

# The Shadow of the Mills

Working-Class Families in Pittsburgh,

1870–1907 S.J. Kleinberg



**Pittsburgh  
Series in  
Social  
and Labor  
History**





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Working-Class Families

in Pittsburgh, 1870–1907

**S. J. Kleinberg**



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**For  
Nic,  
Kinnie,  
and  
Peter**





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## Preface

Over this manuscript's long gestation period, I have accumulated many debts that it is a pleasure to acknowledge. My overall approach to the subject of class and gender relations has been shaped by the tutelage of Samuel P. Hays and David Montgomery. Their concern about the distribution of power and control in the city and in the workplace pointed my research in the direction it has taken. They encouraged these investigations into the lives of working-class women, the family, the city, and the industrial economy when I was a graduate student and have continued to do so.

Many other scholars have made valuable suggestions and comments upon successive drafts of this manuscript. The late Herbert Gutman, and Tamara Hareven, Joan Scott, John Modell, and Daniel Scott Smith commented upon papers presented at conferences. Milton Cantor, Glen Elder, Jr., Bruce Laurie, Donald Hastings, Claudia Goldin, Richard Jensen, Maris Vinovskis, Peter Williams, Alice Kessler-Harris, Dudley Baines, Nigel Walford, Anne Hockey, Sara Arber, Joan Jensen, Paul Johnson, August Giebelhaus, Howell Harris, and Janet Hunter read all or parts of this work in progress, making much appreciated suggestions. Gerda Lerner's and Joan Scott's encouragement and recommendations have sustained me during the process of turning a dissertation into a book. Daniel Walkowitz made incisive comments upon the penultimate version of this work. Maurine Greenwald's continued interest in the project and

penetrating observations have been invaluable. Colleagues at both the University of Tennessee and the London School of Economics helped to refine and shape the ideas presented in these pages. I have been especially fortunate to benefit from the suggestions of the historical community on both sides of the Atlantic and am immensely grateful to all those who made themselves part of this project through giving their time and ideas.

Historians rely heavily upon libraries for access to their raw materials. The staff of the Pennsylvania Division of the Carnegie Library of Pittsburgh, Frank Zabrosky of the University of Pittsburgh's Archives of Industrial Society, and John Pinfold of the British Library of Political and Economic Science have been immeasurably resourceful in a project that has frequently been conducted long-distance. The computer centers of the University of California, San Diego, and Miami University of Ohio, provided assistance in the initial stages of data processing. The Sociology Department of the University of Surrey, where I enjoyed three years as an honorary visiting research fellow, supplied a stimulating setting as well as access to their mainframe.

The Western Pennsylvania Humane Society, the Pittsburgh Association for the Improvement of the Poor, and the Allegheny, St. Mary's, and South Side cemeteries permitted me to scour their records for useful material and kindly provided me with places to work. Various Pittsburgh and Allegheny County agencies, particularly the Division of Biostatistics and the Marriage License Bureau, allowed me to make time- and space-consuming investigations into their holdings. I am grateful to the staffs of these busy institutions for accommodating me as I worked through their materials.

This work has enjoyed the cooperation, moral support, and editorial suggestions of Jenny Law, Tess Truman, Rosemary Hudson, Helen Denore, and Linda Sampson, who converted mangled, handwritten drafts into neatly typed text. Tracie Dyer, Samantha Lambley, Suzanne Clift, Janet Blythman, and Cathy Monger provided loving care for Kinnie and Peter Kleinberg Flemming at various times, freeing both their parents to work.

Nicholas C. Flemming has sustained this project from its beginnings as a dissertation to its completion as a book. His incisive editorial eye and

scientific precision tightened my prose and focused my arguments. In many ways this work is a product of our time together. It has certainly taken up much of our time and has benefited enormously from Nic's faith in it and his willingness to read draft after draft. Kinnie and Peter Kleinberg Flemming have contributed immeasurably, if intangibly, to this book. Their presence helped sensitize me to the intricacies of family relationships and the family economy. It is thus to my own family, to Nic, Kinnie, and Peter, that I dedicate this book about families in Pittsburgh.





## Introduction

Writing in 1909, the director of the Pittsburgh Survey described Pittsburgh as “not primarily a woman’s town.”<sup>1</sup> Yet without the labor of women, Pittsburgh could not have existed as the leading iron and steel producer in the United States. To be sure, female employment levels were lower in the Steel City than in all other U.S. cities, other centers of heavy industry excepted.<sup>2</sup> No women poured molten metal, but they were as necessary to industry as if they guided the flashing iron bars through the great rolls. Women’s place in Pittsburgh’s main industries was completely peripheral but absolutely vital. Peripheral because, with a few exceptions, they did not hold industrial jobs, and vital because they undertook all the daily work in the home, which enabled men to toil intolerably long hours in the mills. Although economists ignored this work, it underpinned this extreme form of the industrial economy and made it possible to wring every last drop of effort from the millhands.<sup>3</sup>

The separation of home and workplace and a longer working day and working week accompanied industrialization. The family reacted to these dislocations by concentrating domestic responsibilities upon women, freeing men to focus their efforts upon income earning. In Pittsburgh the switch to steel from iron exacerbated this situation in the 1880s as the twelve-hour day replaced the ten-hour one and working every other Sunday became the norm. In such circumstances women’s domestic labors were crucial to family survival. Millworkers could not have en-

dured the grueling work routines demanded of them unless someone cared for all their personal requirements. As either wives or lodging house keepers, women cooked, cleaned, and made homes for the iron- and steelworkers at a time when all those tasks were vastly time-consuming. It was almost inconceivable that a man would be able to work a twelve-hour day and provide his own domestic services or spend much time looking after his children. Thus it can be said that the economy that emerged in Pittsburgh at this time depended as much upon women's labor in the home and total responsibility for looking after the family as upon men's work outside it. This was not, of course, unique to Pittsburgh, but the physically debilitating and dangerous nature of men's work and the lack of nonhousehold employments for women represented an extreme version of the male-as-breadwinner, female-as-domestic-manager dichotomy.<sup>4</sup> It also contributed to a separate and seemingly unequal division of power within the family.<sup>5</sup>

This study examines the development of Pittsburgh, in 1900 the nation's eleventh largest city, and its primary enterprises. It details the consequences of the industrial transformation and rapid urban growth for laboring families' daily lives and life chances. It provides an opportunity to see how gender constraints influenced the inhabitants of heavy industry cities and towns and, conversely, how the industrial structure influenced gender roles. It examines women's response to the urban industrial setting itself, as they attempted to make their homes into comfortable and safe places for their husbands and children. It looks at the family economy, efforts to reform the city, its industry, and family relationships, while at the same time tracing the working-class response to the grand forces affecting the lives of workers and their families.<sup>6</sup>

