

THE SCHNADERBECK BREWERY'S LAGERKELLER IN WILLIAMSBURG, BROOKLYN

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Abstract

Lager brewing arrived in the United States in the early 1840s. In Williamsburg, which became one of the main centers of lager brewing in the 1870s and 1880s, the earliest recorded lager breweries date to the 1850s. But only a handful of those existing at that time have been recorded. Like many others, Sebastian Schnaderbeck's establishment, though quite substantial, was lost to history. These early lager breweries must have cold-aged their brew in subterranean vaults, as Schnaderbeck did. Yet only two other surviving lager cellars, both later in date than Schnaderbeck's, have been documented. These circumstances made the discovery of Schnaderbeck's brewery, and especially of his perfectly preserved vaults, particularly important for the study of the architectural history of lager cellars.

Introduction

In 2015, a backhoe operator excavating for construction at 33 Ten Eyck Street in Williamsburg, Brooklyn, accidentally discovered four massive, subterranean vaults when his shovel banged against the hard plaster surface sealing the vaults' roof. Further digging and sweeping uncovered a hole left by a vanished ventilation chimney. The operator lowered a ladder through that narrow opening, hardly wider than the ladder, and climbed down 14 feet to the vault's floor. He was astonished to find himself in a vast, perfectly preserved brick and stone-built structure (Fig. 1).

The 75.0 by 100.0 ft. lot (22.86 by 30.48 m), which had stood vacant since the early 1980s, was planned for affordable housing partly funded by public monies, and therefore required approval from the New York City Landmarks Preservation Commission (LPC). Because a building with a basement had covered the entire site until ca.1982/4, the LPC determined that

any potential archaeological remains would already have been severely compromised or destroyed, and, therefore, did not recommend any study of the lot ahead of construction. No one suspected that architectural remains of historic significance could still lie buried on the site between approximately 14.0 and 28.0 ft. (4.27 and 8.5 m) below ground. When the vaults were discovered, however, excavations were suspended and the LPC recommended that an archaeological assessment be prepared to investigate the building's history.

The assessment of Celia Bergoffen Ph.D. RPA found that the vaults were built ca.1859 by Sebastian Schnaderbeck, a German immigrant, for cold-aging and storing his lager beer.¹ His 'Schnaderbeck Brewery' also included a structure above the vaults once connected to the former brewery building fronting on the opposite side of the block, on Maujer Street, which is now occupied by apartments (Figs. 2 & 3). The original entrance to the vaults was via a staircase from that building, but the stairwell opening into the vaults was filled with brick detritus, rendering it impassable and leaving the chimney hole of the vault closest to Ten Eyck Street the sole point of access.

Lager brewing is first attested in the United States in the early 1840s. In Williamsburg, the earliest recorded breweries date to the 1850s. Schnaderbeck's brewery was established in the first decade of lager production in Williamsburg, which by the later 1860s and '70s had become the centre of this industry in New York City. At that time, almost all the district's breweries were German-owned and operated, and they served a large German population whose preferred brew was lager. Before mechanical refrigeration became generally available, ca.1880, the breweries built deep vaulted cellars because lager needs to ferment and age at cold temperatures. Since Schnaderbeck was producing lager by 1859, it is logical to assume that his vaults were constructed by that date. Only a handful of the lager breweries that existed in 1850s Williamsburg have been recorded and, like many others, Schnaderbeck's establish-

* This article has undergone peer review.



Figure 1. Vault 1: Access through the shaft opening in the roof of the vault, ventilation shaft openings in the east wall, doorway to vault 2. Photo by Christopher D. Brazee

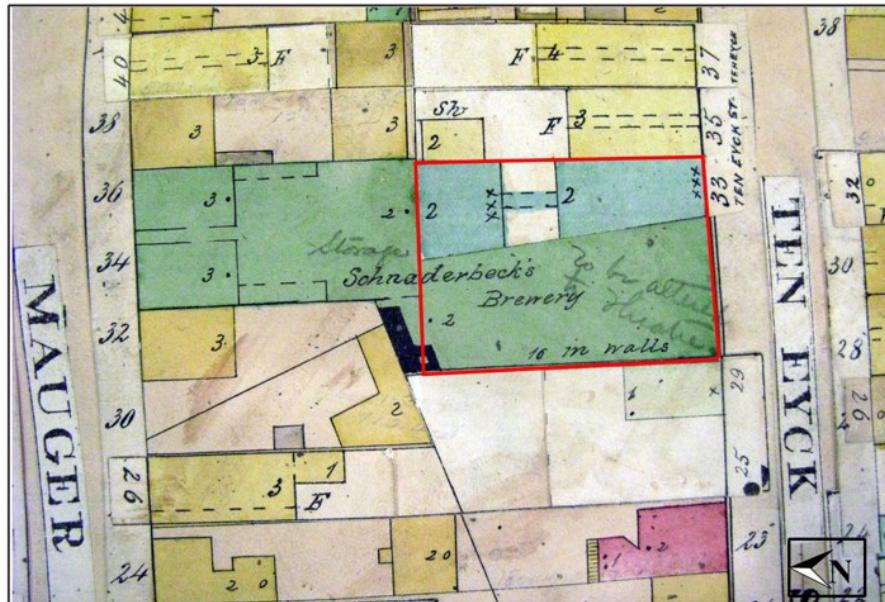


Figure 2. Schnaderbeck Brewery on the 1868 Higginson's map (Vol. 4, pl. 82).²



Figure 3. Maujer Street building façade. Photo by Celia J. Bergoffen.



Figure 4. Still photo of Matthias Kolbe's 3D model of the Sebastian Schnaderbeck Brewery Lagerkeller / subterranean vaults, ca. 1860. Photo by Celia J. Bergoffen and Arnulf Hausleiter. Drone photography by Petr Hejl. Please contact Celia J. Bergoffen for permission to exhibit or reproduce

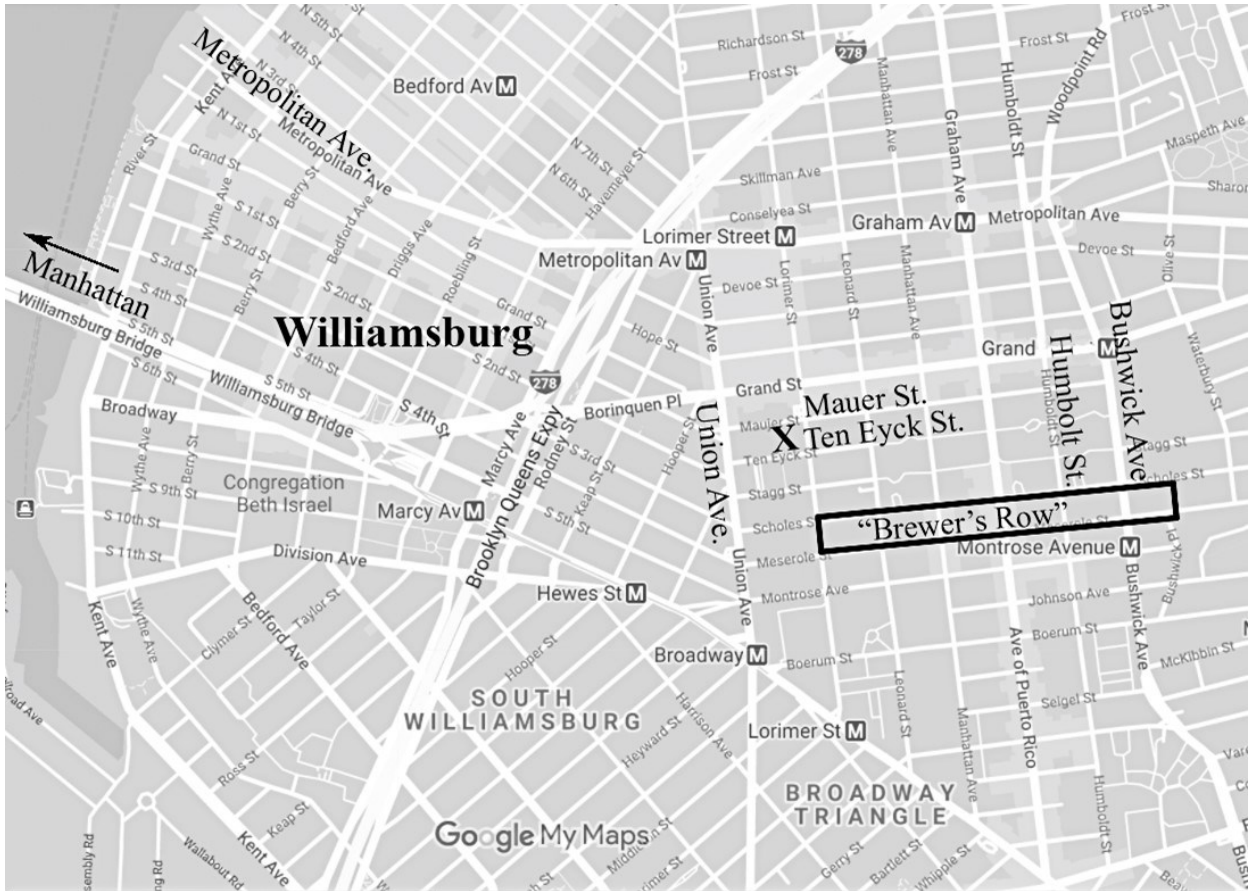


Figure 5. Map of Williamsburg, Brooklyn, X marks the Schnaderbeck Brewery site. Google Maps.

ment, though quite substantial, was lost to history. No doubt there were other subterranean brewery vaults in Williamsburg built during the 1860s to 1870s, but only two other surviving structures are known to the author. These circumstances make the discovery of Schnaderbeck's brewery, and especially of his vaults, particularly important.

