Environment and Planning A 1998, volume 30, pages 1743 – 1756

The German-American pharmaceutical business establishment in the New York metropolitan region

Y Schreuder
Department of Geography, University of Delaware, Newark, DE 19716, USA;
e-mail: YDAS@udel.edu
Received 24 April 1997; in revised form 20 February 1998

Abstract. Between World War 1 and World War 2, the New York metropolitan region became the main region for the production of organic synthetic pharmaceuticals in the United States. The leaders in this area of specialization were subsidiaries of foreign—mostly German—companies which had established distribution networks in the 19th century and had begun manufacturing pharmaceuticals in the region at the turn of the century. By looking back to the mid-19th century, the author analyzes the relationships between the German professional and business immigrant community in New York (among them the Forty-Eighters), the development of the New York hinterland, and the success of the German-American pharmaceutical business establishment, in an effort to discern one possible explanation of the concentration of the pharmaceutical industry in New York metropolitan region.

Introduction

In 1960 the *New York State Commerce Review* touted that drug manufacturing was one of the leading industries in the New York metropolitan region (Department of Commerce, 1960). The Census of Manufactures had shown that almost 24% of the industry's value added was derived from production in New York State and that the second-ranked state, New Jersey, accounted for 14% (almost all of the production being concentrated in northern New Jersey). Combined, the larger metropolitan region of New York and northern New Jersey accounted for 38%. The industry had specialized in the production of organic synthetic pharmaceuticals (among them antibiotic preparations) which had become the main branch of the industry in the 20th century. Today, the headquarters and research and development facilities of ten of the world's largest pharmaceutical companies are located here along with research facilities of other major firms. Many of the pharmaceutical companies in the region date back to the 19th century and had their origins in the wholesale trade. Several of the major firms are of foreign origin, such as Bayer and Merck, or Hoffmann la Roche and Ciba Geigy, who all established manufacturing plants in the region sometime around the turn of the century. This begs the question of why the industry is so heavily concentrated in the area and what the historical-geographic circumstances were that anchored the industry in the region. As Lichtenberg (1960, page 40) noted, the industry could be labeled 'footloose' as its location is not a result of proximity either to raw materials or to the market, but rather is a result of a set of historical circumstances that committed the industry to the region. So, what were these historical circumstances?

Industrial location, international trade, and the immigrant community

In traditional industrial location theory we focus our attention on agglomeration effects of economics of scale and scope and explain the concentration or clustering of industries in specific locations from a perspective of specialized labor pools, external economies derived from proximity to firms in the same industry, and the availability of specialized inputs and services (Hoover, 1948; Isard, 1971; Marshall, 1920). Wholesale trade and transportation networks play an important role in explaining the origins and

development of industrial concentrations (Conzen, 1977; Ettlinger, 1991; Glasmeier, 1990; Meyer, 1980; Muller, 1977; Pred, 1965; 1966; 1977; Vance, 1970; Ward, 1971), and from an historical-geographic perspective the development of urban systems or metropolitan urban networks is important in industrial agglomeration formation. In essence, gateway or port cities were the centers where wholesale trade and later industrial development took place. Interior market centers, linked with gateway or port cities via transportation networks, developed as part of an urban system, and distribution channels subsequently evolved through banking and merchant networks. By linking business distribution strategies with the geography of metropolitan urban network development, a dynamic model of industrial agglomeration emerges.

Krugman in *Geography and Trade* (1991) recognized that space matters in regional economic and industrial development; however, he repeatedly states that the origins of particular industrial clusters are historical accidents (chapter 2). What I hope to demonstrate in this paper is that industrial clusters are not always accidental and, in fact, can be understood if we comprehend the nature of international or wholesale trade and if we recognize that long-distance trade is channeled through particular communities. In the late 19th and early 20th centuries the immigrant communities in port cities and in other gateway cities served such a role. In the business world, trust and familiarity are important considerations and business people, such as wholesale merchants, count on family and ethnic networks to conduct their business. This was particularly important at a time when there was a limited financial infrastructure in place and when credit had to be provided to customers who had to be relied on and counted on to repay. Under these circumstances, kin and ethnic connections are essential factors in business enterprise (Porter and Livesay, 1971). In this respect, one could argue that the immigrant community formed a component link in the development of entrepreneurship in the United States.

Both Pred (1965; 1966) and Vance (1970) note the fact that the most pronounced wholesale and industrial growth occurred in the most important metropolitan areas which were at the same time the most established commercial centers (foremost among them the New York metropolitan region), but neither recognize that immigrants may have played a crucial role in particular wholesale networks or in the development of specific industrial clusters. Ward—in *Cities and Immigrants* (1971)—notes that particular immigrant groups cluster in particular urban centers where they establish economic niches, but he does not explicitly tie the immigrant community and the emerging metropolitan system to wholesale trade and industrial formation. Meyer (1980), in his theoretical model of the integration of frontier urban places, refers to the importance of face-to-face contacts in control of exchange and physical movements of trade goods; however, few examples are given that illustrate the point. Ettlinger (1991, page 394) is more specific and mentions immigrants (transplanted northeastern professionals and entrepreneurs) in the early development of California.

In this paper I will consider the role of the German immigrant community in the development of the pharmaceutical industry in the New York metropolitan region. The link with Germany originated through the import wholesale trade that preceded the manufacturing of pharmaceuticals by German and some Swiss-owned companies in the New York region. I intend to offer a somewhat different perspective on the emergence and development of industrial concentrations or agglomerations in the United States and present the immigrant as an active entrepreneurial agent in historically developed industrial districts. The hypothesis presented here suggests that the German immigrant communities established in the 19th century in major gateway cities such as New York, Cincinnati, Chicago, and St Louis, provided the trade networks through which wholesale entrepreneurs and sales agents of major German pharmaceutical companies

marketed their products. When as a result of changing US tariff policies in the late 19th century profitable trade was threatened, the same foreign (that is, German) companies began to manufacture their wares in the New York metropolitan region.