The issues raised here concern the ways in which industrialization and urbanization changed family life and gender roles. To what extent was the individual affected by the grand forces of the age? What did urbanization, industrialization, migration, and immigration really mean to the people who lived through these processes?<sup>7</sup> These forces were the backdrop to the everyday dramas of proletarian existence. Everywhere one looks in Pittsburgh, the mills forged daily life as well as molten metal. The developments in the economy, the shift from iron to steel production,

and the coming of the white-collar era altered the employment prospects of the men in the mills, their sons, and their daughters. The mills shaped male and female employment patterns, mobility into and within the city, and the home environment. As in other rapidly expanding urban areas, the need for services, particularly sanitation, outstripped the available expertise and political willingness to provide them. The consequences for health were grave indeed.<sup>8</sup> The expansion of steel production lured tens of thousands of people into the city, turning it into a whirling vortex of humanity, frequently ill-housed and poorly served by outmoded physical structures. Rapid population turnover severely stressed the sanitary services and cultural homogeneity of the city, provoking responses from reformers and workers alike. Newcomers suffered great hardship in this period of extreme exploitation, but they also searched for their own solutions to the problems of urban, industrial life. As steel replaced iron as the linchpin of Pittsburgh's economy, longer working days, devaluation of skills, and higher occupational mortality rates affected all phases of the working-class life cycle: the interaction between parents and their children, the life chances of the very young, their education, employment prospects, marital relationships, and the lives of the elderly.<sup>9</sup>

The years between 1870 and 1907 witnessed the shaping of urban industrial life before regulation and reform blunted the rougher edges.<sup>10</sup> This era is vitally important to historians seeking to understand the interaction between industrialization, urbanization, and gender roles since it shows the extent to which previous understandings about gender structured working people's response to new economic modes and residential environments. They are particularly crucial ones in Pittsburgh's history. The city grew rapidly in these years, and the economy began its transition from skill-based to capital-intensive. Massive immigration from Southern and Eastern Europe changed the demographic composition, and the flow of blacks into the city also began in these years.<sup>11</sup> The population thus diversified as the industrial pace quickened.

Epitomizing reformers' concern over the problems of urban industrial society, several Progressive investigations focused on Pittsburgh. Lincoln Steffens condemned its politics as corrupt in *The Shame of the Cities*, first published as a series of articles in the muckraking *McClure's*

*Magazine* in 1902.<sup>12</sup> In 1907–1908 a group of concerned Progressive reformers clustered around *Charities and the Commons* magazine launched a study of the working and living conditions in the Pittsburgh district, by which they meant the city itself, Allegheny City, and neighboring steel mill towns including Homestead. This classic study, the Pittsburgh Survey, shows the concerns of that important group of reformers, while it documents and analyzes life, work, and politics in Pittsburgh at the height of its industrial might. The results of the Pittsburgh Survey were published in six volumes devoted to the steel mills, workplace accidents, industrial households, women’s employments, wage earners, and the politics and infrastructure of the area.<sup>13</sup> The Survey chose Pittsburgh because it was the “capital of a district representative of untrammelled industrial development.” It was not merely a scapegoat city for all the illnesses of that development but also an area that was “rampantly American” and representative of the problems and potentials of urban industrial society.<sup>14</sup> The social workers, academics, and reformers who comprised the Survey team believed it was possible both to measure the social effects of industrialization and to suggest remedies for the ills they believed characterized that society.<sup>15</sup>

Subsequently, Pittsburgh has been the subject of several biographies and specialized studies, as befits its status as a major industrial city.<sup>16</sup> A recent group of books have focused on various aspects of working-class life in the late nineteenth and twentieth centuries. One examined the experiences of groups of migrants to the city after 1900, contrasting the employment, housing, and mobility patterns that developed as blacks, Poles, and Italians adapted to urban life. Another compared working-class standards of living in Pittsburgh with those of workers in heavy industry settings in Britain. A third explored the artisan culture that grew up around the city’s iron mills and was submerged by the industrial shifts accompanying the switch from iron to steel manufacturing.<sup>17</sup> These works either look at the industrial and family economies in the twentieth century, after they had reached their mature form, or neglect women’s work at home and in the labor force by emphasizing the culture of skilled workers and industrial employment. Most of Pittsburgh’s wage workers

were unskilled, and most women performed non-wage labor inside the home after marriage.

The issues of gender, industrialization, and the family economy are intertwined in Pittsburgh in two ways. It has been suggested that women's employment outside the home before and after marriage, especially in large units with other women, determines the degree of equality in family relations and extends women's interests beyond the house and family.<sup>18</sup> In addition, the type of paid wage labor prevalent in a heavy industry setting rested upon certain social and economic assumptions, namely that women would devote themselves exclusively to domestic services for their families while men and older children provided a cash income.<sup>19</sup> Girls and women were expected to serve their families, even if this meant the eldest daughter stayed home from school to watch her younger siblings while her mother did the family wash and baked.<sup>20</sup> Many impoverished new residents carried their assumptions about housework to the new country with them. New World emphasis on the importance of education notwithstanding, they assumed that the daughter's schooling took a back seat to the overall needs of the family. She might be enrolled, but she was kept home on the days when her mother needed an extra pair of hands.

Social engineers responded in these decades to the problems highlighted by the Pittsburgh Survey, condemning the family economy that sacrificed the individual for the group. New methods replaced older, less formal approaches to problem solving, engendering more interference into family relations. This reflected the willingness of many reformers to impose their values and perspectives on the less comfortably circumstanced and those from alien cultures. Such ventures directly affected the women and children of the city, who were more likely to become dependent through the premature death of the breadwinner, nonsupport, and the inability to find steady work in Pittsburgh's narrow economy. The institution of new forms of charity and social services has been amply documented on the national level.<sup>21</sup> These new services impinged upon the family, trying to transmit the values of the dominant cultural group. Municipally funded charity was utterly inadequate in this era; thus self-

help efforts of newcomers existed along with new charities and welfare agencies.

Pittsburgh also illustrates the class-based divergence in women's ability to participate in public affairs, which became more exaggerated as industrialization progressed. Freed from rigid domestic routines by domestic servants and household technology, middle-class women moved into political and social activities outside the home, joining a panoply of clubs, agitating for temperance, civic reform, and suffrage. The arduous nature of proletarian women's domestic tasks meant they remained primarily engaged in the service of their families inside the home.<sup>22</sup> This was particularly the case for the wives of unskilled workers, who lived in the most crowded and least sanitary dwellings. Their men's long working hours, the dirt of the city, and the struggle to make ends meet complicated their housekeeping chores.<sup>23</sup> Because their husbands and boarders worked varying shifts in the mills and they were expected to service their needs, these women had little time to venture outside the home.