In view of the vaults' excellent state of preservation, their importance for the architectural history of early lager cellar construction in the United States, and their significance for German ethnic heritage and industry in the United States, the developer agreed to clear the overburden from the roofs to permit the study and recording of this rare find both from without and within. The complete photographic documentation of the site permitted the creation of a 3D model, which was submitted both to the LPC and the New York State Historic Preservation Office (SHPO) along with the report on the archaeological investigation.³ These agencies determined that the site was eligible for listing on the National Register of Historic Places. It was recommended

that all or a portion of the vaults should be preserved, and that the developer should consider how they might be integrated into the proposed construction. After a year of discussions between the concerned governmental agencies and the developer, the latter agreed not to remove the crown of the vaults and fill the remainder, as originally planned, but instead to fill three of the vaults in their entirety with liquid concrete, which preserved the exterior of the structures but effectively destroyed their interiors. Although the fourth vault remained void, it has now been completely buried under the building's backyard with no means of access. No portion of the vaults, therefore, is any longer visible or accessible.

The following article presents a detailed description of the vaults including a still image of Matthias Kolbe's 3D model (Fig. 4), and an account of Schnaderbeck and his brewery in the context of Williamsburg's beer breweries and German heritage. Dr Kolbe's model was created using videos made by the author, Dr Arnulf Hausleiter, and drone photographer Petr Hejl. It may be viewed interactively at:

<https://sketchfab.com/3d-models/schnaderbeck-brewery-lagerkeller-ca-1860-0e2c77422f4448728aa239b16b081f64>

Because the documentation of the vaults was prepared for the LPC and SHPO, measurements were recorded in the English / American system, as required by those agencies. The American historic newspapers cited in this article also used this system. The original measurements were therefore retained, with their metric equivalents included in parenthesis, in conformity with standard international scientific publications.

The development of Williamsburg, German immigration and breweries

The development of Williamsburg began in 1802 when Richard M. Woodhull started running a horse ferry from Corlear's Hook at the foot of Grand Street in Manhattan to a landing place at present-day Metropolitan Avenue, in Williamsburg (Fig. 5). Speculating that the area would soon be built up, Woodhull purchased land near the road to the ferry, naming it Williamsburg in honour of the town's first surveyor, U.S. engineer Colonel Williams, who was also a grand-nephew of Benjamin Franklin.⁴ When Thomas Morrell began running a second ferry to Manhattan from the foot of Grand Street, in 1812, the settlement, then known as 'Yorkton', still extended just four blocks north-south, from Metropolitan Avenue to South 1st Street. The first building boom came only in the later 1830s, with the erection of about 500 houses; in the

second boom, between 1843 and 1845, another 400 houses went up.⁵

The rapidly expanding City of Williamsburg, established in 1852, was consolidated into the City of Brooklyn together with Bushwick, on 1 January 1855. Although by ca. 1845, streets had been planned as far east as Manhattan Avenue – two blocks east of the later brewery site – and houses were already standing and occupied by that date on the Maujer (formerly Remsen) Street side of the brewery's block, Ten Eyck (formerly Wyckoff) Street was not officially opened until 1852 and the site of the brewery, which extended across the block between Ten Eyck and Maujer Streets, was not yet developed.⁶ The Maujer Street address was first listed in the 1854-55 city directory.⁷ The address on Ten Eyck Street, where the vaults were located, was first listed only a few years later, in the 1859-60 directory, roughly the time the brewery began operating.⁸ Apparently, Schnaderbeck was the first to build on the Ten Eyck Street lot, incorporating the older Maujer Street building into his brewery (Fig. 2).

The dramatic growth in Williamsburg's population, which doubled from 5,300 in 1850 to 10,925 in 1854, was largely due to the influx of German immigrants arriving in numbers equal to or exceeding the previous inpouring of Irish refugees escaping from the potato famine of ca. 1845-49.⁹ The figures for German immigration to the United States in these years speak for themselves:¹⁰

Year	1851	1852	1853	1854	1855	1856	1857	1858	Total 1847-60
German immigrants	69,919	118,611	119,644	176,986	52,892	56,113	80,974	31,874	979,575
% of Total U.S. immigration	24%	39%	42%	55%	39%	39%	44%	41%	37%

Aside from economic opportunities, one of the historical circumstances behind the surge in German immigration at mid-century was the failure of the 1848 revolution in Germany, whose goal had been the creation of a democratic, unified state. The revolution's collapse provided the impetus for its former supporters, the 'Forty-eighters', as they were called, to emigrate to the United States, whose values accorded well their own progressive views.¹¹ Sebastian Schnaderbeck, who arrived in New York in 1847-48, was chronologically one of this group, although it is not known whether he was actually a political refugee.¹² Later on, however, he was drawn into American politics: as one of the most eminent citizens of Brooklyn, he was among the many

vice-presidents nominated at a large Republican rally held during the Civil War in support of preserving the Union.¹³

In addition to new immigrants, Williamsburg's ample housing and commercial space lured many of those already settled in Manhattan across the East River, away from the crowded Lower East side, where the German community had been mainly concentrated. For brewers, the district's main attraction – aside from space for their facilities – was the availability of good water, the principal ingredient needed to make decent beer.¹⁴ Before the introduction of Croton water into Manhattan in 1842, pure water was hardly to be found. But even after the aqueduct's arrival in the city,

Croton water was not necessarily immediately accessible to everyone. The Shaefer brother's brewery, for instance, then located on Broadway between 18th and 19th Streets, was not initially connected to the new source, forcing Frederick and Maximilian Schaefer to buy a yearly supply of water for their brewery from a local grocer.¹⁵

The Germans' thirst for lager was prodigious and as their numbers grew so did the number of breweries. In 1854, there were reportedly 13 breweries in Williamsburg, although whether all or only some of these were already brewing lager is not known.¹⁶ The center of lager production, between 1850 and 1880, was in 'Brewer's Row', a five-block strip extending from Lorimer Street to Bushwick Place between Scholes and Meserole Streets (Fig. 5). In 1868 six breweries were packed into that small area.¹⁷ The number rose to eleven over the next decade.¹⁸ By the end of the century, there were reputedly some 45 breweries in Brooklyn with various, sometimes conflicting, estimates of the number existing at different times in the intervening decades.¹⁹ The lack of concordance among the various sources may be related to the nature of the industry as observed by two *Brooklyn Daily Eagle* reporters. One noted that most of the 30 to 40 breweries operating in 1875, by his count, did not produce on a regular basis and had only a small output. The other observed that many breweries were ephemeral: they 'failed and disappeared from public notice'.²⁰ Although it prospered for nearly two decades, Schnaderbeck's brewery, which stood just two blocks northwest of the famed Row, eventually joined the ranks of the forgotten.