Research on immigrant entrepreneurship in the transformation of the US beer-brewing industry because of the German influence that followed mass immigration from Germany in the 19th century, is well known (Baron, 1962, pages 175 – 190; Downard, 1973). Less well known is the role the immigrant community played in the transformation of the US chemical and allied pharmaceutical industry although the German scientific influence on the industry is widely recognized (Beer, 1959; Haynes, 1945; 1954). Research on German immigrant entrepreneurship in Latin America is better documented (Luebke, 1990, chapters 6 and 7; Newton, 1976). In Brazil German entrepreneurs dominated the trade in and production of beer, furniture, tobacco, machinery, and soap (Luebke, 1990, page 103). In Argentina German merchants controlled the export trade in hides, wool, and wheat and were found in banking, shipping, and as agents of major German industrial firms, in particular in machinery. At the same time, German-owned textile and leather-tanning firms spun off from trade and established factories in Argentina (Newton, 1976, chapter 1). The German commercial and industrial hegemony in Latin America ended with World War 1, and thereafter US companies moved in to fill the vacuum left by German companies.

In the United States, few urban centers developed a socioeconomic structure where Germans dominated trade and industry. Milwaukee and Cincinnati, with approximately one third and one quarter of the population of German origin at the time of the Civil War, were two of the few exceptions (Conzen, 1976; Downard, 1973). Here, German immigrant communities formed ethnic enclaves and managed a rather independent social and economic existence. As part of this they developed their own industries. For the most part, German immigrants, like other European immigrant groups, dispersed and were absorbed into the rapidly expanding US economy. In New York City, however, unique opportunities offered themselves to the German immigrant community. In 'Klein Deutschland' at the end of the 19th century, as described by Nadel (1990, pages 62 – 87)—similar to the situation in Buenos Aires, Argentina—German-American businesses were developed out of commercial ties with Germany rather than in direct relationship to the local economy. New York City was the major port of entry for European goods into the United States and thus attracted the interest of the export-oriented industrial firms of Germany who sent agents to New York to market their wares. Through the networks of contact that existed among the various German-American immigrant communities in the Northeast and the emerging hinterland of the Midwest, trade subsequently offered great opportunities for profit. As Kabisch in *Deutsches Kapital in den USA* (1982) illustrates, New York, New Jersey, and Connecticut (together considered to be the New York metropolitan region) played the leading role in this development. At the time of World War 1, 75% of the 336 German firms with direct business investments in the United States were located in the New York metropolitan area. The firms included both wholesale and manufacturing companies. In the pharmaceutical industry both the wholesale trade and manufacturing was focused on New York City.

The German immigrant community in New York City

German immigration to the United States was particularly significant during the period when New York City established its hegemony in transatlantic trade and in the 'hinterland' of the Midwest (Albion, 1939). The first large group of immigrants from Germany arrived after the Revolution of 1848, when a significant number of educated and skilled workers settled in New York City (Ernst, 1949; Faust, 1927; Nadel, 1990). In the century

before World War 1 over 5300 000 German immigrants came to the United States. In 1850 the German immigrant population constituted nearly 26% of the foreign-born population in the United States and in 1860 it was over 31%. German immigrants were found throughout the Eastern Seaboard with significant concentrations in Philadelphia, Baltimore, and New York City. In addition, German immigration inland concentrated in the Midwest which was in the path of the emerging hinterland of New York City. At the end of the 1850s the German population of New York City was estimated at 100 000 with 20 churches, 50 schools, 10 bookstores, 5 printing establishments, and numerous drugstores and apothecaries, besides grocery and butchery stores and bakeries (Wittke, 1939, page 198).

Ernst, in *Immigrant Life in New York City, 1825–1863* (1949), gives us a good idea of how German immigrants established a foothold in the 1850s. As the second largest immigrant group, following the Irish immigrants in number, the German immigrants in 1855 concentrated in 'Klein Deutschland' on the Lower Eastside of Manhattan. Across the East River they concentrated in Williamsburg which later became part of Brooklyn, and across the Hudson they settled in Jersey City and Hoboken. German immigrants engaged in many of the same occupations as other immigrants; however, they were proportionally overrepresented in trade, business, and the professions. For instance, German bakers were more than twice as numerous as Irish bakers in 1855, and brewing became a typical German enterprise. Importers, wholesalers, financiers, agents, and salesmen were initially few in number but through the emerging German retail businesses and the growing German resident population, a link with import trade was soon established. The German merchants, mostly from the Rhineland and northern Germany, were aided in their mercantile pursuits by the presence of a mostly German-speaking Jewish mercantile community that had established itself in New York City and surrounding areas in the early 19th century. In addition, brokers such as Schulz and Bleidorn, G Sonne, and Phillipp Speyer, in business in New York since the 1830s, served to help finance transatlantic trade through remittances, and arranged transportation to and from European port cities (Ernst, 1949, pages 93–96; Lemke, 1891). In the professions German immigrants predominated over other immigrant groups. Many members of the professional class were refugees from the political turmoil of Europe, especially the revolutions of 1830 and 1848. Among them were lawyers, physicians, pharmacists, engineers, architects, musicians, artists, and scholars (Ernst, 1949, pages 96–98).

