

WIDNES AND THE EARLY CHEMICAL INDUSTRY, 1847-71. A CASE OF OCCUPATIONAL MOBILITY IN THE INDUSTRIAL REVOLUTION

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Until the advance, a generation ago, in the study of the demographic aspects of the Industrial Revolution, the relationship between depopulation of land and the growth of factories was simple. As the Land Enclosure Acts began to have an effect, the factories in the north of England began to grow.¹ Hammond wrote in 1919, 'the small farmer was a farmer one day of the week and a [town] labourer another.'² T.S. Ashton, writing in 1948 saw the migration into the factories in fairly simple terms, 'agricultural workers, there is no doubt, migrated to the nearby towns, but they were attracted to manufacture rather than repelled from agriculture.'³ In 1952 G.D.H. Cole expressed the classic view of factory growth again, 'the peasants during the Industrial Revolution were torn from the land and driven to live in the noisome factory towns.'⁴ There seems to have been an understanding that the factory represented the only recourse for a dislocated population, an understanding which dictated simple notions about the new occupational structures thrown up by economic change, and the complex relationship between skilled and unskilled labour.

Recent historians have examined the labour force which was attracted into factories in the Industrial Revolution and find little to support the classic notion expressed by Hammond, Ashton and Cole. Perkin, for instance, in 1969, pointed out that there was no real decline in population in agricultural areas until after 1851, and that improved technology on the farms demanded more, not less labour.⁵ E.P. Thompson, in 1968, examined the influx of skilled labour into the Midland metal industries and suggests, 'Even where an old skill was replaced by a new process requiring equal or greater skill, we rarely find the same workers transferred from one to another, or from domestic

to factory production.⁶ And more perceptively remarks, 'In comparing a Suffolk labourer with his grand-daughter in a cotton-mill, we are comparing not two standards, but two ways of life.'⁷ With this change in attitude towards the growth of factories came a change in methodology. Historians such as J.T. Ward have examined a wide range of primary sources often scattered and inaccessible in libraries. He makes considerable use of journals written at the time to assess the effects of economic change on the population.⁸ John Foster makes use of the Census Returns to examine how the occupational structure was changing, and explores the implications of occupational variations in the evidence of marriage returns.⁹ With the changing methodologies have come revaluation of previous assumptions. Compton, in his study of Northamptonshire, has been able to show how migrant families had recourse to Elementary Education from the Census Returns and whether this schooling had any effect on occupational mobility twenty years later by the marriage returns.¹⁰ Previously, elementary Education has been dismissed with the view that school provision engendered attendance, and literacy became a skill for upward mobility some time after 1870.¹¹ With the availability of prime sources such as Census Returns and Marriage Registers and a developing methodology, minute variations in occupational structure can be traced.

What few studies, either using the classic assumptions of factory development or the recent changes in Census methodology have been able to do, is examine the interaction between old and new trades as the new industry became prominent. The reason for this is that in so few areas yet researched did the arrival of the Industrial Revolution coincide with the post-1841 house-to-house Census Returns.¹² In the majority of Lancashire towns the Industrial Revolution had become well established by 1841. Hence, Censuses for towns such as Bury or Blackburn reveal an established occupational structure with a dominant industry. In Widnes, however, the Industrial Revolution came late, in 1847 with the arrival of the Chemical Works. By 1861 the Chemical Industry was the most dominant in the town. The Censuses for 1851 and 1861 show the industry's development. Most interesting are the changes in the existing occupations such as watch and filemaking, weaving and agriculture. Labour migrated into the town, skilled jobs established their prerequisites and the economic pattern of the town changed.

The evidence for such changes depends upon the reliability of the Census Returns. The most common error in the actual enumeration of the Census sheets seems to have been in omissions, double-entries or calculations of the statistics at the end of the sheets. Since considerable care was taken by enumerators in Widnes, as can be seen by meticulous checking and cross-checking marks on the sheets, and since no duplicated pages can be traced, the Returns for Widnes seem extremely accurate. Similar care was taken in towns like Preston and St. Helens, where Census studies have been carried out.