As married women and, to a lesser extent, children were excluded from production, they became men's economic dependents. State-mandated school attendance and protective labor legislation, for which Progressive reformers struggled, reinforced this tendency.<sup>24</sup> In Pittsburgh older working-class children joined the labor force in growing numbers throughout this era, but married women remained outside it. Secular changes in the structure of work, middle-class ideologies of domesticity and childhood, and intensified assumptions that men should receive wages sufficient to support their families reinforced married women's exclusion from the economy.<sup>25</sup> In Pittsburgh many women tacitly accepted the domestic and family wage ideologies but still tried to make economic contributions to their families by taking in boarders, bringing money into the household without going outside it.<sup>26</sup> These economic endeavors capitalized on women's domestic abilities but buttressed the separation of spheres of the sexes by, in effect, restricting women to the home.

This book focuses on the private side of industrialization, on how the mills structured the everyday existence of the women, men, and children

who lived in their shadows. The women appear in few historical records. They did not participate in politics; they were too busy making ends meet and meeting their families' needs to join in the club activities of their more affluent sisters. Their lives were, nevertheless, indicative of their times and as affected by Pittsburgh's mighty industries as those of their husbands. In order to understand them, one must look first at men's work, for the family was organized around it and could be destroyed by it, and the children's life chances were powerfully affected by it. Only then is it possible to explore the environment in which the working class lived, their health, and well-being. Families existed in this urban industrial environment, making choices about their children's education and employment within it. They got on with the daily relations between husband and wife while the mills roared around them. Their lives, as they aged, were powerfully affected by the role allocated to them as workers, in the mills and at home.

The organization of the data would have made sense to the people of Pittsburgh—work comes first. Most people migrated to Pittsburgh in search of employment or to join kin who had found jobs there. The population ebbed and flowed in response to business cycles. Once one has examined men's lives at work, the development of the physical world of the working class, and their homes and health, it is then possible to turn to family life: to children's prospects as shaped by class and gender, to gender roles themselves, and to family members' progression through the life course.<sup>27</sup> The proletariat, reformers, and government all perceived industrialization and densely crowded living conditions as engendering problems for the citizens of the Steel City. Although death logically forms the final chapter in the examination of the life course, it is not the last chapter of this book, since one needs to consider the reaction of the family and the community to the problems brought not only by death but also by the adversities of life in the steel mill milieu.

The working class was not passive in response either to death or to the problems of urban life, despite the overwhelming forces at work. They united into trade unions to concentrate their efforts against those of their employers. More significantly for unskilled workers and their families and the new immigrants pouring into Pittsburgh at the turn of the

century, they formed religious, social, benevolent and self-help organizations to provide solidarity, aid, and assistance.<sup>28</sup> The working class turned first to members of their own community both to celebrate the good times and to assuage disaster. When informal familial and neighborly resources proved insufficient, they relied upon their own class and ethnic organizations. Outside agencies, middle-class charities, and city services were the last resort for Pittsburgh's less affluent citizens. Reformers tried to rationalize family relationships, to manipulate them like so much molten metal to be poured into new castings, seeking the same efficiency in charity and welfare as Andrew Carnegie sought in his mills. But the women and men of the industrial districts sought their own solutions to the challenges of life in the industrial city as they molded their family relationships around emerging work patterns and opportunities.

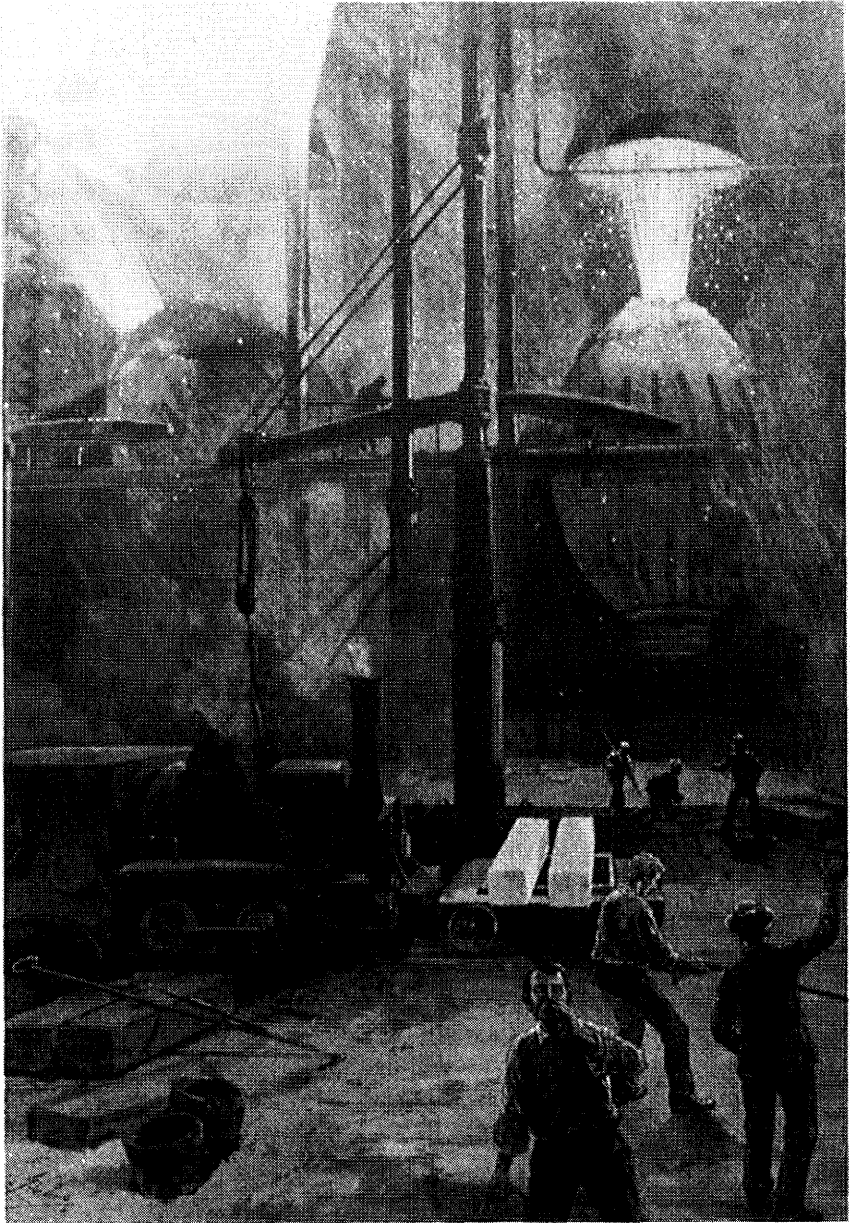
The term *working class*, as used here, denotes all manual workers, regardless of skill level or affluence. The differences between the classes were real, though not entirely financial.<sup>29</sup> A member of the labor aristocracy might earn more than a clerk, but he was subject to much the same working conditions as a laborer. He might die in an industrial accident; he endured the same intolerably long hours and came home as tired. Nevertheless, significant discrepancies existed between skilled and unskilled workers' place in the labor force and their families' prospects. Wherever the data permit, I draw distinctions within the working class, notably in standards of living, role of children in the family economy, and infant mortality. I also refer to widows as a class. Although a few were comfortably situated, most were not. The lack of an adult male breadwinner seriously impaired children's life chances in a city that provided few employment opportunities for women. Not all widows were elderly, but the two groups are treated together because they shared certain characteristics, most notably a high degree of economic marginality and dependency. Because they are less central to this study, I frequently lump the middle and upper classes together. Where they are differentiated, *upper class* refers to professionals and the owners and upper-echelon managers of the means of production, large stores, and banks. *Middle class* refers to petty proprietors and entrepreneurs, lower- and middle-level white-collar workers.<sup>30</sup>