The Williamsburg breweries were not merely factories, they also sold beer on their premises in saloons, providing gathering places for men to talk business and politics while they quaffed their lager. In addition, in the beer gardens run by the larger establishments, one could eat, bowl, or enjoy music with the family. Along with the churches and gymnastic and other clubs, the breweries were a vital part of the German community's social life. From the brewer's standpoint, ready and direct sale to customers was a necessity, since lager beer quickly lost its carbonation once the keg was tapped: after an hour, it was 'dead'.²¹ Consequently, the beer produced in the lager breweries was meant only for local consumption, frequently imbibed in a *Bierstube*, a saloon set with tables and chairs where patrons could sample the brewer's wares.²² Some brewers operated beer gardens, like the one adjoining Henry Urban's Boulevard Brewery at the corner of Meserole Street and Bushwick Avenue, in Brewer's Row. In his family-style hall, people sang and danced, and Tyrolean yodellers yodeled.²³ Schnaderbeck evidently also had a *Bierstube*, perhaps in the same space as the earlier saloon in the Maujer Street building, since he was able to provide a meeting place in his 'Schnaderbeck's Hall'

for Republican delegates to the 8th Assembly District Republican Convention.²⁴

Lager brewing, caves and cellars in Germany, the United States, and New York City

The Dutch and the English began brewing ale the moment they set foot in the New World. The 1660 Castello Map records the location of five breweries in New Amsterdam (the southern tip of Manhattan Island), and the earliest recorded brewery in Brooklyn also dates ca.1660.²⁵ Lager, however, which requires a different kind of yeast from ale, was not introduced to the United States until about 1840. John Wagner, a brew master from Bavaria, is credited with bringing lager yeast to the United States in that year.²⁶

While all beers are made with water and a malted cereal, most often barley; yeast, which produces the alcohol and the carbonation, and usually hops, lager uses a type of yeast that ferments at the bottom of the vat instead of the top, as in other beers, and requires aging over an extended period at cold temperatures not above 5°C in order to complete the process.²⁷ Malt might be made by the brewers or by specialized maltsters. The grain is steeped, to begin germination, then laid out on floors to complete germination. Malt houses require good ventilation as well as ample space. It was not possible to determine whether Schnaderbeck's had the facilities to produce its own malt. The germinated malt is roasted in kilns, allowed to cool, and then ground into meal. The meal is mixed with warm water to create mash, which is boiled in a brew kettle to make the wort. Other ingredients such as hops may be added to the brew kettles to create different flavourings. Yeast, added last, after the wort has cooled, feeds on the sugars and produces alcohol and the carbonation. The mixture is again allowed to cool, sometimes by passing over pipes filled with ice water, and then sent to the fermenting tubs in a cold cellar.²⁸ Once this process was completed, the liquid was conducted into lagering casks, which were stored in a cold cellar for aging. Architecturally, a practical arrangement would be to excavate sufficient depth for two cellar levels and lay out the fermentation tubs in the upper one. This way, the fermented mixture could be conducted into the lagering casks below via pipes. Before refrigeration, lager brewing was done only during the winter months, and the longer it aged in a cold cellar, following the fermentation, the better the flavour and frothiness.²⁹ Lager, which means storehouse or 'to store' in German, was also called summer beer because that is when the kegs were tapped, after aging through the winter months.³⁰ The refreshing drink, lighter in colour and more effervescent than ale, was favoured by the Germans and quickly became the most popular brew across America.³¹

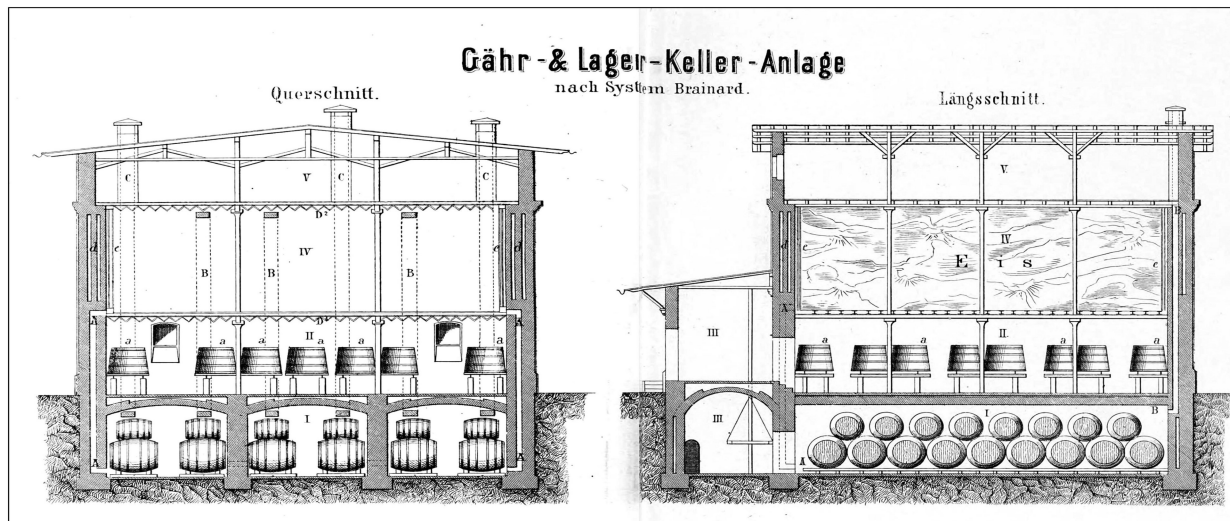


Figure 6. Cross section of a Fermentation and Lager Cellar built according to the Brainard System from Tausing, J.E. (1877) *Die Theorie und Praxis der Malzbereitung und Bierfabrikation mit besonderer Berücksichtigung des Wiener Brauverfahrens nach eigenen Erfahrungen bearbeitet*. Leipzig: J. M. Gebhardt, Taf. VI.

Together with their lager, the Germans brought to the United States the methods of constructing fermenting and aging / storage facilities in modified caves, in rock-cut chambers mined out of hillsides (*Felsenkeller*), or in deep underground vaults.³² All such facilities had to provide suitable spaces for moving and storing the barrels in a cold, dry and well ventilated atmosphere. Maintaining cold temperatures and ensuring proper air circulation were crucial for fermentation and aging to prevent spoilage and to remove the noxious gases produced during fermentation. Although every lager brewery needed facilities that could fulfil these requirements, the means of meeting them varied widely, so that no two breweries were exactly alike in their architectural arrangements. There were, however, certain basic, shared elements of the plans and workings of all lager cellars. The main points, set forth in some 19th century German technical manuals, may be outlined as follows:

Aside from pure water and high quality ingredients, the most important requirement for the production of good lager, whether aged or not, was cold temperatures. Cellars excavated at various depths underground offered the necessary environment, providing seasonal fluctuations in temperature could be mitigated. The deeper the cellar, the less the effect of these fluctuations, but only at 23 m depth (75.5 ft.), according to Tausing,³³ would the temperature no longer vary, but rather maintain the yearly above-ground average. The floor of the cellar, however, had to be above the water table, a factor limiting its potential depth. The cellars were composed of long, barrel-vaulted chambers, side-by-side, built

of brick and stone and heavily waterproofed on top with a thick coating of plaster. Depending on the size of the vaults, the thickness of the supporting walls varied between 1.3 and 1.5 m (4.3 to 4.9 ft.) and of the vaults, from 0.6 to 0.7 m (2.0 to 2.3 ft.) at the base to 0.5 to 0.6 m (1.6 to 2.0 ft.) at the crown.³⁴ The individual vaults in cellars cooled by ice chambers at the sides (see below) were typically 15.0-20.0 m long (29.21-65.21 ft.), 7.0-8.5 m wide (22.97-27.89 ft.) and 5.0-6.0 m in height (16.40-19.69 ft.).³⁵ Barrels, raised off the floor on low wooden racks, were stacked in two layers along the long walls. To keep warm air out, access to the vaults was limited to a single entry via an antechamber, which contained a staircase and hoisting apparatus.³⁶ If the lager was to be aged, rather than sold 'young' throughout the year, doorways between the chambers might be sealed after all the barrels were filled, to be opened only in the spring, when it was time to tap the barrels for the summer lager.³⁷

Ice was used to lower the temperature of the fermentation and storage areas. Initially, the blocks were placed in wooden crates or ice pits directly in the chambers, but in Germany, this method was generally abandoned by the mid-19th century, if not earlier, in favour of constructing separate compartments for the ice, which better retarded melting.³⁸ The ice chambers were built against the sides of the subterranean fermentation and storage chambers but in time, it became common to erect an icehouse, consisting primarily of a vast chamber filled with blocks of ice, over an above-ground or semi-subterranean, or wholly subterranean fermentation chamber, with one or more levels of subterranean

storage cellars beneath the latter, typically consisting of brick-built, barrel-vaulted spaces.³⁹