In 1801 the population for Widnes was 1,063. Of this 662 were workers. 38% of the workforce was involved with the old crafts of file, watch and canvas making. 60% of workers were involved in agricultural occupations. By 1851 the population was 3,211 and by 1871 it had risen to 14,300. Several changes had occurred in the 1830's to bring migrants to the town. A canal had been extended to Widnes from St. Helens, the Sankey Navigation. Railway links had been established with the south Lancashire coalfield at Sutton to the north at the same time. A dock was constructed at the southern tip of the town where the railway and the canal met and so Widnes became a very convenient place where coal from the north and salt from Cheshire were unloaded. A community began to grow around the dock, mostly families of 'watermen' in the 1841 Census. By 1841 Widnes had a population of 2,209, with 42 families (about 200 people) living in the dockside settlement. The district was described in 1841:

'(Widnes Dock) Where families of the 'flatmen', a very low class, unsettled in their behaviour, pass much of the time on the 'flats' or 'barges'.¹³

10 of these families can be traced on the 1851 Census in the same locality. There was little to associate the new community with the rest of the town to the north. Widnes-born families did not move into the settlement before 1851, and after this time only a few shopkeepers for whom the settlement was source of profit. The 1851 Census, coming only four years after the first Chemical Factory, shows how changes were starting to occur. Several tradesmen's sons had moved away from their fathers' occupations in the northern district, some leaving skilled occupations altogether and had become semi-skilled workers near to the industrial area. Such changes, and the trends thrown into relief by the

developing Chemical factories, are the subject of this article.

The notions of skilled and semi-skilled workers are of crucial importance when tracing the occupational changes brought about by new industries. Yet if one tried to itemise every occupation mentioned in the Census Returns it would become unwieldy. A methodology employing the notions of managerial, overseer, skilled and semi-skilled has been developed for small area study by Anderson in his study of Preston.¹⁴ Such a methodology defines six groups (henceforth called Socio-Economic Groups or SEG). The first two groups (I and II) represent professional and managerial, commercial and supervisory occupations. The next groups (SEG III) is divided into commercial and overseer (SEG IIIa) and skilled tradesmen such as coopers, bricklayers, blacksmiths and other trades demanding an apprenticeship (SEG IIIb). The fourth group (SEG IV) contains the semi-skilled workers. In Widnes these were lime-burners, copper workers, domestic servants and certain categories of labourer. Lastly, the fifth group (SEG V) contains those who are simply designated as agricultural or chemical labourer in the Census. Although criticism can be made of such a system, it is justified since no large occupational group has been omitted or amalgamated as part of a larger group. The classification of Chemical labourer, the largest group in the town after 1861 as SEG V along with agricultural labourers, distinguishes them from semi-skilled railway and dock labourers, carters and watermen. The Socio-Economic grouping for Widnes in 1851 and 1861 are as follows.

TABLE 1 *The Socio-Economic groups and number of families by occupation of the head of household in Widnes, 1851 and 1861.*

| SEG | | No of families 1851 | No of families 1861 |
|------|---------------|------------------------|------------------------|
| I | Doctors | 1 | 3 |
| II | Manufacturers | 3 | 4 |
| IIIa | Shopkeepers | 44 | 55 |
| | Engineers | 3 | 19 |
| | Clerks | 0 | 8 |

| SEG | | No of families 1851 | No of families 1861 |
|------|------------------------|------------------------|------------------------|
| IIIb | Watchmakers | 60 | 24 |
| | Canvas Weavers | 49 | 41 |
| | Filemakers | 15 | 23 |
| | Joiners | 7 | 34 |
| | Tailors | 10 | 12 |
| | Bricklayers | 7 | 17 |
| | Coopers | 4 | 6 |
| | Platelayers (Railway) | 0 | 20 |
| IV | Watermen | 43 | 48 |
| | Dock Labourers, etc. | 18 | 8 |
| V | Agricultural Labourers | 73 | 50 |
| | Chemical Labourers | 70 | 233 |

SOURCE: Census

The table shows an increase in the numbers of each occupational group except for watchmakers, canvas weavers and agricultural labourers. The increase in the numbers involved in SEG IIIb with the Chemical industry are slight compared with the massive influx of unskilled Chemical Labourers. The trades which declined from 1851 onwards, watchmaking and canvas weaving, were under pressure from forces outside the town. A slump in the British watch trade caused by a 30% tariff in the U.S.A. forced many skilled artisans to leave the craft and seek employment elsewhere. However, the very nature of the labouring jobs in the Chemical factories meant that few locally-born men were suited to them. The majority of labourers came from Ireland and lived in the squalid area of town called 'Pigtown' and later Newtown.¹⁵ The sons of watchmakers who felt they could no longer pursue their family trade in Widnes responded very differently from other groups in the district to the Industrial Revolution. Several sons went into agricultural labouring work and there is much evidence to support the view that agricultural labourers were a group which profited by the proximity of industrial change.¹⁶ The increased demand for food from the land in the new towns meant larger profits for the local farmers and higher wages for labourers to keep them on the land and out of the factories. A few sons of watchmakers became canal labourers and moved completely away from the old trade centres of Appleton and Farnworth. Perhaps the most interesting group in the skilled SEG IIIb category in Table