This investigation largely ends in 1907, the year of both the Pittsburgh Survey and the amalgamation of Allegheny City into Pittsburgh. Later data for Pittsburgh, for example in the printed tables of the United States Census from 1910 onward, also included Allegheny City's rather broader economic base. I draw material from the Survey itself, as it describes the culmination of three decades of economic and social upheaval, occasionally moving beyond the geographical boundaries of the Steel City when such information illuminates the lives of iron- and steel-making families. The most notable instance of this is Margaret Byington's investigation for the Survey of Homestead, a small mill town immediately east of Pittsburgh.<sup>31</sup> Homestead was Pittsburgh distilled into its purest form, wholly dependent upon the steel mills for sustenance, a small industrial community with no counterbalance to the might of the Carnegie Steel empire. Byington analyzed the daily lives of millworkers' families, with particular attention to the penetration of the mill into family life and the discrepancies in standard of living between Slavic and English-speaking millworkers. Although outside Pittsburgh's political boundaries, Homestead was a microcosm of the Pittsburgh experience.<sup>32</sup>

My concern in this work is to root the development of family economy into a particular urban industrial setting and to examine how urbanization and industrialization each shaped the lives and living conditions, work, and family and gender relationships of Pittsburgh's working class. The Survey provided a snapshot of Pittsburgh, whereas this study explores the development of class and gender relations as the nature of male and female employments changed and formal institutions emerged to cope with worsening urban conditions. Pittsburgh epitomized heavy industrial settings in the United States with their limited employment opportunities for women and brutal working conditions for men. Its families struggled to make a world for themselves where each member's contribution was vital, but strictly limited by gender.



**The  
Shadow  
of the  
Mills**



**Bessemer Converter at Andrew Carnegie's Pittsburgh Steel Works,  
1886, by Charles Graham for *Harper's Weekly***

### **The Nature of Industry**

Visitors to nineteenth-century Pittsburgh agreed that it looked like “hell with the lid off,” its skies colored by the fire and dust spewing forth from the teeming iron and steel mills.<sup>1</sup> The mills dominated the city and the lives of its inhabitants, reaching into the very households of the working class to structure their daily lives, relations within families, and the life cycles of both males and females. The organization of work and power in the iron and steel industries affected almost every aspect of working-class family life: relations between husbands and wives, the role of women in the family, attitudes toward education, marriage, and widowhood, and the nature and extent of family mobility. The mills molded time and space, family life and leisure. The city’s wealth originated with its industrial might, but in Pittsburgh, as in other mill towns, the “outpourings of smoke and soot suggested the ruthlessness with which great industry consumes the city’s working people,” and the wealth produced by the mills was distributed most unequally between millworker and magnate.<sup>2</sup> This chapter explores the dynamics of the iron and steel industries and the consequences of industrial employment, particularly the high accident rates that characterized the steel industry in this era.

The mill penetrated the household in each phase of the industrial economy as it developed in Pittsburgh between 1870 and 1907. Frequent unemployment engendered insecurity and diminished standards of living.

Rotating shifts disrupted household routines. The lengthening of the working day left men exhausted. Sex-segregated occupational patterns curtailed women's employment outside the home even if they wanted or needed to work. Industrial accidents impoverished working-class families, leaving them dependent upon their respective ethnic communities and external agencies for assistance. At the same time, technological innovations and the shift from iron to steel production devalued the position of many skilled workers, which contributed to the demise of the Amalgamated Association of Iron and Steel Workers (AAISW) in Pittsburgh and increased economic uncertainty for millworkers' families.<sup>3</sup>

The iron industry itself grew gradually in Pittsburgh through mid-century, the first local attempts to manufacture iron occurring in 1792. By 1813, Pittsburgh had a diverse iron industry with a rolling mill, blister steel furnace, iron foundries, and nail factories. Entrepreneurs constructed three or four mills each decade, so that by 1840 there were nine rolling mills, eighteen foundries, many engine factories, and machine shops. Iron manufacturing in Pittsburgh expanded as railroads spread across the United States and the demand for iron surged. Five new rolling mills appeared in the 1850s and ten in the 1860s, by which time subsidiary light industries such as cotton textile manufacturing had disappeared, although the glass industry persisted.<sup>4</sup> Pittsburgh's mastery of heavy industry in the United States intensified during the second half of the nineteenth century, leading the Pennsylvania Bureau of Industrial Statistics to declare that "in steel, as in iron, Pittsburgh is the preponderating manufacturing community of the United States."<sup>5</sup> In 1900, Pittsburgh ranked fifth among U.S. cities in the amount of capital invested in manufacturing, with more than half its assets located in iron and steel production. It produced one-fourth of the nation's iron and steel in its forty-eight mills and nearly three hundred metalworking establishments.<sup>6</sup>

The nature of Pittsburgh's industries structured the sexual composition of its labor force. In both 1870 and 1900 the iron and steel industries employed more than one-third of the male labor force but almost no women. In fact, the entire labor force in Pittsburgh was predominantly

male, unusually so for a large U.S. city. In 1870, 14 percent of Pittsburgh's workers were female; by 1900 this proportion had risen to 18 percent, at a time when women comprised 30 percent of the labor force in other major U.S. cities.<sup>7</sup> The lack of employment opportunities for women in Pittsburgh should be placed in its cultural context, for in other heavy industrial settings women did labor in the metal trades. Thus in Birmingham, England, nearly 20 percent of the women workers toiled in the metal trades compared with less than 1 percent in Pittsburgh. Nearly 25 percent of the metalworkers were female in the English city compared with 1 percent of Pittsburgh's iron- and steelworkers.<sup>8</sup>