Kremers and Urdang, in *History of Pharmacy* (1940, page 183) mention that in the German principality of Baden, 30 physicians and 20 apothecaries had left after the defeat of the 1848 uprising. Most of them went to New York, the main port of arrival for German immigrants from that era. Not only New York City, but also Cincinnati and St Louis received many German immigrants at this time. Of the 47 retail drug stores and the 10 wholesale establishments which existed in St Louis in 1852, 24 retail drug stores and 2 wholesale establishments were owned by German immigrants. Cincinnati and Milwaukee too had a large number of pharmacists and apothecaries among the Forty-Eighters. The City of New York counted 273 retail drugstores and 51 wholesale drug companies in 1852 many of which were owned by German immigrants. In fact, the *Deutsche Apotheke* was in evidence everywhere and German pharmacists arriving later had no difficulty in finding employment. In the decade before the Civil War there was reputedly a German pharmacy for every 50 families (Wittke, 1939, page 388). From this it seems reasonable to conclude that the German apothecaries and drug merchants had a significant influence on the US pharmaceutical trade in the second half of the 19th century.

The German pharmaceutical community

Although the German influence is widely recognized in the development of the US pharmaceutical industry in the 20th century (in particular in the period after World War 1), the reputation for scientific training and professional standards among the German apothecaries in New York City was widely recognized even in the 19th century. US-born pharmacists often aspired to an apprenticeship with a German pharmacist who had been educated at a German university. In order to do this it was necessary to learn German first; however, the payoff for this effort was the promise that one would be accepted everywhere as a competent pharmacist. In order to promote scientific and professional standards the German pharmacists in New York founded the New Yorker Pharmazeutischer Leseverein which changed its name to Deutsche Pharmazeutischer Verein six months later (Kremers and Urdang, 1940, page 184; Ramsberger, 1896; Ruprecht, 1876; Schleussner and Lehman, 1926; Wankmuller and Cowen, 1980). The original purpose of the organization was to share subscription fees to pharmaceutical and scientific periodicals and to have the journals circulate among the membership. In 1852 the organization established a committee to prepare a pharmaceutical manual (*Formulary*) that would standardize the preparations of drugs. The manual appeared in 1858 under the title: *Manual des New Yorker Deutschen Pharmazeutischen Vereins*, written in Latin with annotations in German. A year later the editor of *Druggist Circular* obtained the rights to publish an English-language version of the manual. The organization also published a price list for prescriptions in order to diminish competition between its members. The group imposed on its members stringent regulations as to the training of apprentices and made the examination of apprentices obligatory in 1857 (Wankmuller and Cowen, 1980, pages 4–5). At that time the Society rented its meeting place in Ludlow Street where the Society's Library was established and a scientific collection was begun.

For some time in the late 1850s the Deutsche Pharmazeutischer Verein replaced the New York College of Pharmacy as the main institution granting certificates of proficiency in pharmaceutical training (Kremers and Urdang, 1940, page 185; Wankmuller and Cowen, 1980). Many German pharmacists had a fundamental training in chemistry and some—like Johann Michael Maisch—became professors at the New York College of Pharmacy in 1861 to help revive the College (Wittke, 1939, pages 387–388). Maisch became the supervisor of the Army Medical Laboratory in 1863 and later became the general secretary of the American Pharmaceutical Association. Similar developments took place in the medical profession. Many members of the Society of German Physicians of New York were Forty-Eighters who were well known in their profession (Wittke, 1939, page 387). The obvious relationship between physicians and pharmacists contributed to the force of institution building that so much characterized the German pharmaceutical and immigrant community in the second half of the 19th century. In 1864 the Deutsche Pharmazeutische Verein became the New Yorker Apotheker Verein in order to open up membership to second-generation German immigrant pharmacists who had not been trained in the traditional (German) scientific way (Schleussner and Lehman, 1926). At this time a second German pharmaceutical society on the East Side of New York was founded. The new Society called itself the New Yorker Deutschen Apotheker Verein, underscoring the scientific and professional standards of the first German Pharmaceutical Society (Ramsberger, 1901, page 16). As was the case with its predecessor (the New Yorker Pharmazeutischer Leseverein), the purpose was to establish a scientific reading society for the benefit of its members. In 1873, the two Societies merged into the Deutscher Apotheker Verein von New York.

That the relationship between the German and the US pharmacists and medical community was not always an easy one would seem obvious. When in 1872 New York

made the first attempt to test the professional and scientific knowledge of proprietors of drugstores, of the 270 candidates of German descent, 207 proved to be scientifically educated. Of the 276 US candidates, only 76 had sufficient scientific education to pass the test (Kremers and Urdang, 1940, page 295). Concern about the lack of skill and knowledge ran deep, and in 1871 a new law regulating the dispensing of drugs through the examination and licensing of pharmacists was proposed for New York City by the political establishment of the city. The originator of the controversial law was James Irving, who wanted a political commission consisting of members of the medical community as the overseeing body for licensing and examination. The plan was defeated through the joint action of the New York College of Pharmacy, in which the German pharmacists had by then gained a foothold, and the German Apothecaries Society. The movement was led by another German pharmacist, Frederick Hoffman, who later played an important role in countering the movement on the part of the American Medical Association, to control the dispensing of drugs under the direction of a committee of physicians. Hoffman took the issue to the floor at the 1877 meeting of the American Pharmaceutical Association in Toronto, and the result was a decision to retain the professional reputation and responsibility for pharmaceutical practices in the hands of the pharmacists. The movement was supported enthusiastically by pharmacists of German birth or descent and led to the resolution that the American Pharmaceutical Association was to take a more active role in the revision for the next edition of the *Pharmacopeia.* The committee appointed consisted of 15 members, 6 of whom were of German birth or descent (Kremers and Urdang, 1940, pages 255–256). In 1882 the new and revised *Pharmacopeia* was published and became the basis for all later editions. Clearly, under Hoffman's leadership and the forceful position of the German pharmacists, the American Pharmaceutical Association gained the dominant influence as the representative of the US pharmaceutical profession as a whole.