Where the ice room was on top, cold air could be conducted into the lower chambers and warm air removed through shafts built in the walls or erected on top of the vaults (Fig. 4). Additionally, vents leading outside the building were opened in winter or on cold nights to admit cold air into the cellars.⁴⁰ But all of these vents had to be sealed during the summer months to prevent warm air from entering, leaving only the minimum number operational in order to vent stale and humid air. The inside openings could be closed by a trap door or panel, while the upper opening of the shafts might be blocked, at a depth of approximately one meter from the top, by a wooden board, with sand or masonry rubble filling the space above it; or there was simply a flap that might be covered lightly with sand, allowing for easy removal during the colder seasons.⁴¹ Other sealing methods and materials were also possible. Schlager notes that in Brooklyn, as in Germany, the cold air from the icehouses was funnelled into the vaults 'via shafts with regulating valves', but unfortunately she did not document specific instances where this was the case.⁴²

There were many variations in the ventilation systems and lay-outs of German-American breweries during the 1860s and '70s. One such system, designed by Brainard and illustrated here in Fig. 6, shows a typical combination of icehouse, fermentation chamber and lager cellar as well as diagramming the ventilation system. This helps to elucidate the placement and purpose of the two openings in each of the end walls of Schnaderbeck's vaults, where one opening at floor level, corresponding to (A) on the diagram, will have brought cold air into the chamber, while a second, just below the ceiling, like (B), will have removed the warm air.⁴³ The chimney-like vents atop the Schnaderbeck vaults are comparable to the vents recorded in similar positions on the cross-section (Fig. 6). These vents allowed cold fresh air, weather permitting, to enter the building, and for noxious gases to be expelled. All of these openings could be blocked or unblocked as required by fluctuations in outdoor or indoor temperatures, in order to maintain a constant temperature in the cellar of just above freezing.

Lager cellars and tunnels abound in the U.S. cities where the German immigrants congregated, especially Chicago, Milwaukee, Cincinnati and St. Louis. A few examples of the many and generally poorly recorded installations are described here in order to indicate the variety of types and to highlight some of the earliest, as well as those best or most recently documented, but mainly focusing on the breweries and vaults of New York City.⁴⁴ The discussion of the architecture of the rare surviving vaults in New York City

reveals both individual idiosyncrasies as well as similarities with the Schnaderbeck vaults.

In the United States, the earliest lager cellar, by his own account, was built by Charles C. Wolf for his Philadelphia brewery, Engel and Wolf. Wolf claimed that he was the first to produce lager on a large scale and that his cellars, completed in 1845, were 'the first vaults built for the storage of lager beer'.⁴⁵ According to an 1855 advertisement illustrating his plant, the brewery stood next to the Columbia Rail Road atop a steep-sided rock outcropping in which five vaults were excavated to a depth of 45 feet. The entrance to this space, comprising 50,352 cu. ft., (1425.81 cu. m) was in the side of the hill below the brewery buildings.⁴⁶ It is not known whether the facility had an icehouse or whether Wolf kept his cellars cool with adjacent ice rooms and / or by packing ice on top of or next to the casks.

By the same date, 1845, according to a local newspaper article, Johann Adam Lemp had adapted an approximately 100-yard long section within a network of natural caves in St. Louis, MO to age and store the lager beer from his Western Brewery, established ca.1841-2 on Second Street.⁴⁷ Like other cave-cellars as well as in wholly constructed subterranean vaults, the space was subdivided into smaller units in order to contain the cold air when one or another chamber was filled or emptied.⁴⁸ The cellars below the brewery had carved out, barrel-vaulted ceilings. There were 25 of these, lying at various depths, up to 50.0 ft. (15.24 m).⁴⁹ Over time, due to increasing demand, Lemp extended his storage system into the surrounding caves. Archaeological investigations of the Lemp Brewery caves (but not the cellars below the brewery), documented nine discrete chambers behind brick-built partitions pierced by arched doorways, with brick-lined drains in the floors.⁵⁰ It was not possible, however, to determine whether all of these spaces were used for lagering or whether some were created at a later date for recreational purposes.⁵¹

Dating to the 1850s or 1860s, the Stahlmann Cave Brewery in St. Paul, MN, provides another example of a natural cave modified for the aging and storage of lager beer. Accounts published in 1877 and 1883 describe an extensive system of cellars 'three deep', excavated 60.0 ft. (18.29 m) below the surface. The natural refrigeration provided by the depth of the caverns was supplemented by ice. Each row of six to eight butts of beer (approximately 130 gallons apiece) were 'backed by a huge chamber of ice to keep them at the proper temperature', i.e. the above-described side-by-side arrangement.⁵²

In New York City, there is no karst topography and therefore no caves. The Ebeling Brewing Company's claim that its brew was 'Aged in Natural Rock Caves' near its brewery

in The Bronx is false: the caverns were actually excavated into the hillside, probably around the time the company was established, in 1868.⁵³ These spaces, no longer accessible, are poorly recorded, but a brick partition and arched opening are visible in photographs published in Kirby.⁵⁴ Similarly, the Bechtel Brewery ‘caves’ in Staten Island were brick lined vaults built before ca. 1861 into Grymes Hill.⁵⁵ The brewery was founded in 1853 and the caves were therefore probably built during that decade. The system consisted of five tunnels extending over approximately 60.0 ft. (18.29 m).⁵⁶ An artesian well that came out in the vaults provided the brewery’s water.⁵⁷

In New York, the first lager brewers were George Gillig, from Bavaria, who brewed lager in 1844 in his brewery on Third Street between Avenues A and B in Manhattan, and the Prussian Schaefer brothers, Frederick and Maximilian, who began making lager in 1848 in their second brewery in Manhattan, on 7th Avenue between 16th and 17th Streets.⁵⁸ We have no information about their lager cellars, although these must have existed.

In Brooklyn, the burgeoning German population’s demand for lager meant that in order to produce outside the winter months, brewers had to use ice to improve the natural refrigeration of their fermentation and storage cellars.⁵⁹ John Schneider’s 1854 lager brewery, one of the earliest established in Williamsburg, was equipped with a frame-built icehouse at least by 1868, if not from the start. His Congress Brewing Company, in Brewer’s Row, occupied the eastern end of the block between Scholes and Meserole Streets on the west side of Humboldt Street.⁶⁰ Schneider also offered a saloon with bowling, a very popular entertainment in such establishments in Germany.⁶¹ Two other pioneer lager brewers in Williamsburg were Nicholas Seitz and Samuel Liebmann.⁶² Seitz opened a brewery on Maujer Street in 1848 and began producing lager in 1850.⁶³ His son continued the business in a new location on Maujer Street, east of present-day Bushwick Place (presently occupied by a playing field). The business is first listed in this second location in the 1858-59 directory (Lain’s). By 1868, if not before, the facility was equipped with a brick-built icehouse.⁶⁴ Liebmann began brewing lager in 1855 in his first brewery, located just west of Brewer’s Row, on Meserole and Leonard Streets, but moved his operations to Bushwick the following year, where he founded the famous Rheingold Brewery.⁶⁵ A later brewery at 56-60 Meserole Street between Leonard and Lorimer Streets, in approximately the same location as Liebmann’s first establishment and possibly using the same buildings, had a brick-built icehouse.⁶⁶

While no information was found about subterranean vaults associated with any of these earliest lager breweries in

Brooklyn, we may surmise that the area was, and may still be, honeycombed with such installations, judging by the depth of the extensive cellars under Henry Urban’s Boulevard Brewery, described in an 1875 article in the *Brooklyn Daily Eagle*,⁶⁷ and those that still exist under the former Huber Brewery building on Meserole Street, east of Bushwick Place (see below). In Williamsburg, cold aging and storage cellars like these were built at various depths under the brewery buildings. According to the *Brooklyn Daily Eagle*, some breweries had cellars up to 80 ft. (24.38 m) deep. Such vaults had become a ‘prime necessity’ to stock the breweries’ ever-expanding output: ‘... the demand for increased facilities to store larger quantities of the fluid is made year after year, and still the cry is for more.’ Breweries had ‘as much or more space below the surface as above’, and cellars were ‘attached to every brewery’.⁶⁸

Henry Urban’s Boulevard Brewery, later called the Urban & Abbott Boulevard Brewery, was located on Scholes Street west of Bushwick Place.⁶⁹ Guided by the (aptly named) German foreman, Charles Keller, an un-named reporter from the *Brooklyn Daily Eagle* observed, in this brewery, ‘immense’ vaults with a ‘well bricked but damp floor’ containing the fermenting tubs.⁷⁰ His detailed description allows us to visualize what were probably very similar conditions at Schnaderbeck’s brewery. The cellar was kept at 5° F (sic) according to the freezing and not very precise reporter, who apparently did not realize that the temperature was given in Centigrade, i.e. 41° F, the recommended temperature for lager aging. The icy temperature was obtained, he related, by packing ice around the floor – thousands of tons monthly. After fermenting for ten to twelve days in the tubs, the mixture was pumped to the icehouse and placed in casks. The icehouse was a brick building that also contained the wash house where the kegs were cleaned and stored. Below the icehouse there were three levels of storage cellars, the lowest being 54.0 ft. (16.46 m) underground. Altogether, there were reportedly some 300,000 cu. ft. (8495.05 cu. m) of storage capacity underlying the brewery with space for about 40,000 barrels.⁷¹

Otto Huber began his operations in 1866 in a building formerly occupied by the Joerger brewery, at Graham and Meserole Streets. In 1868, he expanded into new premises at Meserole Street east of Bushwick Place.⁷² The surviving barrel-vaulted cellars under the former Huber Brewery are approximately 15.0 ft. (4.57 m) in height, built of brick, and equipped with channels running under the floor to carry off the melted ice water.⁷³ All these features are comparable to the Schnaderbeck vaults. There are, however, at least two levels of these cellars. The building also contained an artesian well, which provided the necessary pure water for Huber’s beer.