The production of iron required a strong, skilled labor force. The first step was to convert iron ore into pig iron in a blast furnace, a huge barrel of masonry and steel plates into which layers of ore, coke, and limestone were loaded from the top, and the resultant molten pig iron tapped from the bottom.<sup>9</sup> Small carts carried the raw materials to the top of the furnace, where laborers known as top fillers dumped the contents into the giant barrel. By 1900 top filling was done automatically in many blast furnaces, eliminating the top fillers' position altogether.<sup>10</sup> After the oxides of iron in the ore reacted with the coke and limestone to form pig iron and slag, men tapped the furnace (let the molten ore out) by drilling partway through the fireclay bung, then hitting it with a metal rod. The pig iron roared out, burning anyone who did not jump quickly, while molders channeled it into forms prepared by pattern makers in the sand in front of the furnace. Manipulating the molten metal was difficult, dangerous work that had to be done with care lest the molds be ruined. Molders and pattern makers needed years of training acquired as helpers or apprentices and were highly skilled workers.<sup>11</sup>

The next stage in iron making was the elimination of carbon impurities from the pig iron. Until the middle of the century, this had been done manually by alternately heating and beating the iron, but three innovations mechanized the procedure. Ironmasters substituted hotter-burning coke for charcoal. Reverberatory furnaces separated the iron from the fire, reducing contamination and permitting the use of the less pure coke. Lastly, iron-bottomed furnaces reduced wastage previously

caused by spilling liquid pig iron. The new fuel and machines put an end to manual purification, increased output, and improved the quality of the iron.<sup>12</sup>

Highly skilled puddlers stirred the molten pig iron through a small opening in the furnace until the impurities separated. John Fitch, author of *The Steel Workers*, likened the process to churning butter from cream.<sup>13</sup> James J. Davis, a former puddler who became Warren Harding's secretary of labor, described the puddler's job as similar to a cook's stirring gravy to keep it from scorching. As the iron solidified, the puddler worked it into flaming balls, which he then pulled through the door. The puddler stood exposed to the furnace's full heat and glare, stirring his iron stew with a rabble weighing twenty-five pounds.<sup>14</sup> The work required skill as well as strength; if the balls were removed too soon, they could not be worked and would need reheating, slowing down production. Nor could the procedure be hurried; iron makers never discovered a way to mechanize the puddler's judgment, and puddling remained an impediment to the rapid manufacture of iron until the adoption of the open hearth for making steel in the 1880s displaced wrought iron in Pittsburgh's economy, a transition completed by 1890.<sup>15</sup>

The next stage of the iron-making process squeezed the remaining impurities from the puddled iron balls. The flattened billets were rolled through a series of muck or roughing rolls, rather like old-fashioned clothes wringers, which flattened them. The resulting muck bars went to a furnace where the heater reheated them so they could be welded together in the finishing rolls. Rolling was the most skilled operation in the mill. Rollers served long apprenticeships learning to guide the iron bars through the rolls without jamming them. They also had significant supervisory posts in the mills, being responsible for the machines and production from furnace to finishing.<sup>16</sup>

Despite technological innovations, iron making remained a skilled trade in which key artisan workers, particularly puddlers and rollers, exercised control over critical processes and trained their own successors. During the years between 1870 and 1907, as steel replaced iron as the basic product of the Pittsburgh mills, the balance shifted from significant worker autonomy in the iron mills to owner control of the steel industry.

Increased mechanization meant fewer skilled workers and apprentices, a relative loss of differentials between the skilled and unskilled, larger mills, and a speeding up of production. It also meant, in many cases, that new methods outmoded the knowledge of older workers, so that one aspect of control in the workplace, the training of new workers, passed to supervisory personnel. Managers pushed men in the less mechanized departments to keep pace with machines elsewhere in the mill, and new devices replaced workers altogether or divided complex, skilled tasks into easy-to-learn unskilled jobs.<sup>17</sup>

The expansion of the railroad network, which led initially to increased use of iron, resulted in a demand for steel as heavier, high-speed trains quickly wore out wrought iron rails. Railroad magnates experimented with steel rails imported from Great Britain, but the adoption of the Bessemer process in the United States in 1865 provided a domestic source of relatively inexpensive steel, most of it produced in Pennsylvania, and much of that in Pittsburgh. A decade after the first steel rails had been rolled in the United States, the railroads used more steel than iron in their tracks, and by 1883 the manufacture of iron rails virtually ceased. Total iron and steel production figures reflected shifting demand, so that by 1892 U.S. mills turned out more steel than iron.<sup>18</sup>

The technology of the steel industry made it more highly integrated than the iron industry had been, with production concentrated in a relatively few large firms. Before 1865 the transformation of iron ore into pig iron and then into wrought iron had been accomplished by separate firms, so that the integration present in steel firms can largely be attributed to the Bessemer process itself.<sup>19</sup> In 1876, Pittsburgh had ten steel works, all larger than its thirty-three iron rolling mills. Over time, the size differential between iron and steel mills grew. Whereas the average blast furnace employed 71 hands in 1869 and 176 in 1899, the typical steel mill employed 119 men in 1869 and 412 in 1899, with the large integrated firms employing many more hands than the smaller individual ones.<sup>20</sup> The extreme integration of the larger works, such as Andrew Carnegie's, contributed to the callous attitude prevalent in the steel industry that workers were merely another factor in the cost of production, to be bought as cheaply as possible. Steel manufacturers did not regard their workers as

individuals, only as anonymous providers of the commodity known as labor. The success of the U.S. steel industry lay in its ability to reduce labor costs, largely through the substitution of machines for men and the elimination of skilled workers, whom the manufacturers perceived as impediments to production and unionized troublemakers.<sup>21</sup>

Of the long list of technological innovations in the steel industry, a few are particularly illustrative of the general trend toward economy of labor cost and the undermining of the position of skilled workers who might hold up production through strikes or restrictive practices. Engineers and new machines operated by interchangeable unskilled workers replaced many skilled and semiskilled workers as first the Bessemer process, then the open-hearth furnace made it possible to fabricate steel directly from pig iron without the intervening step of wrought iron production. The contrast between the two methods of making steel was elaborated in a 1908 book designed to make steel making intelligible to the lay reader. "Instead of the puddler raking for hours his little puddle of iron into a viscous ball, later to soak for days in the charcoal bath to be recarbonized, Bessemer ran tons of molten iron into a great pear-shaped retort and through holes in the bottom air, under pressure, was blown."<sup>22</sup> This air blast burned carbon impurities from tons of iron in about twenty minutes whereas it took a puddler thirty minutes to purify a hundred-weight. The open-hearth furnace, which supplanted the Bessemer converters in the 1880s, was essentially an extremely hot puddling furnace that operated without puddlers. These two innovations rendered puddlers' skills obsolete by the mid-1880s with the result that many puddlers and boilers could not find work in those mills and were forced to take any job, whether skilled or not.<sup>23</sup>

Puddlers and boilers were not the only uprooted workers. The shift from iron to steel nails and the introduction of automatic nail-making machines displaced many nailers and nail feeders. As the production of steel nails rose, so did unemployment and idle mills. The nail trade suffered from a classic "speed up and stretch out" situation as employers forced workers to keep pace with the new machines and to operate more of them. Nailers and nail feeders resorted to wage cutting among themselves to obtain employment, and the nailers' skill became unimportant in the

manufacturing process. Overall, the introduction of machinery dislodged skilled workers in the fabrication of many small hardware items including nuts, bolts, chains, and forgings and resulted in the employment of a few women in some of the fabrication processes.<sup>24</sup>