1 is the canvas weavers. The Census Return shows that the industry in Widnes was dominated by women and children. Analysis of the children's occupations in the industry in 1851 reveal that weaving in Farnworth was predominantly a domestic concern. There was only 1 bobbin-winder under the age of 11 and the factories would have taken children at an earlier age than their occupations recorded in the Census Return.

TABLE 2 *Children employed in the Widnes canvas weaving industry, 1851*

| Age of children | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|-----------------|----|---|---|----|----------------|----|----------------|----|
| | Bb | | | | Bg Bb Bb | Pb | Pg Pg Bb | Wb |

W = Weaver. P = Pin-Winder. B = Bobbin-Winder.

b = boy

g = girl

The eight children over the age of 11 in canvas weaving indicates factory work.¹⁷ By 1861 the sons of canvas weavers who had been trained at an early age in the trade found it could no longer afford them a living. The Merseyside sailcloth industry was declining since shipping no longer required sailcloth, and the canvas mills closed down. The Widnes canvas weavers reacted uniquely to the Industrial Revolution. They monopolised a particular type of railway work, platelaying. F. McKenna's work on the recruitment of railway workers in the mid-century period has shown that recruits were often 'across the fence' workers. They saw better opportunities with the new railways than with their existing occupations.¹⁸ The exclusiveness of the change in occupation in Widnes can be explained by the fact that early movement into platelaying by a dislocated group of workers led to the control of admissions in that job. Hence, families which exerted some control over apprenticeships in the weaving sheds before 1851 were able to exert a similar control to the new trade of railway platelaying. Furthermore, it is most likely that the railways represented the

best opportunities in the town at the time. Promotion prospects were better with the railways, a strong union solidarity was developing and it was an occupation very firmly associated with the new Industrial Revolution, which canvas weaving had not been.¹⁹ A contemporary report from the *Liverpool News* in 1863 suggests unemployment in the South Lancashire textile towns was so severe that people had been forced to take any occupation, regardless of status.²⁰ In Widnes, however, the opportunities offered in the Chemical factories attracted no canvas weavers at all until well after 1871. There was much more likelihood of watchmakers entering the Chemical factory gates, children of a craft much less threatened, much more autonomous, and, one suspects, much more likely to want to retain the status of their fathers in the 'aristocracy of labour'.²¹

Such exclusive routes into the new trades were generated by the Chemical factories themselves. Most importantly for the Irish labourers was the coopering trade. By 1861 this was the only trade from the skilled SEG IIIb category over which the Irish had complete control. Entry was most likely open to those who had become known to overseers and foremen in the factories by helping their fathers and brothers. There is some evidence in the Census Returns to indicate that early factory 'contact' of this kind was significant in securing apprenticeships of most trades at the time.²² The vast majority of Irishmen's children entered the unskilled Chemical labouring occupations of their fathers, and those who did not were probably the sons of skilled Irishmen who could only find labouring jobs when they came to the town. Such workers would be most anxious to re-establish themselves and their families as skilled workers and found the opportunity through the coopering trades.²³

The fact that so few Widnes-born men entered the new Chemical factories before 1871 illustrates how unattractive the work must have been. After this date, the economic structure of the town changed somewhat with the arrival of new industries such as iron smelting, brass working, bleach and fertiliser production.²⁴ Locally born men were beginning to enter the factories, as Table 3 reveals. New skills were migrating into the town and the early stronghold that industrial skilled workers had over admission to their trades was breaking down.