The best known, extant lager vaults in New York City are those underlying the former premises of the Nassau Brewing Company at 1042 Dean Street in Crown Heights, Brooklyn. The architects were Philip Engelhardt, John Platte, and Charles Stoll.⁷⁴ The oldest of the extant buildings dates to 1865; the icehouse was built by Stoll in 1871.⁷⁵ In one section of the former brewing company's cellar, the crowns of the brick vaults are punctuated by a series of deep transverse arches resting on brick piers projecting from the vault walls. The proportions of the vaults are lower and broader than Schnaderbeck's. The lunettes of the arched doorways connecting three parallel vaults were filled and the resulting rectangular doorways framed by a narrow wooden lintel resting on broad piers. There were small, rectangular, brick-lined ventilation shafts near the top of the stone end walls, as in the Schnaderbeck vaults. Drainage channels bisected the brick floors.⁷⁶

Sebastian Schnaderbeck and his brewery business

Sebastian Schnaderbeck was born in 1808 or 1809 in Upstadt bei Bruchsal, in Baden Germany, and died on or about 9 March 1891, in Farmingdale, New York.⁷⁷ In 1835, he married Catharina née Stengel (1810-1858). They had two sons, Edward (b. 1839) and August (b. 1850), and two daughters, although only Herriet (b. 1852) seems to have survived.⁷⁸ Edward eventually moved to Oyster Bay, Nassau and opened a lager, mineral water, and soda water bottling business with Richard Runge under the name 'Schnaderbeck & Runge' liquors.⁷⁹

Sebastian's first venture in New York was a wine import business at 13 Spruce Street. Within a couple of years, he formed a partnership with his neighbour, August Krager, a 'liquor' (sic) merchant at 11 Spruce Street.⁸⁰ The firm was called 'Shnaderbeck & Co' (sic).⁸¹ An older New Yorker, Krager had started his wine business at 102 Fulton Street in 1845/46.⁸² He lived in Manhattan, but Schnaderbeck settled in Williamsburg from the start.⁸³ In 1857-58, Schnaderbeck was selling liquor from the Maujer Street building where he later established his brewery (Fig. 3). Although brewers and workmen were sometimes accommodated in breweries at that time – and partly paid in beer – Schnaderbeck did not live over his business but first at 81 Second Street and then at 97 Union Avenue.⁸⁴ Krager eventually moved to 49 South 1st Street in Williamsburg, remaining Schnaderbeck's partner until he died on 6 September 1865, at the age of 61.⁸⁵

As noted, Schnaderbeck established his lager beer brewery before the end of 1859, when he apparently also closed the shop at 11 Spruce Street.⁸⁶ He was therefore among the ear-

liest lager brewers in Williamsburg. His New York business must have been quite successful, since starting a brewery of this size required a big investment both for the purchase or construction of brewery buildings and cellars as well as for acquiring equipment such as kettles, tubs, grinders, etc.⁸⁷ Around this time, Schnaderbeck went back to Germany, returning from Hamburg on the steamship Bavarian in June 1861.⁸⁸ Although the Schnaderbeck family archives record that there was at least one brewer among Schnaderbeck's ancestors, Sebastian's occupation on the ship's manifest was listed as 'Kaufmann' (businessman), and he may have gone to Germany to find a brewer.⁸⁹ Brewers were highly skilled and highly paid, and there were instances of brewers brought from Germany to oversee production in Williamsburg's breweries.⁹⁰

The 1859-60 directory lists 'Shauderbeck (sic) & Co. Stag brewery' at 19 and 21 Wyckoff n.[near] Union (33 Ten Eyck Street).⁹¹ In the 1861-62 directory, 'Schnaderbeck & Co. lagerbeer brewery' is at 19 Wyckoff (33 Ten Eyck) and 30 Remsen Streets (36 Maujer Street), with a depot at 17 Spruce in N.Y. The 1859-60 listing is the earliest known for 19 Wyckoff Street, where the vaults were located, indicating that Schnaderbeck was the first to develop the lot and that the brewery vaults, the building above them, and an adjoining two-story building, were the first constructions on the lot (Fig. 2). There is no specific mention or a description of an icehouse that might have occupied the second story over the vaults indicated on the Higginson's map or the two frame buildings, connected by a passageway, that stood immediately adjacent to the vaults on the eastern third (approximately) of the lot.⁹² There is no description of these, nor can we determine their date. They were drawn on a small piece of paper that was glued onto the original map and it is not possible to determine when this was done, or what was originally indicated on the plan! It should also be noted that during the time the brewery was in operation, these buildings were not connected by doorways to the building over the vaults.⁹³ After the brewery closed down the Ten Eyck building was put to various uses. A Federal (WPA) tax photograph shows a one-story garage.⁹⁴ Interestingly, while 20th century Sanborn maps no longer record a basement, suggesting that it had gone out of use, successive plans still indicate their diagonal outer wall, now serving as an interior division.⁹⁵ The above-ground portion of the building was demolished between 1982 and 1984.⁹⁶

Schnaderbeck initially had a liquor business at 30 Remsen, possibly in partnership with the liquor (merchant) William Stahlman, who was also listed at this address in 1857-58. Stahlmann opened a saloon at 30 Remsen in the following year.⁹⁷ These entrepreneurs followed in the footsteps of earlier brewers, who had businesses at this address. 30

Remsen Street was initially listed in the 1854-55 directory, suggesting that the property was first developed at that date as a residence. It was occupied by a merchant, Josiah O. Low, whose place of business was in lower Manhattan.⁹⁸ By the following year, however, beer was being sold at this address. The brewer Richard Klingholz, whose home was at 48 Remsen, maintained premises at 30 Remsen, ostensibly for his business,⁹⁹ as presumably also did his successor, the brewer John Kuhlman.¹⁰⁰ Schnaderbeck's brewery buildings at Ten Eyck Street, however, were apparently a new development. He opened his 'Shauderbeck (sic) & Co. Stag brewery' at 19 and 21 Wyckoff Street (Ten Eyck Street) in 1850-60 at addresses not previously listed in the directories.¹⁰¹ Since we do not have tax assessments for years prior to 1866, we cannot verify when Schnaderbeck acquired the property on Maujer Street (30 Remsen Street), only that the brewery was listed at this address, as well as on Ten Eyck Street, from 1861-62.

Judging by the directories and historic maps, the building still standing on the Maujer Street side of the former brewery, at number 36, incorporates the 1854 façade (Fig. 3). Its second and third floor windows are capped by slightly recessed arches typical of the *Rundbogenstil* (round arch style) adopted by later 19th century brewery architects. While the earliest brewery complexes of the 'pioneer days' before 1860 were, for the most part, an 'unsightly conglomeration of one-story structures,' those of the second period were more design-conscious, employing the services of expert brewery and brewery cellar engineers and architects, who advertised in trade journals such as *The American Brewers' Gazette*, *The American Brewer*, *The Brewers Journal*, and *The Western Brewer*.¹⁰² It is likely that the increasing emphasis on the breweries' appearance reflected the growth in their businesses' value and reputation.¹⁰³ A fourth floor was added to the façade of 36 Maujer Street in the 1890s, but the rear portion, visible from the street is three stories, as indicated on historic maps.¹⁰⁴

Schnaderbeck retired from the brewery ca. 1875, leaving his son August, a mere stripling of 25, in charge.¹⁰⁵ That lasted for two years, until ca. 1877-78. The 1876-1880 tax assessments record, in a faint notation, that the two-story building on Ten Eyck Street was then a 'factory', but the owner's name – no longer Schnaderbeck – is not legible. Henry Hesse purchased the property in May 1881 together with the building on Maujer Street and continued to operate a factory in the two-story structure on Ten Eyck Street, although the building on the Maujer Street side of the property was still listed in the tax assessments as the 'S. Schnaderbeck brewery'. By 1883, however, this building was a 'mere wreck' and in the following year, 'in ruins'.¹⁰⁶ During the mid-late 1880s, there were efforts to turn the old brewery into a thea-

tre, but the work was never completed.¹⁰⁷ This is the last we hear of the project, except that the site became a hazard. Thirty-foot deep cellars, approximately the depth of those discovered on Ten Eyck Street, were 'left exposed and without safeguards' and a boy fell in and was 'fatally injured'.¹⁰⁸ But the roofs of the vaults revealed in the excavations were perfectly intact. Could the boy, then, have plummeted down the same, thirty-foot deep shaft as a worker killed some 25 years earlier in the same way,¹⁰⁹ and is it possible that room for 2,000-odd people in the planned theatre was made feasible because another set of cellars existed on the Maujer Street side of the property?