The introduction of natural gas in the iron and steel industry in the 1880s also resulted in unemployment, this time for unskilled workers. In one Carnegie Steel Company boiler house, a single man tending a gas flame replaced ninety firemen shoveling four hundred tons of coal a day.<sup>25</sup> Whether the particular innovation displaced skilled or unskilled workers, the overall trend was clear to workers and industry analysts alike. In 1885 the iron- and steelworkers' union, the AAISW, protested the inroads steel had made upon iron and urged a return to iron nails in order to reemploy displaced puddlers and boilers. A decade later the Pennsylvania Bureau of Industrial Statistics estimated that one man produced as much iron or steel as six or eight had in 1840, before the use of the new fuels and new machines.<sup>26</sup> The overall effect of this shift was to introduce more instability into working-class life as workers and their families moved in search of work.

Another factor contributed to the increased output per hand in the steel mills: the hours of labor actually rose at the end of the century. Most iron- and steelworkers toiled ten hours a day in the 1870s for an average working week of sixty hours. The iron furnaces of the 1870s did not run continuously, and custom fixed daily output at five or six heats (about ten hours) per day, so that puddlers fired their furnaces early in the morning, made their heats, and went home after a long, but not shattering day's work. The lengthening of the work day occurred with the shift to direct steel production. The steel mills could not be shut down easily, for the large furnaces cracked unless kept hot, even if idle. In 1879 this led steel magnates to employ three eight-hour shifts, since "it was entirely out of the question to expect human flesh and blood to labor incessantly for twelve hours." Captain William R. Jones's statement notwithstanding, most Carnegie plants turned to a twelve-hour day in the 1880s as further mechanization somewhat reduced the physical effort required of the workers. Hands then labored eleven hours a day on the day shift (or turn) and thirteen hours on the night turn, or seventy-two to eighty-nine hours a

week. The longer working day remained standard through the first decades of the twentieth century until a coalition of church members and reformers successfully pressed for its abolition in 1923.<sup>27</sup>

Steelworkers in the 1890s endured longer working weeks as well as longer working days than had ironworkers earlier in the century. Although a seven-day week had been the norm in 1870, the Amalgamated successfully fought in the mid-1880s to eliminate Sunday work. Following the Homestead Strike in 1892, employers reinstated Sunday work, so that most men labored twelve hours a day, six or seven days a week. The hands alternated day and night shifts biweekly, the switch occurring on Sunday night as men from the day turn stayed on through the night, laboring twenty-four hours without respite. A character in Thomas Bell's novel of life among the steelworkers, *Out Of This Furnace*, said of this shift, "At three o'clock in the morning of a long turn, a man could die without knowing it."<sup>28</sup>

Most workers reacted negatively to the longer working day and the long turn, which left them too exhausted to enjoy their nonworking hours and disrupted their family life. Many wrote to the Bureau of Industrial Statistics to support a return to the eight-hour day. Jim Barr typified the hands in this regard. A skilled worker with a comfortable home, he believed: "I've got as good a home here as a man could want. It's comfortable and I enjoy my family. But I only have these things to think about. I'm at work most of the day, and I'm so tired at night that I just go to bed as soon as I've eaten supper. I have ideas of what a home ought to be, all right, but the way things are now I just eat and sleep here." Home was food, bed, and a family seen in passing for Barr and countless others.<sup>29</sup> They had little time with their children and wives because they spent so much time in the mills. Longer hours of labor burdened wives, whose husbands were too exhausted to do much at home, leaving the women most of the work and responsibility for running the home. This form of industrialization removed men from their families and reinforced gender role distinctions.

Shift and Sunday work complicated family life and made domestic arrangements more difficult. It fell to the wives to keep the children quiet so that men could sleep during the day, to organize their household

routines around the men's schedules so that their needs for food and sleep could be met in the crowded homes. With the men gone twelve hours a day and too tired to do more than eat and fall into bed, the mill reached into the household to determine the activities of all its members and deprived women and children of whatever household and child care duties the men might have performed had they not been so tired. The mills thus made their contribution to emerging gender roles in which a man's main contribution to the household was his wages rather than his presence, the passing on of skills to his sons, or participation in the daily events of family life.<sup>30</sup>

The various technological innovations that were responsible for the longer hours of labor also contributed to the decline of the AAISW in the Pittsburgh district, although unstable economic conditions and the desire of the employers to break the unions also played critical roles. The Amalgamated enrolled approximately two-thirds of the eligible skilled workers at its peak, but it excluded the laborers, who comprised a growing proportion of the industry. The union concerned itself chiefly with wages and struck repeatedly to force manufacturers to sign the scale of wages it set. Most strikes lasted a matter of weeks, but some dragged on for months, depleting the union treasury and workers' resources.<sup>31</sup>

Large numbers of nonunion men in many mills limited the effectiveness of the Amalgamated's strikes. When some AAISW members walked out over the number of heats per day in 1878, its *Journal of Proceedings* stated that the unorganized hands manifested no interest in the question but continued to work and thus broke the strike. According to the Bureau of Industrial Statistics, the iron and steel mill strikes had been unsuccessful more often than not in the years preceding the debacle at Homestead in 1892. In that strike skilled and unskilled, union and non-union men banded together but lost in the face of the force exerted by the Carnegie Steel Company's hired Pinkertons.<sup>32</sup> Previously union membership ebbed and flowed with the business cycle. Membership stood at 16,000 in 1882 but fell to 6,000 in 1885, a reflection of unemployment and reverses suffered in strikes during the depression. It peaked at 24,000 in 1892 and plummeted after the Homestead Strike failed, leaving former AAISW members in Pittsburgh with no organization to turn to in hard

times and, as I shall show in the last chapter, enhancing their dependence upon private and public welfare agencies.<sup>33</sup>

At the end of the nineteenth century, technological innovations and cost-conscious capitalists converted iron and steel making from a highly skilled, unionized craft into an enormous industrial enterprise with large numbers of unskilled, unorganized laborers. The general skill structure of Pittsburgh's labor force mirrored these industrial transformations (see table 1) as the proportion of unskilled workers rose from 37 percent in 1870 to 41 percent in 1900, while that of skilled workers dropped sharply from 45 percent to 36 percent. During the same interval the proportion of white-collar workers in the labor force climbed from 18 to 23 percent, a reflection of the increased paperwork and professionalization that accompanied urban industrial life at the turn of the century.