Similarly, the American Pharmaceutical Association gained an important say in the development of food and drug legislation. During the 19th century, Congress had appointed inspectors in the principal ports of entry where imported drugs were examined; however, interstate trade was not regulated until later in the 1880s when the National Board of Trade sought state legislation which resulted in proposals on the part of New York and New Jersey state legislatures to impose laws on food and drug adulteration. The American Pharmaceutical Association here too played an important role in setting standards and exercising quality control.

Throughout the second half of the 19th century, continental European and in particular German methods and practices in pharmacy gained ground over British-based US methods and practices. Nowhere was this more evident than in the development of the pharmaceutical literature. When in 1846 the Philadelphia College of Pharmacy created a professorship of pharmacy and gave William Proctor Jr, a well-known and highly respected Quaker pharmacist, the responsibility to develop a curriculum, he could find no text or reference materials in the English language that would fulfill the requirements of a scientific training in pharmacy (Kremers and Urdang, 1940, pages 206–207; 277–281). At the same time, German and French pharmaceutical textbooks were of little practical use to the US student. Gradually German textbooks were translated and the *Pharmacopeia*, inspired by the recognition of continental practices, gained ground as reference texts in the practice of pharmacy (Kremers and Urdang, 1940, pages 255–257). It is interesting that in one of the most important textbooks in the 1890s, the *Handbook of Pharmacy*, written by Virgil Coblentz (published in 1894), 19 of the 25 books mentioned as source materials were German texts and 2 were English adaptations of German books (Kremers and Urdang, 1940, page 281).

All these influences combined gave US pharmacy in the second half of the 19th century a distinctly German character which cleared the way for large-scale import of German pharmaceutical products when the economic opportunity arose.

The development of the export and wholesale trade

Throughout most of the 19th century, the pharmaceutical trade was conducted by wholesale establishments in East Coast port cities such as Philadelphia, New York, and Boston. Most specialized urban merchants depended on extensive trade with the interior to guarantee a high volume of business. Rivalry between merchant houses in different cities for access to interior markets is well documented in the literature and led to business-interest pressure to construct transportation facilities such as the Erie Canal, and the Baltimore and Ohio Railroad (among others) in the early and mid-19th century (Porter and Livesay, 1970; 1971). As distributors, East Coast wholesalers often extended important financial services to their brethren in the interior and they were often willing to extend credit to small drugstores and physicians in inland towns (Atherton, 1939; Becker, 1970; Jones, 1937; Olsen, 1931). Most drug establishments dealt in a wide range of pharmaceutical or botanical products, but might include other items, such as paints and glassware and sometimes copies of pharmaceutical journals and specialized texts on medicine. In addition, they often made their own drugs through mixing and compounding of chemicals and medicines that were first imported from abroad. Some wholesalers, such as Schieffelin and Co. in New York, specialized in imported fine chemicals and drugs which then were distributed via several smaller wholesale establishments to interior centers. Gradually, domestic manufacturers added to the range of products that were marketed. Because so few drugs were manufactured in interior centers until after the Civil War, wholesalers, retailers, and physicians had to be able to rely on strong commercial ties with each other. These included firm financial commitments as well as quality controls, which led the proprietors of the more reputable wholesale establishments to encourage the foundation of colleges of pharmacy (Porter and Livesay, 1970).

The history of Schieffelin and Co. illustrates much of the development and evolution of the drug wholesale trade and manufacturing (Schieffelin, 1928; 1944, pages 12–14). Founded in 1794 the company started as an importer and distributor of drugs and medicines, and later turned to manufacturing drugs. Jacob Schieffelin, the founder of the company, had business interests in Detroit and the Northwest Territories, as well as in Montreal and London. In the early 1780s, he had spent a year in London as an agent for his father-in-law where he was in a position to investigate the drug market and where he learned the business of the major London firms. Much of the business in the early years of the wholesale establishment involved import from Europe and distribution throughout the Eastern Seaboard. An advertisement of the business in the *New York Evening Post* in 1801 states that Jacob Schieffelin, Druggist, had received a large supply of drugs from Leghorn, London, Amsterdam, and Bristol, as well as twenty crates of shop furniture, a general assortment of patent medicines, and surgeon's instruments. The advertisement also states that the company sells medicine chests for ships. Jacob had a London agent but no sales offices elsewhere in the United States. Instead he depended on widespread advertising of his wares that were distributed from his New York wholesale drugstore on Pearl Street. The prestige of the business depended on the purity and quality of drugs sold under the name Schieffelin. By the 1850s competition from sales agents employed by British and French wholesale houses had alarmed Schieffelin and the company changed its marketing strategy by employing its own sales agents. After the Civil War, Schieffelin had more than 10 travelling salesmen on the road. Drug sales had increased substantially as New York became

the foremost trade center. In 1854 the company had moved to larger quarters on William Street and a druggists' sundries department was established. The Civil War had changed the market in drugs and through the increased demand for medical supplies had stimulated pharmaceutical manufacturing. The need for large quantities of high-quality drugs had led some companies to establish laboratories and manufacturing outlets in New York City, and retailers now found it more advantageous to buy standardized pharmaceutical products directly from the manufacturer. Schieffelin responded by buying several smaller wholesale establishments and going into manufacturing and laboratory research (in 1882). By the mid-1880s they had erected a new building with modern equipment to house the manufacturing branch of the business and established a link with the chemical and pharmaceutical firms in Germany for the import of fine chemicals and new synthetic products. In 1889, as one of the largest wholesale and manufacturing establishments in New York City, Schieffelin and Co. became the sole agent for the pharmaceutical products of the Farben Fabriken (formerly Bayer and Co.). This signaled the significance of the German companies as manufacturers of synthetic pharmaceuticals because Schieffelin could not contract with any other manufacturer without the consent of Bayer. To secure even greater market share, Bayer established its own sales office in New York called Farbenfabriken of Eberfeld, shortly thereafter (Mann and Plummer, 1991, page 28). By the turn of the century, the contract with Schieffelin was terminated and Bayer conducted its sales in the United States directly from its sales office in New York City.