Beyond Sebastian Schnaderbeck's origins, the names of his wife and children, and his brewery, we know little of his personal history. Only two events reported in the *Brooklyn Daily Eagle* give us some insight, perhaps, into the Schnaderbeck household and Sebastian's character. In one account, the family's servant managed to mistake arsenic for soda, put it in the pudding, and poisoned everyone. Fortunately, the doctor arrived in time to save them.¹¹⁰ Then in January 1873, an individual named only as 'Miller', who was either staying or residing in Schnaderbeck's home, died in bed. The coroner's initial determination was death by natural causes: 'fatty accumulations around the heart'.¹¹¹ But when a packet of strychnine – from a Newark apothecary, according to the label – was found in the bed, the cause of death was changed to suicide. Apparently, Schnaderbeck had known about the packet but 'kept mum' as he said: 'It was bad enough to have the old scoundrel die in my bed without having any more bother about him'.¹¹²

The Schnaderbeck Brewery vaults

The footprint of Schnaderbeck's cellars consisted of a trapezoidal building measuring approximately 100.0 ft. (30.48 m) north / south by 47.5 ft. (14.48 m) on the south and 40.3 ft. (12.28 m) on the north (Fig. 7). The top of the structure is about 14.0 ft. (4.27 m) below grade. The interior of the brick and field stone construction is divided into four barrel-vaulted chambers, all 14.0 ft. (4.27 m) in height, sharing the three interior long walls, each of which was 3.0 ft. (0.91 m) thick, with an arched opening near the eastern end. On the plan, the vaults are numbered 1 to 4, from south to north. The width of each of the chambers was approximately 22.0 ft. (6.7 m). Each vault has a circular opening near the top centre of its crown measuring 2.0ft (0.61 m) in diameter (Figs. 8, 9, & 10). When the top of the vaults was cleared, it was discovered that tall chimney-like ventilation structures had stood over these openings (Figs. 4, 8 & 10). The thickness of the crown of both vaults 1 and 3 at this opening, was 1.33 ft. (0.41 m).

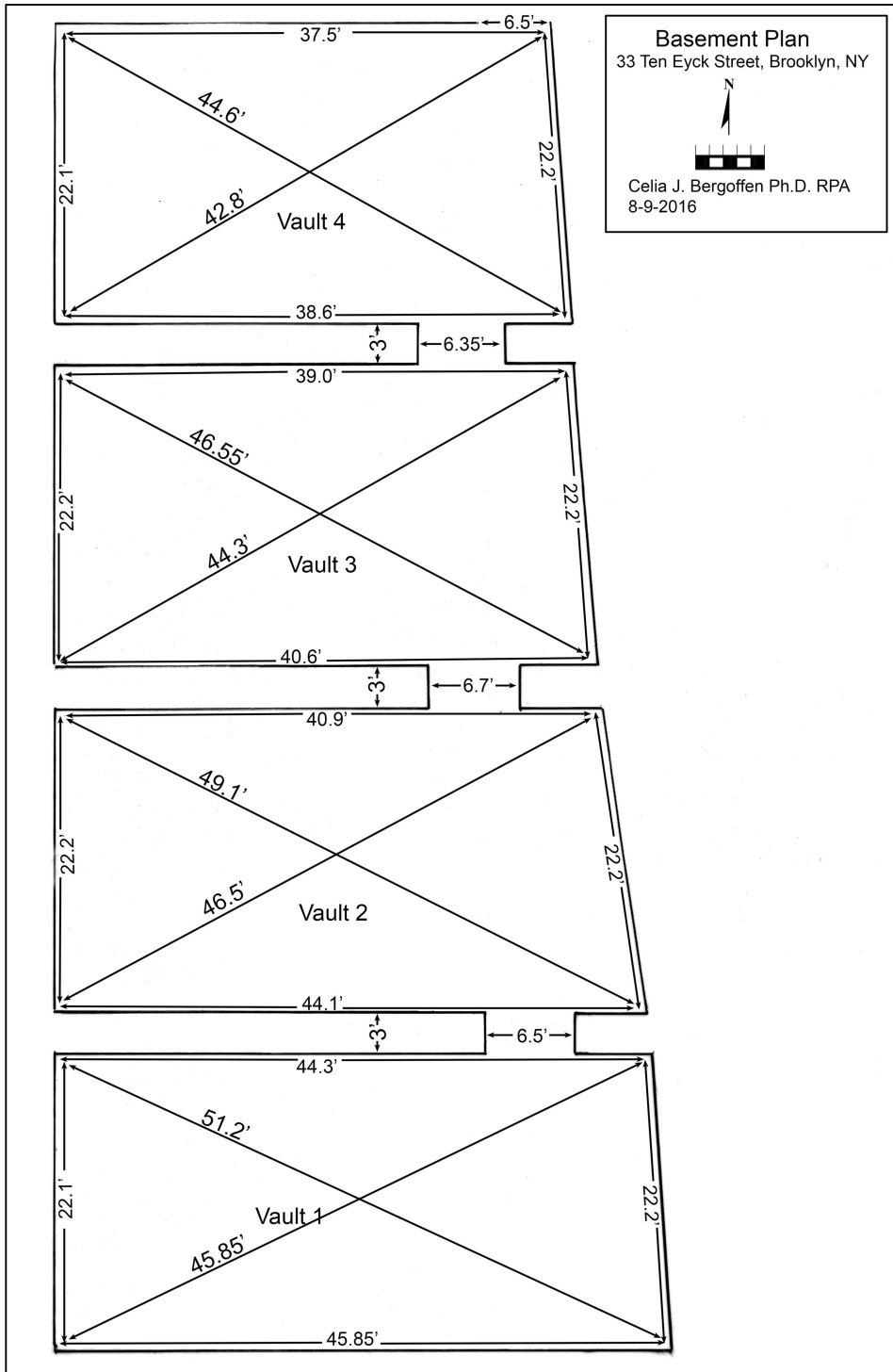


Figure 7. Ground plan of the Schnaderbeck Brewery vaults. Celia J. Bergoffen and Arnulf Hausleiter .