### **Ethnic Composition of the Labor Force**

As the city's labor force became more sharply differentiated by status at the end of the nineteenth century, so did the ethnic composition of the population. Southern and Eastern European immigrants poured into the United States at this time; many of them sought employment in the mills and mines of the Keystone State, in the anthracite region of Eastern Pennsylvania and the bituminous fields at the western end of the state. The expanding steel mills of Pittsburgh, Homestead, and numerous towns up and down the Monongahela and Allegheny rivers attracted a new work force searching for greater economic rewards than their home fields could offer. For many, money compensated for the dreary brownish-red pall hanging over the mills and the fire shooting from the furnaces that disturbed the night sky and blotted out the stars. The new immigrants took their places at the bottom of the economic hierarchy. Relatives and former neighbors from the old country used their toeholds in the mills and construction gangs to get work for their landsmen.<sup>34</sup>

By the beginning of the new century, the older ethnic groups had largely been assimilated. Though native-born white men continued to occupy most of the white-collar positions, both the British and the Irish had moved into clerical and professional employments and away from

Table 1. Occupational Level of Male Workers  
(In Percentages)

	Unskilled <sup>a</sup>	Skilled <sup>b</sup>	White-collar <sup>c</sup>	N
1870	37	45	18	25,606
1900	41	36	23	107,902

Sources: U.S. Census, Ninth Census, 1870, vol. 1 *Population*, pt. 1, p. 795; U.S. Census, Twelfth Census, 1900, vol. 2, *Population*, pt. 2, pp. 582–85.

a. Unskilled includes laborers, gardeners, domestic servants, launderers, soldiers, operatives, and other unskilled workers. Where unskilled and white collar were grouped together in the 1870 census, as in hotel and restaurant owners and employees, the categories were separated using the proportions given in the 1900 census as guidelines.

b. Skilled includes craft occupations specified in the “Manufacturing” category of the census but omits occupations requiring little or no training. The largest category, iron- and steelworkers, was included as skilled since “in manufacturing districts unskilled workmen are often reported simply as ‘laborers’” rather than as, say, iron- or steelworkers.

c. It was assumed that in the domestic and personal service and manufacturing categories, the unitemized workers were unskilled and skilled workers, respectively. White-collar workers were taken as the residual labor force after the unskilled and skilled positions were itemized.

unskilled labor (see table 2). The newest migrants into Pittsburgh, blacks and Southern and Eastern Europeans, were concentrated in laboring positions with little white-collar or professional employment among them. German immigrants also moved into white-collar work, but not proportionately to their numbers in the populations, which may be partially explained by the census practice of designating some Slavic immigrants, notably those from “German Poland,” as Germans rather than Poles. As a result those people listed as German in the census show a bifurcated pattern with, presumably, the older German-speaking immigrants moving into the nonmanual positions and the newer, Polish-speaking ones taking jobs in the steel mills.<sup>35</sup>

As Pittsburgh's major employers, the mills reflected the city's diverse population, though not completely, for some migrant groups opted out of the mills while others were not permitted into them. At the beginning of this period, 1870, the mills and laboring population of the city (since unskilled millworkers were usually designated as laborers in

Table 2. Ethnic Composition of the Male Labor Force  
(In Percentages)

	Laborers		Iron & Steel		Clerks		Professional		Total Labor Force	
	1870	1900	1870	1900	1870	1900	1870	1900	1870	1900
<i>N</i>	5,533	23,430	2,542	9,646	1,547	5,824	793	4,429	25,772	107,902
Native-born white	23	11	50	16	83	52	74	54	51	26
British	5	6	20	13	2	10	5	10	7	9
Irish	49	22	21	21	7	18	9	12	23	18
German	20	17	8	22	7	15	8	14	16	21
Black	NA <sup>a</sup>	12	NA	4	NA	1	NA	2	NA	7
S. & E. European	—	30	—	20	—	2	—	4	—	15
Other <sup>b</sup>	3	2	1	4	1	2	4	4	3	4
Total	100	100	100	100	100	100	100	100	100	100

Sources: U.S. Census, Ninth Census, 1870, vol. 1, *Population*, pt. 1, p. 795; U.S. Census, Twelfth Census, 1900, vol. 2, *Population*, pt. 2, pp. 582-85.

a. Not available, as the 1870 Census did not separate native blacks and whites.

b. Northern European, Canadian, and unknown.

the census, rather than by industry) reflected the older immigration pattern. In that year, nearly one-half Pittsburgh's laborers had been born in Ireland, the rest came equally from Germany and the United States, and a few came from Great Britain and other Northern European nations. The iron- and steelworkers listed in the census were mainly semiskilled and skilled workmen; one-half were U.S. born, Great Britain and Ireland each contributed one-fifth, and the rest were of German or Northern European origin. As a group they probably would have agreed with the poem published in the *Irish Pennsylvanian*, "The Dignity of Labor," that their trade gave them status as well as a living, for even the unskilled among them could aspire to advance within the mill.

The master of a trade may proudly sing:  
 "I am a power on earth, and may earn  
 the right to call myself a man. I turn  
 The wheel of progress, and I feel a king  
 Among the useless drones. The shame and sting  
 of charity I know not for I learn  
 to use my gifts. The highest plane I yearn  
 To reach, to merit all that life may bring."<sup>36</sup>

The steel industry into which the new immigrants moved at the turn of the century differed greatly from the iron and steel industry prior to 1870. It had no place for skills acquired through long years of assisting older workers. By the time of the Pittsburgh Survey in 1907, nearly three-quarters of the hands working in the steel industry were unskilled or semiskilled. The decline in status coincided with a shift in ethnic composition of the mill labor force. The proportion of native-born whites in the mills decreased dramatically; it was one-third what it had been in 1870, and the proportion of native-born whites and Irish doing laboring jobs dropped by half. Although the Irish continued to hold skilled and supervisory jobs in the mills, these were increasingly as foremen rather than as the puddlers, heaters, and rollers of the earlier period. John Fitch, who visited every mill in the Pittsburgh district for the Survey, wrote that it was surprising to see a (white) American, German, or Irishman among the unskilled millworkers. He also said that he knew of no Slavic men

working as rollers or heaters; in other words, none held skilled positions in the steel works.<sup>37</sup>

Polish immigrants to Pittsburgh at the turn of the century moved into the mills in large numbers, assisted by relatives and fellow countrymen to find work in the labor gangs. They toiled with their kin and friends within the steel works, serving what amounted to an ethnic apprenticeship that helped acculturate them into the industrial world. Bodnar, Simon, and Weber's study of Italians, Poles, and blacks in twentieth-century Pittsburgh demonstrates the way in which the lack of opportunity for advancement within the mills impeded Polish upward mobility. They found that as many as "two-thirds of Pittsburgh's Poles" became millhands and thus had little chance to move up the hierarchy. In 1905, Polish and Italian men experienced roughly the same lack of mobility, 76 percent of the Poles and 78 percent of the Italians holding the same level of job as they had in 1900. But by 1910 the Italians, who eschewed the mills in favor of construction jobs and petty entrepreneurship, began to pull ahead; only 62 percent had the same level of job as in 1900, compared with 71 percent of the Poles.<sup>38</sup>