Merck operated in a similar way and both companies obviously pursued rather aggressive direct export strategies in the US market that were characterized by sales from the companies in Germany (Feldenkirchen, 1987; Galambos and Sturchio, 1992). The German pharmaceutical firm E Merck of Darmstadt had used the New York City wholesaler Lehn and Fink for distribution of its products in the United States. The relationship began before F W Fink emigrated from Germany to the United States in 1866 and is an example of the reliance on ethnic ties to reduce risk in business. In 1887 E Merck was forced to terminate the relationship because Lehn and Fink had been counterfeiting E Merck labels and had been placing them on inferior goods. It was then that E Merck decided to set up its own US marketing department by sending a trusted employee, Theodore Weicker, with a family member, George Merck, to New York to organize the company's US operations. In 1891 the company formally established the new branch, Merck and Co., in New York City (Galambos and Sturchio, 1992).

The Columbia World Fair in Chicago in 1893 was the most significant breakthrough for the German chemical and pharmaceutical industry. Several of the well-known companies participated in a highly organized and coordinated effort to promote the industry in export trade to the United States. Several of the well-known as well as smaller companies participated including Merck, Badische Analin and Soda-Fabrik, Aktien Gesellschaft für Anilinfabriken Berlin, E Schering Berlin, Merck Darmstadt, Gogle and Co. Stuttgart, and Farben Fabriken (Friederich Bayer and Co.). Many won prizes at the fair which they proudly displayed on their letterhead and price lists when they began to market their products through New York sales agencies.[1] Merck and Bayer had already established their own branch offices in New York in the late 1880s and early 1890s but many of the smaller companies still depended heavily on established

[1] See Kremer Reference Files at the American Institute for the History of Pharmacy, College of Pharmacy, University of Wisconsin, Madison, WI. The Reference Files (C38 b, I, Germany) include the guidebook to the participating German chemical and pharmaceutical companies entitled, *Fuhrer durch die Ausstellung der Chemischen Industrie Deutschlands auf der Columbischen Weltausstellung in Chicago, 1893* (Berlin). See also Kremer Reference File C38 b, I, Germany, for advertisements, price lists, and product descriptions of New York sales agents.

New York wholesale distributors to market their products. Many of the wholesale distributors were of German origin, however, and were able to facilitate entry into the US market.

Towards the end of the 19th century, most pharmaceutical and chemical products sold in the United States were manufactured in Germany and imported through New York wholesale distributors. In fact, until World War 1, manufacturing of pharmaceutical products in the United States remained in its infancy. In a drug list, published in 1912, and used throughout the trade in the United States, a large number of products were still imported.[2] The drug list provides, in addition to the chemical and physical properties of the product, the name and address of the manufacturer or proprietor, and in the case of foreign origin, the name and address of the US agent. Of the 1799 products listed, 512 identified agents and of these 498 resided in New York City. For those products with a New York agent listed, 419 were manufactured in Germany, 59 in a country other than Germany, and 20 products had no manufacturing location given. The list suggests that the extent of import of pharmaceutical products before World War 1 and the role of Germany in manufacturing and New York City in distribution were significant. In addition, names of agents listed, prove that a large majority of the products indeed found their way into the US market via the German immigrant community in New York City. Of the products imported from Germany a significant number were synthetic pharmaceuticals and it is here that we have to consider the development of the German pharmaceutical industry in the United States (table 1).

Table 1. Wholesale distribution of pharmaceutical products in the United States, 1912 (source: "The modern materia medica" *Druggist Circular* New York, 1912).

Number of products listing:	Number
Total	1799
Agent name and address	512
Agents with addresses in different cities	
New York City	498
Philadelphia	2
San Francisco	3
Lake Forest, IL	1
Baltimore	2
Detroit	1
St Louis	4
Astoria, NY	1
New York agents, where products are manufactured in	
Germany	419
France	21
Hungary	7
Russia	4
Saxony (Germany)	1
Switzerland	11
United States	15
Manufacturing location not available	20

[2] "The modern materia medica" *The Druggists Circular* New York, 1912.

The establishment of the German pharmaceutical industry in the New York metropolitan region

Companies such as Bayer and Merck began to expand their marketing functions into manufacturing operations towards the end of the 19th century. The United States experienced rapid population growth and provided lucrative new markets but the imposition of tariffs on imports of pharmaceutical products and fine chemicals and fluctuations in the tariff rates created uncertain conditions. In order to secure market access, the larger German companies bought or built factories to begin production of pharmaceuticals in the United States. In 1899 George Merck established the Merck American manufacturing plant in Rahway, northern New Jersey, not far from the company's wholesale distribution center in New York City (Sturchio, 1991). By building a loyal, mostly German-speaking workforce and customer base, and by emphasizing the German parent company's reputation for producing high-quality products, George Merck, the American company's founder meticulously developed a niche in the US market (Galambos and Sturchio, 1992).