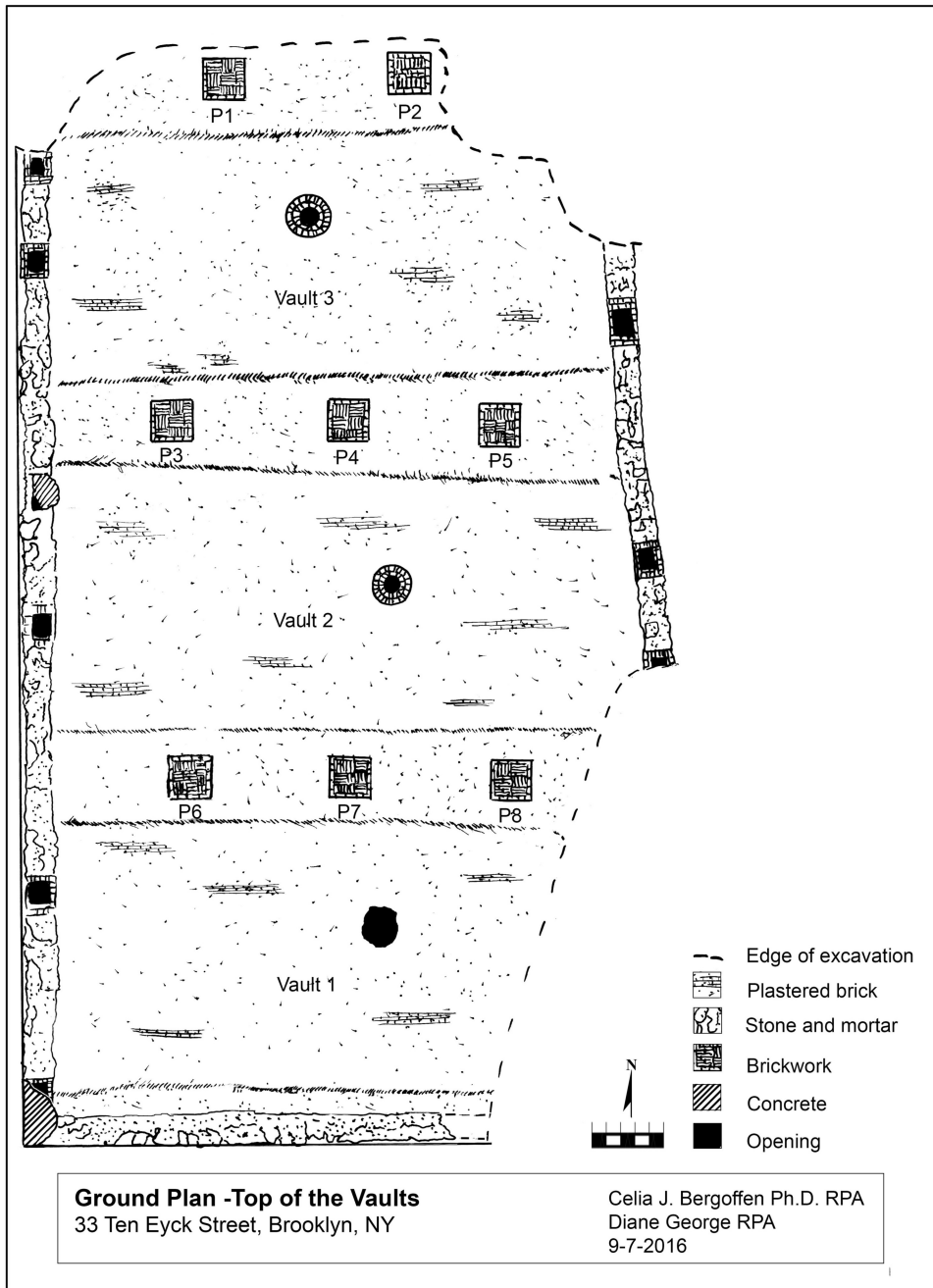


Figure 8. Plan of the top of the Schnaderbeck Brewery vaults. Celia J. Bergoffen and Diane George .



Figure 9. Aerial view of the south wall, the cobble packing, partly covered by plaster, the access shaft and small pipe (?) openings in the roof of vault 1, and piers 6, 7, and 8. Photo by Petr Hejl.



Figure 10. View to the south over the vaults, the author and Petr Hejl, the chimney-shaped shaft on vault 3 and pipe (?) opening, the east wall, piers 5, 4, 3, the chimney-shaped shaft on vault 2, piers 8, 7, 6. Photo by Petr Hejl.



Figure 11. Vault 1: Ventilation shaft openings in the west wall, pipe (?) opening in the roof of the vault. Photo by Christopher D. Brazee.



Figure 12. Vault 2: Ventilation shaft openings in the east wall, doorway to vaults 3. Photo by Christopher D. Brazee.

The stone bases of the vaults' brick walls vary between approximately 3.83 ft. (1.17 m) and 4.17 ft. (1.27 m) in height (Figs. 1, 11, etc.). Roughly dressed and of unequal sizes and shapes, the stones were laid with a great deal of mortar in irregular courses. The end walls were built primarily of stone interrupted by brick ventilation shafts, one running the full height of the wall with its opening just above the floor, and a second opening immediately below the arch of the vault. This bonded field stone and brick construction is typical of German cellar architecture.¹¹³ The lower openings were capped by an arch composed of bricks set vertically (soldier course). The upper vent openings were usually cut by the arc of the vault. No two were identical (Figs. 1, 11, 12, 13, 14, 15, 16 & 17). For instance, the top edge of the upper opening in the west wall of vault 1 was bisected on one side by the arch of the vault and capped by a single row of brick headers over the other (Fig. 11). A double arch, composed of headers, elaborately capped the top of the opening in the east wall of vault 3 (Fig. 18). Each vault was also vented through the circular chimney openings. The bricks of the vaults were mostly laid as stretchers, interspersed with occasional headers in no discernible pattern.

In addition to the five ventilation openings found in all four vaults, two on each end wall and one in the ceiling, the long south wall of vault 1 had two further, widely spaced shaft openings (Fig. 19). These brick features pierced the stone footing. Their openings were capped by shallow arches composed of a double row of headers. Above the western opening and its arched cap, three further rows of stretchers filled the space to the top of the stone footing. Above the eastern opening there was room for only a single course of stretchers. A relieving arch composed of a double row of headers was built into the brick wall above both openings. Although the exterior of these openings was not cleared and could not be traced, both were filled with brick detritus and therefore evidently originally led into shafts that rose to the surface or higher, along the street front of the building.

As noted above, the flow of warm air into the chambers must have been controlled by sealing the various shafts, both within the chambers and at their outlets, but no physical evidence of this was recovered. Some fragments of thin wooden planks were found among the detritus on the floor, but we were unable to determine what their original form or function may have been.

There was a small round opening in the north wall of vault 1, just above the stone footing, and three slightly larger round openings, one in the crown of each of the three vaults exposed. One of these was intentionally blocked by a stone (Figs. 9, 10, 11 & 15). These openings would have been suitable for the pipes or hoses needed to bring in water for

washing the floors, walls and barrels, as well as to conduct the lager into the barrels.¹¹⁴

Each of the four chambers communicated with its neighbour by an arched doorway, about 6.83 ft. (2.08 m) wide, near the eastern end of its long wall (Figs. 1, 12, 14, 20 & 21). There was no sign of any door posts. The arches were stilted, that is, slightly set back from the edge of the impost, which was the top of the stone base of the wall. The doorways between vaults 2 and 3, and 3 and 4, were aligned, but the one between vaults 1 and 2 was 1.5 ft. (0.46 m) further east than the others (Fig. 7). The opening in the north wall of vault 4 was still further east, only 0.75 ft. (0.23 m) from the vault's east wall. This last was blocked by brick detritus but was evidently the only access to the vaults, via a staircase from the Maujer Street building (Fig. 21).

The arches over the shaft openings and doorways were quite irregular, built both of voussoirs and stretchers. The uneven workmanship suggests that there was no imposition of a standard technique on the bricklayers, who were not all equally skilled. The lack of "quality control" was observed in particular in the arch over the doorway in the south wall of vault 3 (Fig. 20). On the east side, the bricks were laid in two uneven rows of voussoirs, but on the west side, they were laid in horizontal rows and corbeled for the curved opening. A seam further east in the wall suggests that this side of the arch collapsed and was rudely patched.

The floors were brick. In the middle of the doorway between vaults 2 and 3 there was a circular, vertical metal drain, filled with muddy water, once fed by two narrow pipes, one on either side of it, running along the floor parallel to the threshold (Fig. 21). There may have been additional drainage features concealed under piles of bricks or puddles of mud that we were not able to remove.

Once the top of vaults 1, 2 and 3 were cleared of detritus, we could examine the profiles of the west, east and south outer walls, which were all 1.9 (0.58 m) to 2.0 ft. (0.61 m) thick (Figs. 9, 22, 10, & 23). The top of vault 4 and the north outer wall of the structure were not excavated for fear of undermining the building on the adjacent lot. It was not clear how the south wall of the complex, built of roughly dressed stone, was bonded to the south brick wall of vault 1 and its stone footing. The vaults' interior east and west walls continued above the tops of the vaults to form the outer walls of the building (Figs. 10, 22, & 23). Their construction may have been slightly different, the east being built of two stone faces with clinkers and smaller stones filling the space between them, but in the west wall, the roughly dressed stone faces were tightly packed leaving no discernible intervening space except for the brick shafts. We did not observe any



Figure 13. Vault 2: Ventilation shaft openings in the west wall. Photo by Christopher D. Brazee.



Figure 14. Vault 3: Ventilation shaft openings in the east wall, shaft opening in the roof of the vault, doorway to vault 4. Photo by Christopher D. Brazee.



Figure 15. Vault 3: Ventilation shaft openings in the west wall, pipe (?) opening in the roof of the vault. Photo by Christopher D. Brazee.