Though some of those Poles who stayed on in the mills eventually achieved upward mobility through longevity in the workplace, mill owners at the turn of the century assumed that ethnic segregation in the mills was "quite natural." One steel company official justified this opinion by saying that the skilled men were the ones from whose ranks foremen were chosen, that they needed to know English and be literate, which many of the new immigrants were not. In 1899 more than one-fifth the immigrants to the United States were illiterate and the proportion was much higher among Southern and Eastern Europeans. The mill official believed that this group had no "stake in the country" and did not expect to remain in the United States. He predicted that those who did stay and sent their children to the public schools would "in the second and third generation, be absorbed into the general mass of 'Americans' whose progress in the steel industry or any other will depend solely on individual fitness and adaptability." Though this prediction was not wholly accurate, either as to the assimilative power of education or as to the disappearance of ethnic prejudice, it also ignored the changing structure of employment within the

iron and steel industry, which constricted opportunity altogether at the skilled level.<sup>39</sup>

Recent immigrants found it to their advantage in obtaining employment to look as "American" as possible. As soon as one got to Pittsburgh, his relatives spent \$15 to buy him American style clothes. According to John Kaczyski, a retired millworker, straw bosses handpicked the crews each morning from men lined up outside the mill gate and often turned away more than they hired for the day. In this man's recollection, those who worked regularly were the ones who slipped the straw boss a dollar on payday. But even the Slavs' position at the bottom of the mill hierarchy could be insecure. During the depressed years of 1907 and 1908, foremen and superintendents gave out-of-work English-speaking skilled workers the unskilled jobs previously held by Southern and Eastern Europeans, displacing the new hands until, with better times, the skilled men went back to their higher-paying, higher-status employment.<sup>40</sup>

The mills may have been open to the new immigrants depending upon the business cycle, but blacks migrating to Pittsburgh at this time found them less hospitable. In the 1880s a few black men managed to cross the color line into the mills but were never able to consolidate their position. By 1900, when blacks comprised 7 percent of the labor force and 12 percent of the laborers, they were less than 4 percent of the iron- and steelworkers. Most black steelworkers migrated to Pittsburgh in search of work, getting into the mills by dint of their own efforts, rather than through the assistance of friends or relatives. A large number of them worked at just one plant, the Clark Mills. Blacks comprised a greater percentage of the labor force in the Pittsburgh mills than they did in some of the surrounding towns. In Homestead, where only 2 percent of the millworkers in 1907 were black, some managed to move up the mill hierarchy. Of Homestead's labor force, 2 percent were black, but 17 percent of those had skilled jobs. By contrast, only 2 percent of the Slavic hands at the Homestead works in 1907 had skilled jobs, though 35 percent of the English-speaking Europeans and 40 percent of the native-born whites had advanced up the skill ladder. The experience of blacks in Homestead paralleled that of Pittsburgh blacks, with some of the men

who had been at the Clark Mills for a number of years managing to work their way up from the ranks of the unskilled. Three actually became rollers, the most skilled and highly paid job in the mills.<sup>41</sup> These limited successes notwithstanding, blacks remained a tiny fraction of the mill labor force. One man, who arrived in 1906, summed up the situation nineteen years later by saying that “all the best jobs were for the white men. Plenty of hard work here but there is no chance to get anywhere. Colored men work at the same jobs from year to year while white men and foreigners are promoted in 2 or 3 months after coming here.”<sup>42</sup>

Blacks encountered hostility from white foremen, who did much of the hiring in the mills, from their co-workers, and from the unions. Although tradition had it that blacks entered the mills first as strikebreakers, as they did at the Clark Mills in 1883, some belonged to unions.<sup>43</sup> The black hands at the Black Diamond Mill, who may have gotten their jobs there originally in the wake of a strike in 1878, organized themselves as Garfield Lodge No. 92, Colored, of the AAISW in 1882. They stood fast with the union in refusing to “learn green hands,” or train inexperienced, nonunion men. As a result, two Garfield Lodge members were fired and had trouble finding work in other mills, which demonstrates both their solidarity and the precarious nature of their situation within the steel industry. Their presence within the union and the mill itself was by no means universally accepted. The union from which the Amalgamated was formed, the Sons of Vulcan, limited membership to whites only. In 1885, however, the annual meeting of the AAISW rejected a proposal that “no colored person of any trade or occupation be eligible to hold membership.” Some delegates termed the attempt to insert the words *white male persons* into the constitution absurd and ridiculous. Still, J. H. Carter and other black union members complained of ill-treatment from white co-unionists in various mills in the Pittsburgh district. By the beginning of the new century, black steelworkers believed that white union members would not protect them in controversies with the mill owners, nor were whites willing to admit them to the union on an equal basis. So despite some occupational mobility within the mills, blacks never became a significant proportion of the mill work force, for racial prejudice led foremen to rely upon informal communication among the Slavic immi-

grants to provide the fluctuating supply of inexpensive labor they required.<sup>44</sup>

### **Wages, Working Conditions, and Unemployment**

The old immigrant groups, concentrated as they were in the skilled positions in the mills, enjoyed a considerably higher standard of living than the new immigrants or most blacks in the mills. Great disparities existed between the wages of the most and least skilled workers in the iron and steel industry of the 1870s, those of the labor aristocracy averaging many times those of common laborers. Rollers, the most highly skilled workers, had the fattest pay packets, which made them, according to Jesse Robinson, an early historian of the Amalgamated, "the highest-priced workmen, naturally the object of envy of other workmen." With steady employment, assuming thirty weeks of work in depression years and fifty weeks during good times, rollers might earn as much as \$1,200 to \$2,000 per year; puddlers and other skilled workers averaged between \$600 and \$1,000 and semiskilled hands between \$400 and \$750, but laborers made as little as \$300 to \$550 per year. To relate this to other occupations, the aristocracy of labor earned more than lower-echelon white-collar workers, skilled workers about the same, and the semiskilled and unskilled considerably less.<sup>45</sup> Skilled workers could afford to send their children to high school, to buy homes, and to purchase some of the new labor-saving devices for their wives. Unskilled workers depended upon the labor of their children and the boarders their wives took in to make ends meet.

By the end of this era, mill owners narrowed the differential between the wages of the skilled and unskilled as technological innovations and the defeat of the Amalgamated during the Homestead Strike undermined the position of the skilled workers. Although overall wage rates remained fairly stable in the years between 1880 and 1907, manufacturers cut the amounts paid to rollers and heaters while actually increasing the remuneration of laborers from \$0.14 to \$0.15 or \$0.16 an hour. As the new machines increased output, employers lowered the tonnage rates paid to skilled men, effectively reducing their income despite rising productivity and profits. The beginnings of this tendency can be seen in an action taken