In a similar move, Bayer decided on manufacturing in Troy, New York, in 1903. Bayer's patent on aspirin was about to expire and in order to avoid import duties and to compete more successfully with domestic producers, the company decided to expand production in the United States. In 1881 Bayer had purchased partial ownership in the Hudson River Aniline and Color Works at Rensselaer and so the Hudson River area was familiar territory (Mann and Plummer, 1991, pages 28–29). The location was accessible both to rail and to river transportation and close to the New York market. Like Merck's facility in Rahway, New Jersey, built along the Pennsylvania Railroad, Bayer established its manufacturing plant close to its wholesale distribution center with easy access to the New York market and national transportation network. Merck also established a plant in St Louis, Missouri, where the Herf and Frerichs Chemical Co. had a plant for lease. St Louis had a large German-American community and seemed to be a good site to serve the growing western regional market. Merck later consolidated all of its manufacturing at Rahway in order to achieve economies of scale. The St Louis facility was used later for storing and subdividing chemicals.

The decision to begin manufacturing in the United States illustrates the predominance of the German synthetic pharmaceutical industry (Liebenau, 1987; Swann, 1988). Back in the 1870s German companies had first emerged as the leading producers of synthetic organic products, including dyes, pharmaceuticals, and explosives (Beer, 1959; Haynes, 1954). Germany offered the benefit of patent legislation, favorable tariff rates, and a tradition of scientific research in organic chemistry that the United States lacked (Liebenau, 1988; Morris and Travis, 1992). In addition, the United States lacked support industries such as production of coal tar which proved to be essential for a successful synthetic organic chemical industry. As a result, after the turn of the century, almost all synthetic pharmaceuticals distributed in the United States were either imported directly from Germany via sales agents in New York City or manufactured by German companies in the New York metropolitan region. In addition to Bayer and Merck, a third company—Heyden—had established a manufacturing plant in the New York area around the turn of the century in northern New Jersey near Garfield. The company also had a sales office in New York City to distribute products both from German and from US firms (Haynes, 1954, page 207). Hoechst was an exception among the major synthetic pharmaceutical manufacturers as the company continued to sell its products via a German-American sales agent in New York (Liebenau, 1987, pages 111–113). All German-American pharmaceutical manufacturing companies were closely linked to the parent company through profit sharing and the

German company provided technical know-how and supplied most of the necessary intermediate coal-tar products (Steen, 1995).

World War 1 changed that relationship. When the war broke out, British embargoes essentially stopped the import of fine chemicals and coal-tar products. High prices for organic chemicals subsequently induced the production of these products in the United States. In addition, the experience of strategic vulnerability motivated the US government to stimulate production of dyestuff, pharmaceuticals, and explosives in the domestic market. Various measures were taken to accomplish this, including confiscation of German properties through the Trading-with-the-Enemy Act, which created the Office of Alien Property and appointed a Custodian to carry out the charge (Steen, 1995). Many German-American import firms, as well as some of the manufacturing companies lost their businesses or were taken over by US firms. These included Bayer, Heyden, and Merck, although George Merck was able to buy the company back with support from large New York bankers. Merck had to agree to a Custodian-appointed Board of Trustees for ten years. Many of the German-American marketing and technical personnel, both from the import firms and from the manufacturing companies were subsequently employed by the new firms which were now US-owned. In this way German marketing and production expertise strengthened the synthetic pharmaceutical industry in the New York–New Jersey metropolitan area after World War 1, and it followed its successful course thereafter.

The industry after World War 1

Most studies on the development of the pharmaceutical industry emphasize research and development and industry–university scientific collaboration in the period after the First World War (Galambos and Sewell, 1995; Liebenau, 1987; Parascandola, 1992; Schwartzman, 1976; Swann, 1988). As in other science-based industrial activities, cooperative relationships and the shared resource, skill, and institutional base of firms located in a particular region are important (Arthur, 1990; Nelson, 1994; Zysman, 1994). In the economic–geographical research on the computer, semiconductor, and electronics industry we find examples from Silicon Valley, Route 128, and Southern California that emphasize the importance of industry–university scientific collaboration (Saxenian, 1991; 1994; Scott, 1988; 1992; Storper and Walker, 1989). The development after World War 1 of the pharmaceutical industry in the New York metropolitan region illustrates the case.

During the prosperous 1920s most of the companies in the region expanded their distribution networks and extended their product lines. The value of research had been demonstrated and had been proven profitable but few firms in the region had established laboratories for product development. In the competitive environment after World War 1, there was a series of mergers and takeovers and collaborative research in product development solidified the position of some of the major pharmaceutical companies in the region; among them Merck (Sturchio, 1991). Specialization now became very important and increasingly pharmaceutical companies sought expert knowledge from university researchers and consultants (Liebenau, 1987; Swann, 1988). This had an influence both on the industry and on academic institutions in the region (Parascandola, 1992). In fact, the kind of collaborative research that became standard in the pharmaceutical industry in the United States followed a pattern that was established in Germany in the 19th century where particular firms established strong ties with certain schools (Swann, 1988, page 27). Many prominent scientists in the pharmaceutical and biomedical fields who later became leading consultants to pharmaceutical companies in the region had studied in Germany (Parascandola, 1992).

