigrant labour force?

From the evidence presented in chapter 2, it is quite clear that prior to mining colonisation, east Durham was a relatively thinly-peopled agricultural district where archaic farming practices still survived and where crop yields and farm incomes were lower than in more favoured parts of the county, such as the lower Tees valley. In this area of modestly-sized estates and many small farms, there was a paradoxical contrast between the modern field system with its enclosures and largely consolidated farm units on the one hand, and the retention of conservative and inefficient systems of husbandry on the other hand. Before the development of coal mining, the study area had been virtually untouched by the Industrial Revolution as the workforce was almost entirely employed in agriculture or in the provision of handicraft products or services for the rural population. It was upon this rather inhospitable landscape that the coal industry was superimposed, with great rapidity, from the 1820s onwards.

By the middle of the nineteenth century, thirty years of mining colonisation had created a colliery landscape consisting of

a complex in which collieries, housing, associated works, railways and mineral lines, spoil tips, coal company offices and mine officials' residences were invariably present. What characterised the landscape of the east Durham concealed coalfield landscape however, was the large size and widely spaced distribution of the collieries and their settlements. In response to the resource factors inherent on a concealed coalfield in which the accessibility of the deeply-buried seams was made more difficult by acute drainage problems, the colliery companies perceived, at the outset, the commercial necessity of the acquisition of very large coal concessions. Therefore, not only did the coal companies lease large coal royalties from local landowners whilst the shafts were being sunk, but through the use of double shafts, with greatly enhanced winding capacity, large coal reserves were worked from individual mines, which were therefore widely spaced over the east Durham plateau. Close by these large, deep mines each employing several hundred men and boys, substantial clusters of mining rows and courts mushroomed, company settlements built to house the population influx.

On examining the lease agreements entered into between the colliery companies and the landowners, it is quite clear that the latter exercised the dominant influence on decisions concerning the siting of the various elements of the colliery landscape. In lease after lease the landowners laid down the spatial framework within which the siting of the collieries themselves, the railway lines and the mining settlements was structured, by means of a series of positive and negative locational constraints. Here was no ruthless superimposition of the industrial landscape upon the rural cadaster, but a spatial pattern essentially controlled by a

small group of landowners who were more desirous of entering into rentier relationships with the companies than of sinking their own capital into the mining partnerships. As in other coalfields, the east Durham landowners, although anxious to profit from the exploitation of the coal beneath their estates, were determined to minimise the visual impact of mining operations near their houses.

What type of community lived in the mid-nineteenth century colliery townships? There is considerable evidence that the mining settlements were largely homogeneous in economic and social terms. In each village, the employment structure was dominated by the mine, as in row after row male occupations were dominated by a variety of colliery trades and many of the others gained a livelihood through the provision of goods and services for the mining families. However, a small measure of social heterogeneity and residential segregation, based upon the gradation of colliery employment can be identified. In several of the villages, small groups of better quality housing, built for and occupied by managerial and supervisory grades existed as the "Quality Row" of the village, a feature of the morphology of mining settlements detected by other writers.⁽¹⁾ Whatever the level of skill or responsibility, however, at the scale of the individual household and family, the colliery community was overwhelmingly composed of single family units, largely nuclear in structure, with few other residents, related or otherwise. The miners' family was a tightly-knit nuclear unit, almost invariably housed in a purpose-built terraced cottage, provided by the colliery company. From the earliest years of shaft sinking the companies were estimating for and building the accommodation necessary to house the influx of migrant labour required to work the new collieries. There was no

local supply of labour; there was no available stock of housing, therefore the mining companies were obliged to make their essential provision themselves on land bought or leased for that purpose in the pioneer stage of mining colonisation.

Where were the origins of this immigrant labour force and by what migration routes had the miners and their families reached the concealed coalfield? There is abundant censal evidence that the mining workforce had been highly mobile prior to its arrival on the concealed coalfield, with families making frequent, though usually short-step movements both between and within the various sections of the Northumberland and Durham coalfield. Whilst it is obvious that immigration was necessary for the peopling of the east Durham mining villages, what is surprising is the frequency with which many of the mining families had moved prior to their assumption of residence on the concealed coalfield by 1851. Stimulated by push and pull factors related to the economic vicissitudes of different parts of the North Eastern coalfield and enabled by a virtually ubiquitous supply of company housing, collier mobility appears to have been a frequent attribute of mining society in the first half of the nineteenth century. Additionally, it can be strongly inferred from the census evidence that occupational, as opposed to spatial mobility of the workforce, was infrequent. Very few of the east Durham miners had been born in rural locations, an even smaller proportion of their children had originated outside the coalfield, whilst a negligible supply of labour had come from either the contiguous rural counties or the rest of the British Isles, despite well-publicised episodes of strike-breaking recruitment from beyond the North East coalfield in the 1830s and 1840s. Essentially, the mid-nineteenth century

east Durham pitman was a Northumbrian who had been born most likely in either the old-established Wear valley coal district or on Tyneside. In contrast, by 1871 it can be seen that significantly more frequent long-distance migrants, Lancastrians, Welshmen or Cornishmen had moved with their families to the east Durham villages. By the time of their arrival, however, the initial process of mining colonisation had been achieved by local men who transferred their well-established skills, work routines and attitudes to this new section of the coalfield.