TABLE 3 *The occupations of Widnes-born heads of houses by Socio-Economic Grouping, 1851 and 1871*

| SEG | % in 1851 | % in 1871 |
|-----------------------|-----------|-----------|
| II managerial | 3 | |
| IIIa skilled/overseer | 25 | 15 |
| IIIb skilled | 60 | 48 |
| IV semi-skilled | 6 | 25 |
| V labouring | 6 | 12 |
| Total | 100 | 100 |
| Total families | 118 | 269 |

(the table does not include Widnes-born heads of houses of migrant workers coming into the Chemical factories after 1847)

The table shows a high proportion of Widnes-born men in skilled jobs throughout the period. These were joiners, blacksmiths, mechanics and tailors, along with residual watch and filemakers. The reluctance of local men to enter the Chemical factories as labourers is reflected in the rise from 6% to 12% in SEG V by 1871. The decline from 25% to 15% in the managerial and overseer occupations corresponds to the fall off in the employment of watch, file and sailmakers. The decline in sailmaking for the skilled weavers is shown in the increased figure from 6% to 25% in semi-skilled work these men were likely to take. Several weavers became dock labourers, canal, railway and agricultural workers. Few Widnes-born men moved into the industrial district, either to the English settlement at Barn Street or the Irish community in Newtown which in 1861 was described as, 'so poor and utterly uncivilised a location where men and women drink preternaturally'.²⁵ The Irish had the least prospect of upward social mobility. Research carried out in Manchester with much larger numbers of Irish shows a similar pattern of settlement to that in Widnes. They took the poorest jobs and lived isolated from the English workers.²⁶ The English workers, largely protestant from their preponderance in the marriage returns in the Church of England records, were the earliest skilled

migrants into the industrial district near the dock. They were readily absorbed into the existing settlement of watermen and railway workers. They sponsored the Church and school and established a Mechanics Institute there in 1853.²⁷ Newtown, on the other hand, had no such earlier community to build on. The evidence in the Census shows that many of the earliest Irish Chemical labourers lived on farms throughout the town, perhaps alternating factory and agricultural work. Newtown comprised the cheapest housing, the worst roads and a community least able to improve its conditions. The Socio-Economic make-up of the two industrial districts reads as follows.

TABLE 4 *The Socio-Economic comparison of two industrial districts in Widnes, Newtown and Barn Street, 1861 and 1871*

| SEG | Newtown | | Barn Street | |
|------------------|---------|--------|-------------|--------|
| | % 1861 | % 1871 | % 1861 | % 1871 |
| skilled/overseer | 23 | 17 | 6 | 8 |
| skilled | 16 | 18 | 31 | 27 |
| semi-skilled | 10 | 8 | 40 | 11 |
| labouring | 55 | 57 | 23 | 53 |

Throughout the period there was a higher percentage of skilled workers (SEG IIIb) in the English community at Barn Street. By 1871 over half of the area comprised chemical labourers and skilled workers had moved into the new development at Simms Cross, Halton View and Albert Road. It was from this skilled community in Barn Street that the first overseers and foremen in the Chemical Factories were recruited. Newtown experienced a high percentage of workers in the SEG IIIa (skilled and overseer) category. These were managers who lived along the northern boundary of Newtown, Lugsdale Road. They gradually moved to the new districts, following the same pattern as skilled workers from Barn Street. The highest concentration of chemical labourers anywhere in the town was here, over half throughout the period. The decline in semi-skilled workers in both districts can be explained by greater particularisation in the Census records. Whereas a man might describe himself as 'railway worker' in 1861, the title by 1871 may have changed to mechanic or platelayer.

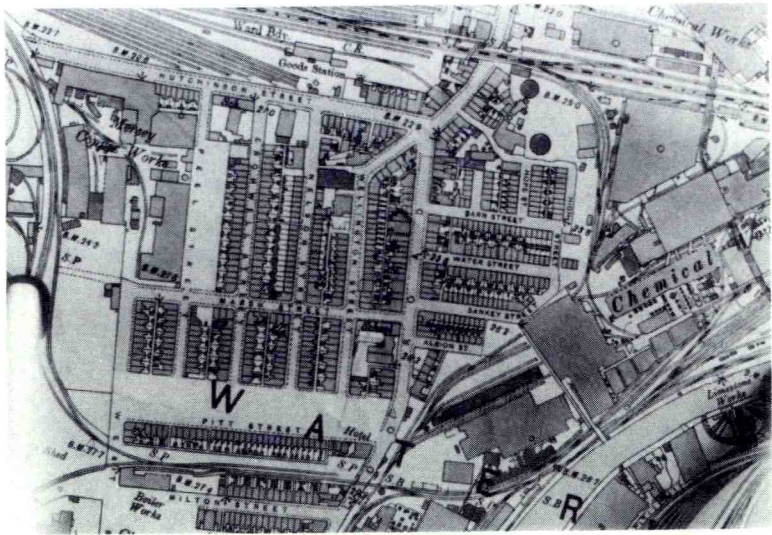


Plate 1: Barn Street district of Widnes.