When Merck established the Merck Research Laboratory (better known as the Merck Institute) in Rahway, New Jersey in the early 1930s, the firm first hired a Viennese pharmacologist, Hans Molitor, as director. Within a few years, Molitor had established collaborative projects with New York University and had made contacts with a large group of academic scientists in the area. He and his staff also presented papers at scientific and professional meetings and published research in professional journals and they regularly gave lectures at the Rutgers College of Pharmacy and at the University of Philadelphia (Swann, 1988, pages 46–47). In addition, the Merck Institute tested drugs for university researchers and often supported research at universities through fellowships and grants (Swann, 1988, pages 48–50). By the late 1930s collaboration between the pharmaceutical industry and universities in the region was well established and included frequent consultations between industrial and university researchers. New research programs at the universities were set up with the needs (and support) of the pharmaceutical industry in mind which added to the level of expertise and specialization of industry and university education in the region. Altogether the industry was now securely anchored in the Mid-Atlantic region and stayed there to prosper after World War 2.

Conclusion

This brings us to the conclusion of the paper. Most studies on the development of the pharmaceutical industry emphasize research and development, and industry–university scientific collaboration in the period between World Wars 1 and 2 (Galambos and Sewell, 1995; Liebenau, 1987; Parascandola, 1992; Schwartzman, 1976; Swann, 1988). Less well understood is the relationship with the retail and wholesale trade in the 19th century that explains why the industry concentrated in the New York–northern New Jersey metropolitan area. In this paper I have tried to fill this gap. I approached the question of the geographical concentration of the pharmaceutical industry from a historical-geographic perspective and presented the development of the pharmaceutical industry in the New York metropolitan region with a focus on the immigrant community. From this perspective the development of the pharmaceutical industry in the New York region took place in the context of the establishment of the German-American pharmaceutical community which proved instrumental in the later success of the German pharmaceutical wholesale trade and industry. The course of events was dictated by US tariff policy, the events of World War 1, and the particulars of the industry in terms of its relationship to academic science and collaborative research which committed the industry to the region.

Acknowledgements. Research funding for this paper came from the NSF—Geography and Regional Science Division. The Hagley Museum and Library provided office space and access to library collections and the American Institute for the History of Pharmacy, College of Pharmacy, University of Wisconsin, Madison, WI, permitted me to consult the archival collections of the Kremer Reference Files.

References

Albion R G, 1939 *The Rise of New York Port, 1815–1860* (Charles Scribner and Sons, New York)
Arthur B W, 1990, "Positive feedbacks in the economy" *Scientific American* February, 92–99
Atherton L E, 1939 *The Pioneer Merchant in Mid-America* (University of Missouri Studies, Columbia, MI)
Baron S, 1962 *Brewed in America: A History of Beer and Ale in the United States* (Little Brown, Boston, MA)
Becker W H, 1970 *The Wholesalers of Hardware and Drugs, 1870–1900* PhD dissertation, Department of History, Johns Hopkins University, Baltimore, MD
Beer J J, 1959 *The Emergence of the German Dye Industry* (University of Illinois Press, Urbana, IL)
Coblenz V, 1894 *Handbook of Pharmacy* (P Blakiston, Philadelphia, PA)

Conzen K N, 1976 *Immigrant Milwaukee, 1836 – 1860* (Harvard University Press, Cambridge, MA)
Conzen M P, 1977, "The maturing urban system in the United States, 1840 – 1910" *Annals of the Association of American Geographers* **67** 88 – 108
Department of Commerce, 1960 *New York State Commerce Review* Department of Commerce, Albany, NY
Downard W L, 1973 *The Cincinnati Brewing Industry: A Social and Economic History* (Ohio University Press, Columbus, OH)
Ernst R, 1949 *Immigrant Life in New York City, 1825 – 1863* (King's Crown Press, Columbia University, New York)
Ettlinger N, 1991, "The roots of competitive advantage in California and Japan" *Annals of the Association of American Geographers* **81** 391 – 407
Faust A B, 1927 *The German Element in the United States* The Steuben Society of America, New York
Feldenkirchen W, 1987, "The export organization of the German economy", in *Business History of General Trading Companies* (University of Tokyo Press, Tokyo) pp 295 – 331
Galambos L, Sewell J E, 1995 *Networks of Innovation* (Cambridge University Press, Cambridge)
Galambos L, Sturchio J L, 1992, "Transnational investment: the Merck experience, 1891 – 1925", paper presented at the Joint Conference on "Transnational Investment", Summer, Munich; copy available from Dr Galambos, Department of History, Johns Hopkins University, Baltimore, MD
Glasmeier A, 1990, "The role of merchant wholesalers in industrial agglomeration formation" *Annals of the Association of American Geographers* **80** 394 – 417
Haynes W, 1945 *American Chemical Industry: the World War 1 Period: 1912 – 1922* (Van Nostrand, New York)
Haynes W, 1954 *American Chemical Industry: Background and Beginning* (Van Nostrand, New York)
Hoover E M, 1948 *The Location of Economic Activity* (McGraw-Hill, New York)
Isard W, 1971 *Location and Space Economy: A General Theory Relating to Industrial Location, Market Areas, Land Use, Trade and Urban Structure* (Harvard University Press, Cambridge, MA)
Jones F M, 1937 *Middlemen in the Domestic Trade of the United States 1800 – 1860* (University of Illinois, Urbana, IL)
Kabisch T R, 1982 *Deutsches Kapital in den USA: von der Reichsgrundung bis zur Sequestrierung (1917) und Freigabe* (Klett-Cotta, Stuttgart)
Kremers E, Urdang G, 1940 *History of Pharmacy: A Guide and Survey* (J B Lippencott, Philadelphia, PA)
Krugman P, 1991 *Geography and Trade* (MIT Press, Cambridge, MA)
Lemke T, 1891 *Geschichte des Deutschtums von New York von 1848 bis auf die Gegenwart* (Verlag von Theodor Lemke, New York)
Lichtenberg R M, 1960 *One-tenth of a Nation: National Forces in the Economic Growth of the New York Region* (Harvard University Press, Cambridge, MA)
Liebenau J, 1987 *Medical Science and Medical Industry: The Formation of the American Pharmaceutical Industry* (Johns Hopkins University Press, Baltimore, MD)
Liebenau J, 1988, "Patents and the chemical industry: tools of business strategy", in *The Challenge of New Technology* Ed. J Liebenau (Gower, Aldershot, Hants) pp 138 – 144
Luebke F C, 1990 *Germans in the New World: Essays in the History of Immigration* (University of Illinois Press, Urbana, IL)
Mann C C, Plummer M L, 1991 *The Aspirin Wars* (Alfred A Knopf, New York)
Marshall A, 1920 *Principles of Economics* (Macmillan, London)
Meyer D, 1980, "A dynamic model of integration of frontier urban places into the United States system of cities" *Economic Geography* **56** 120 – 140
Morris P J T, Travis A S, 1992, "A history of the international dyestuff industry" *American Dyestuff Reporter* **81** (November) 59 – 100
Muller E, 1977, "Regional urbanization and the selective growth of towns in North American regions" *Journal of Historical Geography* **3** 21 – 39
Nadel S, 1990 *Little Germany: Ethnicity, Religion, and Class in New York City, 1845 – 1880* (University of Illinois Press, Urbana, IL)
Nelson R, 1994, "The co-evolution of technology, industrial structure, and supporting institution" *Industrial and Corporate Change* **3** 47 – 63
Newton R C, 1976 *German Buenos Aires, 1900 – 1933: Social Change and Cultural Crisis* (University of Texas Press, Austin, TX)
Olsen P C, 1931 *The Merchandising of Drug Products* (D Appleton, New York)