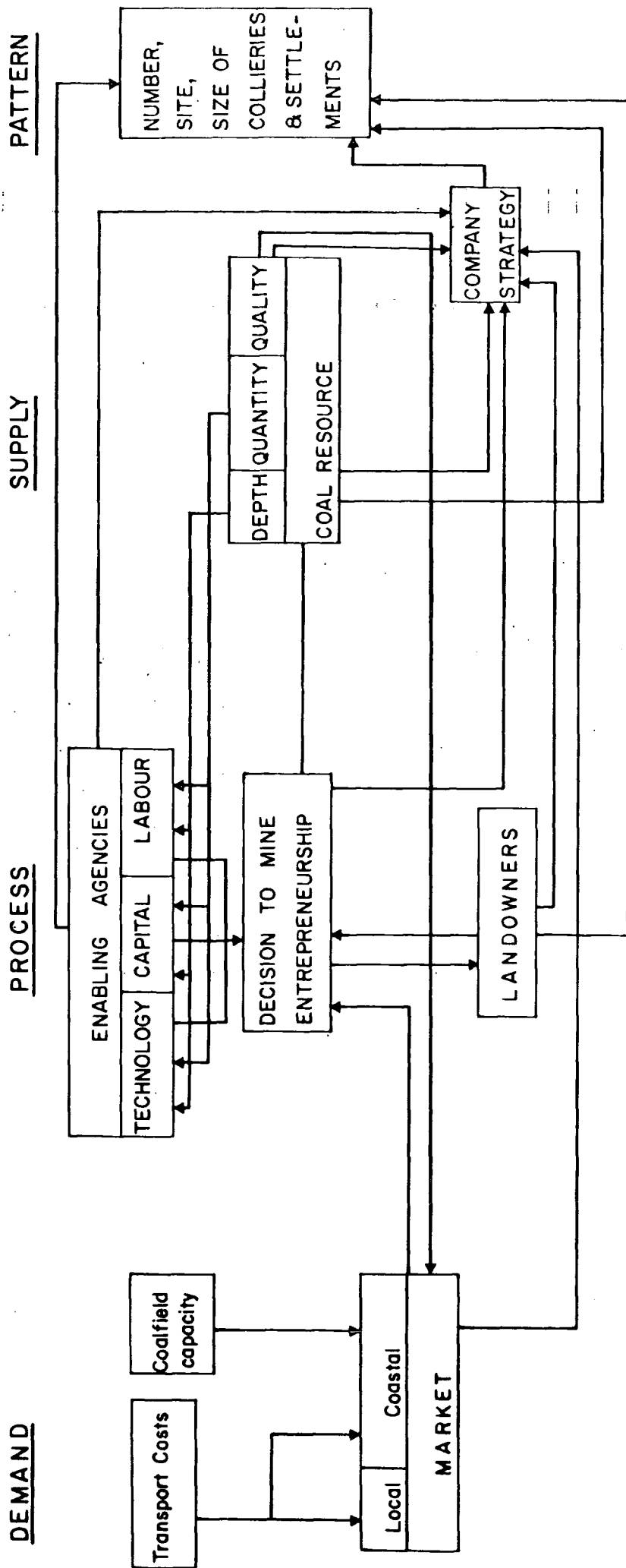
In summary, the principal focus of this work has been to examine the spatial outcomes of the extension of the mining system onto the concealed coalfield through an analysis of the decision-making processes which led to the genesis of the colliery landscape. It has attempted to provide a structured enquiry into the interrelationships between, and functioning of, the objects which make up the pattern of human activity conveniently described as the colliery landscape. The stimulus to extend the Durham coalfield eastwards in the early part of the nineteenth century was provided by the buoyant, if variable demand for high quality household coal found particularly in the Hutton seam; further stimulus was provided by the rapid provision of rail links to the newly-created or greatly extended port facilities, the necessary outlets for the sea-sale coal trade which dominated the market for east Durham coal until after the middle of the nineteenth century. The coal resource, which occurred in the inherent geological conditions of a concealed coalfield, provided a matrix upon which the mining system operated and strongly influenced the human response in terms of the patterns of exploitation. Finally, mining technology, capital provision and labour can be seen as the enabling agents in

the process of the diffusion of mining over the east Durham plateau. It is possible to present the idea of this mining system in schematic form in order to provide a conceptual synthesis distilled from the empirical analysis of the previous chapters.(see below). At the simplest level, the scheme provides an integrative framework upon which the surviving evidence of the process of mining colonisation can be fitted. Based upon demand and supply factors, linked by the entrepreneurs' decisions to mine and creating specified spatial outcomes, the system can be read as follows.

On the demand side, the size of the market share absorbed by the newly developed collieries on the concealed coalfield, depended upon the inter-related factors of transport costs and total coalfield production capacity. During the thirty years after 1820, the extension of the railway network permitted the development of sections of the Northumberland and Durham coalfield which were increasingly distant from tidewater. Over the same period, overall colliery capacity increasingly exceeded the demand of the London household coal trade with the result that the east Durham collieries extracting high quality grades of coal were, early in their productive lives, able to compete successfully with older-established colliery districts such as lower Tyneside, in which depletion of the best household coal reserves had occurred. On the supply side, the key to the exploitation of the coal resources of the concealed coalfield, within a given market context, depended upon the decision-making process in which entrepreneurship acted in relationship to both the enabling agencies of technology, capital and labour and the legal access to the resource sanctioned through lease agreements with landowners in return for various rents. In

the mining system the company strategy is postulated as the ultimate decision-making filter through which the entrepreneurial decision to mine is translated into colliery sinkings, the number, size and spacing of which determined the pattern of the colliery landscape on the concealed coalfield. To conclude, the patterns of human activity which were the outcome of the process of mining colonisation, resulted from contemporaneous perceptions by the colliery companies of the decisions necessary to seek the critical path to profitability.

THE MINING SYSTEM



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Adapted from Langton J. (1979), 27.

REFERENCES

- (1) Examples of the observation of the residential segregation of social groups within nineteenth century mining communities can be read in the work of writers such as D.H. Lawrence and E. Zola. See for example; Lawrence D.H. Nottingham and the Mining Country, (1950)

Zola E. Germinal, (1946)