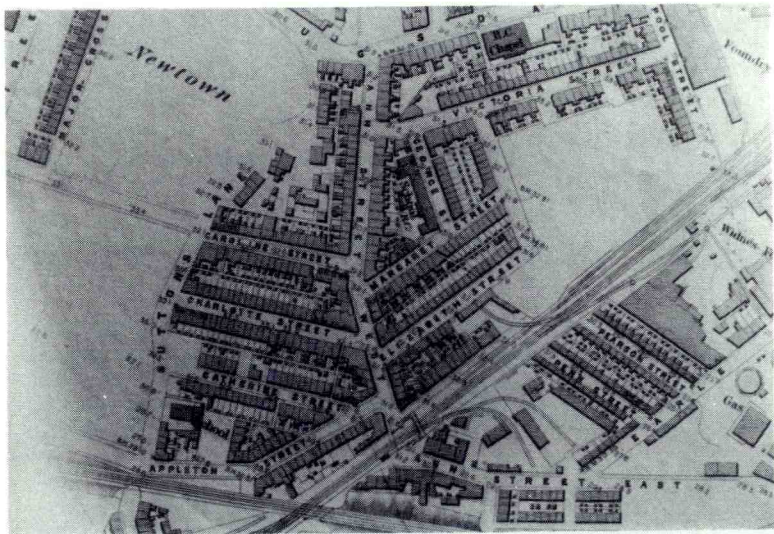


Plate 2: Newtown district of Widnes.

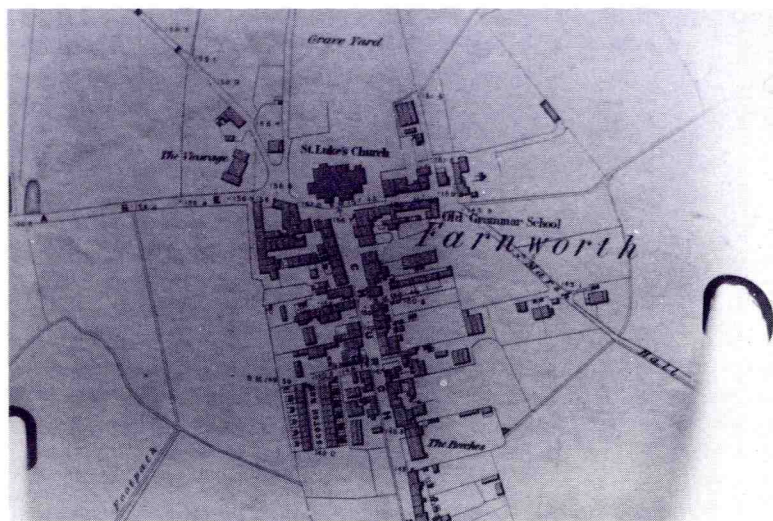


Plate 3: Farnworth Village, Widnes.

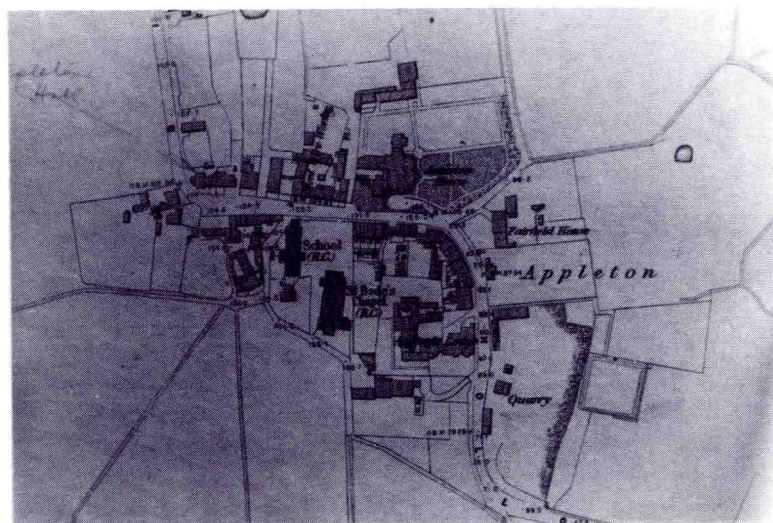


Plate 4: Appleton Village Widnes

In the old craft areas of Farnworth and Appleton quite a different occupational pattern had emerged. The massive influx of labour had not settled here, but the Industrial Revolution had brought about economic changes which affected the entire community.