Parascandola J, 1992 *The Development of American Pharmacology: John J. Abel and the Shaping of a Discipline* (Johns Hopkins University Press, Baltimore, MD)
Porter P C, Livesay H C, 1970, "The anti-bellum drug trade: Troth and Company of Philadelphia" *Pennsylvania Magazine of History and Biography* **94** 347 – 357
Porter P G, Livesay H C, 1971 *Merchants and Manufacturers: Studies of Changing Structuring of Nineteenth-century Marketing* (Johns Hopkins University Press, Baltimore, MD)
Pred A, 1965, "Industrialization, initial advantage, and American metropolitan growth" *Geographical Review* **55** 158 – 185
Pred A, 1966 *The Spatial Dynamics of US Urban Industrial Growth, 1800 – 1914* (MIT Press, Cambridge, MA)
Pred A, 1977 *City-systems in Advanced Economies* (John Wiley, New York)
Ramsberger G, 1896, "Historical sketch of the Deutscher Apotheker Verein of the City of New York" *The Pharmaceutical Era* **16**(7) 203 – 209
Ramsberger G, 1901 *Geschichte des New-Yorker Deutscher Apotheker Vereins* (Deutscher Apotheker Verein, New York)
Ruprecht L G W, 1876 *Geschichte der Entstehung und Entwickelung der New Yorker Deutschen Apotheker-Vereins* (Deutscher Apotheker Verein, New York)
Saxenian A, 1991, "The origins and dynamics of production networks in Silicon Valley" *Research Policy* **20** 423 – 437
Saxenian A, 1994 *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (Harvard University Press, Cambridge, MA)
Schieffelin W J, 1928, "Wholesalers through six generations" *Drug Markets* **22**(3) 217 – 220
Schieffelin W J, 1944 *150 Years of Service to American Health* (Schieffelin and Company, New York)
Schleussner C F, Lehman R S, 1926, "History of the New York German Apothecaries Society", in *Festschrift des New Yorker Deutschen Apotheker-Vereins zur Erinnerung und das Funfundsiebzigste Stiftungsfest 7ten October, 1926* (Deutscher Apotheker Verein, New York)
Schwartzman D, 1976 *Innovation in the Pharmaceutical Industry* (Johns Hopkins University Press, Baltimore, MD)
Scott A J, 1988 *New Industrial Spaces: Flexible Production Organization and Regional Development in North America and Western Europe* (Pion, London)
Scott A J, 1992, "The role of large producers in industrial districts: a case study of high technology systems houses in Southern California" *Regional Studies* **26** 265 – 275
Steen K, 1995, "Confiscated commerce: American importers of German synthetic organic chemicals, 1914 – 1929" *History and Technology* **12** 261 – 284
Storper M, Walker R, 1989 *The Capitalist Imperative: Territory, Technology and Industrial Growth* (Basil Blackwell, New York)
Sturchio J L (Ed.), 1991 *Values and Vision: A Merck Century* (Merck and Company, Rahway, NJ)
Swann J P, 1988 *Academic Scientists and the Pharmaceutical Industry: Cooperative Research in Twentieth-century America* (Johns Hopkins University Press, Baltimore, MD)
Vance J, 1970 *The Merchant's World: The Geography of Wholesaling* (Prentice-Hall, Englewood Cliffs, NJ)
Wankmuller A, Cowen D L, 1980, "The German Apothecary Societies of New York" *Pharmacy in History* **22**(1) 3 – 10
Ward D, 1971 *Cities and Immigrants* (Oxford University Press, New York)
Wittke C, 1939 *We Who Built America: The Saga of the Immigrant* (Prentice-Hall, New York)
Zysman J, 1994, "How institutions create historically rooted trajectories of growth" *Industrial and Corporate Change* **3** 243 – 283

p

© 1998 a Pion publication printed in Great Britain