TABLE 5 *Socio-Economic comparison of the two traditional craft areas, Appleton and Farnworth, 1861 and 1871*

| SEG | Farnworth | | Appleton | |
|-----------------------|-----------|-----------|-----------|-----------|
| | 1861 % | 1871 % | 1861 % | 1871 % |
| I professional | | | 3 | |
| II managerial | | | 3 | 2 |
| IIIa skilled/overseer | 17 | 9 | 20 | 16 |
| IIIb skilled | 60 | 40 | 38 | 43 |
| IV semi-skilled | 20 | 37 | 28 | 23 |
| V labouring | 3 | 13 | 8 | 13 |

At Farnworth the greatest influx had come from the semi-skilled and unskilled workers, mostly agricultural workers, but many domestic servants. The skilled trades declined with the gradual demise of canvas weaving and were scarcely replaced by the new influx of brickmakers, joiners and shoemakers. At Appleton, the influx came with the skilled artisan identity as can be seen when the priest was describing the predominant economic interests to the Catholic Poor Schools Committee and in the various reports he wrote about his changing parish.²⁸ Meanwhile, two changes had occurred which profoundly affected the workers in Widnes. Firstly, the establishment of the Companies Act in 1862 which allowed companies to be run by managers rather than by the owners and their families. This had the twofold effect of polarising the entrepreneur from his workforce and substituting a manager, often foreign to the neighbourhood and unsympathetic to the problems of the workforce. The small watchmaking workshops at Appleton were unaffected by the Act, but the large Chemical factories, some employing up to 500 men, found the new management structure very appropriate. The second administrative change came in 1865 with the Local Board of Health. Hunt has investigated the operations of the Board and points out how few of the traditional craftsmen of Widnes were involved.²⁹ Only two watchmakers were elected, George Barrow of Farnworth and Richard Kent of Albert Road. The remaining seven members were a farmer and six Chemical Manufacturers.³⁰ Either this illustrates

the unwillingness or unpreparedness of the old craftsmen to undertake the administration of the emerging town, or that the unfortunate means of election, and classification of number of votes according to wealth, did not favour the poorer tradesman.³¹ The development of the Chemical Industry had changed the administrative pattern of the town in less than 20 years.

To examine how workers regarded themselves in such a community the occupational patterns exhibited in the marriage returns are quite illuminating. In a traditional craft area which had not experienced factory work, the evidence points to a simple pattern where skilled families generally married into skilled families and unskilled families into unskilled families.³² The marriage registers of Farnworth Church indicate this pattern before 1855, and it is one upon which the village economy established its artisan families, its semi-skilled and labouring populations.³³ In a rapidly industrialising area such patterns are hard to define. The occupational structure was changing so rapidly and migrations occurring at such a rate that stable communities were scarcely established by 1871.³⁴ Nevertheless, research carried out in Oldham, South Shields and Northampton shows how far workers were marrying outside their socio-economic groups. For instance a growing proportion of skilled men marrying daughters of unskilled families suggests a blurring of the old occupational and social divisions. In the industrial district of a town this may indicate a widening of opportunities in factories and a move away from the family monopolies in the old crafts. One figure which shows how slowly the Chemical labouring force was absorbed into the community is the fact that by 1861 only 2% of Irishmen had locally-born wives. None were the daughters of skilled tradesmen, but had their origin in the Dockside community of watermen, railway and Dock labourers.³⁵

The marriage registers show that families in the northern districts of Farnworth and Appleton attended their local churches and the community at the Dock rarely ventured elsewhere but the Dock churches for their weddings. Subsequently, a convenient division can be made between the industrial district which comprised the majority of Chemical workers and the rural, traditional craft areas to the north of Lugsdale.³⁶ Few Chemical workers married at Farnworth and no watchmakers married at the Dock. At Farnworth 28% of men from SEG V married women from

skilled families in the SEG IIIb occupations. A similar percentage of skilled men in the district married women from unskilled backgrounds. Interestingly, the majority of watchmakers before 1871 married into other watchmaking families. Sons who had left this trade did not follow the same pattern, but married into much wider socio-economic groups. Men employed in the weaving industry generally married daughters of weavers, but since the trade was declining by 1871 few weavers are recorded and any trend is dangerous to support. The upward mobility of labourers gives an indication about the autonomy of skilled trades. As job opportunities became more available, skilled trades were available to the labourer. In Farnworth the movement of 10% of labourers into the joinering, shoemaking and bricklaying occupations is paralleled by 13% of them marrying into families from the skilled SEG IIIb category. The tradition of skill marrying into skill was breaking down at the Dock, too. 31% of skilled men married into unskilled families in the industrial district and 24% of labourers from SEG V married into skilled families, mainly involved in brickmaking, joinering and canal work. Like Farnworth, some 10% of labourers' sons had achieved a status higher than their fathers' by the time they married. One feature is prominent throughout; men from managerial and overseeing occupations married almost entirely within their own SEG. The Census Return support the trend and show how difficult upward mobility from SEG IIIb had become. These workers, marked off from the rest of the workforce both geographically and by their articulateness in the local press, were the first to voice a demand for commercial and scientific education in the late 1860's.³⁸ It was a demand for qualifications and was symptomatic of a growing awareness of the competitive nature of management positions. For the next thirty years after 1871 a flourishing Science and Art evening institute provided courses until the Higher Grade school was established by the Local School Board.³⁹ Furthermore, as the management force grew after 1871 large numbers of them took their families to Farnworth, away from the pollution, thereby creating a classic case of urban development where the poorest areas of a town were those from which the overseers and managers had moved.⁴⁰ The evidence points to a consolidation of this group, a consolidation which led to a monopoly over new occupations; those of clerk, works administrator and manager.⁴¹

The years after 1871 are marked by the recruitment of locally-born men into the higher Socio-Economic Groups in the industrial belt, men who had been unable hitherto to take skilled jobs in the industrial area because of the demands of serving apprenticeships. Although information about apprentices in Widnes in 1871 is not accurate because the Census does not generally distinguish between apprentice, assistant, helper or mate, histories of the Chemical Industry suggest other factors at work in the town to change the existing ideas about the 'aristocracy of labour'.⁴² Haber reveals that the elite workers in the Leblanc alkali process were those most physically capable of enduring the work. The 'packers' regarded themselves as the best workers, but the process was so dangerous that few could stand it for any length of time. 'Very few men,' a doctor reported, 'get above sixty.'⁴³ Other workers marked out for their dangerous trades were salt-cake men, lime men, vat men and burners. Their pre-eminence in the industry would mark to ascendancy of the semi-skilled worker, from among occupations which had never demanded apprenticeships. This new trend indicates the beginning of a threefold division in the chemical industry, a division between 'process', 'yard' and 'maintenance' workers.⁴⁴

By 1871 the semi-skilled and skilled workers were emerging in Widnes as important social groups. They can be found making contributions to the vast number of organisations and committees which developed as the town grew. Unions, clubs, societies and institutions which the pre-industrial town had never envisaged, became platforms on which emerging social groups were able to participate. The growing professionalism of the Chemical Industry was able to offer an organisational background to an emerging town, and while the new occupational structure it offered to the old craft structure was disorientating, it was one much more suited psychologically to the advance of industrial society after 1871.

NOTES

- 1 T.S. Ashton, *The Industrial Revolution* (1948), pp. 23-6.
- 2 J.L. and B. Hammond, *The Village labourer, 1760-1832* (1919), p. 211.
- 3 Ashton, *The Industrial Revolution*, p. 61.
- 4 G.D.H. Cole, *A Short History of British Working Class Movements, 1789-1947* (1952), p. 23.

- 5 H. Perkin, *The Origins of Modern English Society, 1780-1880*, (1969), p. 126.
- 6 E.P. Thompson, *The Making Of The English Working Class*, (1963), p. 274.
- 7 *ibid.*, p. 256.
- 8 J.T. Ward, *The Factory System* (1970), vol. 1.
- 9 J. Foster, *Class Struggle And The Industrial Revolution* (1974).
- 10 F.G. Crompton, *Occupational Mobility and Elementary Education in Nineteenth Century Northamptonshire* (History of Education Society Occasional Publications No. 4, Spring 1979).
- 11 H.C. Barnard, *A Short History of English Education, 1760-1944* (1947).
- 12 The methodology of Census Enumerators' Reports and occupational structure is outlined in R. Lawton, *The Census and Social Structure* (1978).
- 13 *Report Of The Committee of Council For Education, 1840 - 1*, pp. 313-407.
- 14 M. Anderson, *Family Structure in Nineteenth Century Lancashire*, (1971), pp. 32-42.
- 15 *St. Helens Newspaper And Advertiser*, February 3rd 1866, p. 5 col. 5, and December 11 1866, p. 3 col. .
- 16 *Journal of the Statistical Society of London*, Vol. 23 (1860), p. 18.
- 17 E.A. Wrigley, ed., *Nineteenth Century Society. Essays In The Use of Quantitative Methods For The Study Of Social Data* (1977), pp. 82-133; D. Bythel, *The Handloom Weavers* (1969), pp. 47, 57.
- 18 F. McKenna *Victorian Railway Workers* (1976), p. 26 *ff*.
- 19 G.F.R. Spenceley, 'A Rural Industry In Competition With Machinery', *Business History*, Vol. 19 (1977).
- 20 *Liverpool Weekly News*, January 31 1863, 6, col. 8.
- 21 E.J. Hobsbawm, *Labouring men* (1964), p. 276 *ff*.
- 22 *Widnes Guardian*, November 13, 1875, 4, col. 3.
- 23 L. Hollen Lees, *Exiles of Erin* (1979), pp. 93-4.
- 24 L. Haber, *The Chemical Industry in the Nineteenth Century* (1953), pp. 231-247.
- 25 Public Record Office, London, Class ED7/58, Ref X/P 03399. Preliminary Statement for St. Marie's R.C. School, Newtown, November 1861.
- 26 J.A. Werly, 'The Irish in Manchester 1832-1849', *Irish Studies*, 71 (1973).
- 27 Lancashire Record Office, Class RcLv, Visitation Returns for Appleton, Widnes, 1855-65; *The Second Annual Report of the Catholic Poor Schools Committee*, Appendix 'N', p. 145.
- 28 J.R. Hunt, 'The Widnes Local Board of Health, 1865-1892', *THSLC*, 119 (1967).
- 30 *Ibid.*
- 31 *Ibid.* There were only 79 voters in the Parliamentary Election of 1851 in Widnes. Of these only 54 lived in Widnes, the majority of whom were farmers, watch makers and canvas manufacturers.
- 32 Foster, *Class Struggle And The Industrial Revolution* p. 129.
- 33 Peter Mathias, *The First Industrial Nation* (1969), pp. 190-193.
- 34 F. Musgrove *The Migratory Elite* (1963); A.E. Musson 'Class Struggle And The Labour Aristocracy, 1830-1860', *Social History* No. 3 (1976), pp. 335-356.
- 35 The marriage registers for Widnes are available at the Lancashire Record Office.
- 36 The district north of the industrial areas was described as rural up to 1880 as various entries in the Farnworth Girls' School Log Book testify.

- 37 Jocelyn Dunlop and R.D. Denman, *English Apprenticeships and Child Labour* (1911), pp. 94–101.
- 38 *Widnes Weekly News*, October 19, 1878, 3, cols 11–12; October 5, 1878, 8, cols 1–7; *Chemical News* vol. (1872), p. 181 ff. In 1860 there were 9 Science and Art Schools throughout the country. By 1870 there were 800 schools with 35,000 students. Classes in Widnes began in the early 1870's. They were extremely popular and the content of the curriculum was a considerable interest in the town.
- 39 J.P.C. Roach, 'Examinations In Nineteenth Century England', *Paedagogica Europa* (1965), pp. 220–232.
- 40 W.E. Marsden, 'Variations in Educational Provision in Lancashire During the School Board Period', *Journal of Educational Administration and History*, vol. X (1978); R. Lawton and R. Pooley 'Methodological Problems in the Analysis Of Small Area Data' (Social Geography of Nineteenth Century Merseyside Project. Working Paper no. 2, 1973).
- 41 Similar trends were located elsewhere. J. Knight, 'The Occupations of the People', *The British Almanac* (1855), pp. 59–88.
- 42 Gordon W. Roderick and Michael Stephens, *Scientific and Technical Education in Nineteenth Century England* (1972), pp. 99–106.
- 43 Haber, *The Chemical Industry in the Nineteenth Century*; the personal testimonies of the following ex-Chemical workers was obtained by personal interview in the Griffin Inn, Farnworth, in 1980. F. Jolley (1890–1980); J. Cooper, (1902 –). F. Derbyshire, (1913 –) J. Walsh, (1918 –).