Figure 16. Vault 4: Upper ventilation shaft opening in the east wall (lower obscured by debris), opening in the roof of the vault, doorway to vault 3. Photo by Christopher D. Brazee.



Figure 17. Vault 4: Ventilation shaft openings in the west wall. Photo by Christopher D. Brazee.



Figure 18. Vault 3: East wall, upper shaft opening. Photo by Celia J. Bergoffen.



Figure 19. Vault 1: West shaft opening in the south wall. Photo by Celia J. Bergoffen.



Figure 20. Vault 3: Doorway in the south wall to vault 2. Photo by Celia J. Bergoffen.

openings on the top of the south wall. The manner of constructing the shafts running through the east and west outer walls was found to be inconsistent, with the sides of the shafts in the west wall of vault 3 being two bricks wide, and the bricks laid as stretchers, while the shafts in the east wall were built of only one row of bricks, sometimes laid on end (Figs. 10, 23 & 24). The width of the openings was approximately 2.0 ft. (0.61 m) and 1.1 ft. (0.34 m) in depth.

The best preserved of the chimney-like structures, found on the top of vault 3, was 7.35 ft. (2.24 m.) in height (Fig. 25). Its profile was bulbous or hourglass-shaped: wider at the base and tapering to the top. At 3.0 ft. (0.91 m) below the top, the diameter was 2.3 ft. (0.7 m). At the base, the diameter was 2.9 ft. (0.88 m). It was built of two concentric rings of whole and partial bricks laid in stretcher courses with copious amounts of mortar. Some of the bricks appeared to be overfired, possibly clinkers. The curvature of the structure was achieved by using broken bricks. The opening at the chimney's top was 0.92 ft. (0.28 m) in diameter.

Exposing the top of the vaults, which was covered by a thick layer of waterproof plaster, provided data for the stories over the lager cellar by bringing to light a series of piers that would have supported the ground floor of the building (Figs. 8, 9, 10, 22 & 25). At the northern-eastern end of the excavated area, the eastern outer wall of the building's basement level, above the vaults, was found preserved to approximately 13.0 ft. (3.96 m) in height, that is, almost to ground level (Fig. 23). The interstices between the crown of vault 1 and the outer south wall and between the haunches of the vaults were filled with rubble and cobbles and plastered over (Fig. 9). Eight piers, of solid brickwork, stood in two rows of three and one of two on top of this levelled strip, over the three interior long walls of the vaults. All eight piers measured 3.0 by 3.0 ft. (0.91 m) at the foot, on top of the vaults.

The two brick piers between vaults 3 and 4 were the best preserved, although the tops of both were broken off (Fig. 25). Pier 1, on the west, was 12.9 ft. high (3.93 m) and pier 2 was 14.3 ft. (4.36 m), bringing it to approximately street level. Both were built in sections diminishing in size from bottom to top. The lowest of the three extant sections, approximately 4.0 ft. (1.22 m) in height, was capped by a 3-inch-thick (7.62 cm) granite slab. The middle sections were 5.7 ft. (1.74 m, pier 1) and 6.0 ft. (1.83 m, pier 2) and the topmost 3.2 ft. (0.76 m, pier 1) and 3.3 ft. (1.01 m, pier 2). The second and third steps were rectangular in section, their long north-south axes set back from the piers' south faces.

The other six piers were preserved to heights varying between 2.95 ft. (0.9 m) and 4.58 ft. (1.4 m). The brick cores were laid in a quasi-chequerboard pattern of grouped head-

ers and stretchers, with faces composed mostly of stretchers, irregularly interrupted by headers. As in the chimneys, there were thick layers of mortar between the brick courses, again suggesting varying levels of skill among the brick layers and the absence of standardized practice.

Aside from large amounts of brick detritus that had fallen into the vaults from the ventilation shafts, and especially through the north doorway in vault 4, the vaults had been cleared of their contents and there were almost no finds. Those few there were are not chronologically significant since they could have been introduced at any time through the shaft openings. A fragment of a ceramic plate with the mark 'Thomas Hu... Burslem', was possibly made in the Thomas Hughes pottery in Staffordshire, which was in operation between c.1860-94 (Thomas Hughes). The embossed label, 'WELZ & ZERWECK BREWERS BROOKLYN. N.Y.' on a neckless, clear glass beer bottle, dates it to after 1883.¹¹⁵ Aside from these two artefacts, there were a few metal buckets and pans and a small amount of unidentifiable metal detritus.

Some of the bricks found on the floor, fallen in through the shaft openings, probably once belonged to the building that stood above the vaults. Three brickmakers' stamps were recorded, all from 19th century Hudson Valley brickmakers. They were: an arrow, for the Arrow Brick Co. in Danskammer Point, NY; '...RYBROS', for Terry Bros. Brick Co. in East Kingston, NY, and 'ROSE', for the Rose Brick Co. in Roseton, NY.¹¹⁶

Conclusion

The dimensions of Schnaderbeck's vaults, and the total area of all four combined, was smaller than the sizes recorded in the above-cited 19th century German brewery handbooks. The plan of the complex, however, consisting of a series of parallel, vaulted chambers, and the mixed brick and stone construction, were typical of German brewery lager cellars, with a German state-of-the-art ventilation system. Based on similarities with the German Brainard system, it is possible that there was an icehouse built over the vaults and that the double shafts in each of the end walls introduced cold air from the ice chamber through the lower opening and removed warm air from the upper. Admittedly, this would make Schnaderbeck's icehouse, if it existed, an unusually early example. Although it is not possible to gauge or reconstruct the original height of the chimney-like structures, brewery vaults require airing to remove humidity and noxious gases, and we therefore agree with Arendt-Fleming's idea¹¹⁷ that these shafts, placed over the middle of each of the vaults, rose above the roof of the presumed icehouse into



Figure 21. Vault 2: Doorway in the north wall to vault 3 with circular drain in the threshold, view of blocked doorway in the north wall of vault 4. Photo by Celia J. Bergoffen.



Figure 22. View over vaults 1 and 2 and piers 6, 7 and 8, to the west wall. Photo by Celia J. Bergoffen.



Figure 23. Outer face of the east wall with brick shaft. Photo by Celia J. Bergoffen.



Figure 24. Shaft in the west wall above vault 1. Photo by Celia J. Bergoffen.



Figure 25. Chimney-shaped shaft on the top of vault 3 and piers 1 and 2. Photo by Christopher D. Brazee.

the open air, as depicted in the cross-section of the Brainard-system fermenting and Lager cellar (Fig. 6). What is missing are the flaps or trap doors or other means of blocking the openings of the shafts during the warmer months of the year. How exactly the lager was channelled into the barrels, and how the space was effectively drained are also questions that the archaeological remains could not fully answer. The examination of the vaults' interiors and exteriors revealed only four small openings suitable for pipes and one vertical drain in the floor. Nor are we able to reconstruct, on present evidence, the arrangement of the rest of the complex in toto or how the several stages involved in brewing moved through it. In sum, however, the historical research on the brewery and the physical evidence provided by the vaults have effectively resurrected one of the oldest lager breweries in the district -- albeit in operation for only a short period -- as well as providing some insight as to how their cellars were constructed and ventilated.

The proliferation of lager breweries in Brooklyn from the mid-1850s on reflects both the concentration of a German lager market and favourable conditions for the industry, principally pure spring water and land for building the breweries. Conversely, the introduction of artificial refrigeration in the 1870s would have permitted bigger operators to expand their markets and possibly to drive out of busi-

ness smaller producers or those unable to keep up with technological improvements. Although Schnaderbeck may have introduced more up-to-date methods in his brewery, as suggested by the *Brooklyn Daily Eagle* reporter,¹¹⁸ the business required a lot of capital and competition was fierce. These factors, together with Schnaderbeck's retirement from the business and possibly his son's inability to keep it up, may have led to the Brewery's demise ca.1878.

Williamsburg was one of the main centers of lager beer production in the United States in the 1860s and 1870s, when Schnaderbeck's Brewery was in operation. Although his was not one of the larger operations, Schnaderbeck was among the first to set up shop in the district. Several dozen brewery vaults must have existed in Williamsburg contemporary with Schnaderbeck's, some, much more extensive. But neither of the two extant cellars known to this writer have been properly documented with measurements and photographs. Aside from the present contribution, there are no detailed descriptions of brewery vault construction in New York City. Further research on this topic should include an in-depth study of the former Huber Brewery and Nassau Brewing Company's vaults and a survey of all the sites of former breweries in Williamsburg that were in operation in the period ca.1855-1880. It is an open question whether, given the depth and the number of cellars that pur-

portedly existed in the district, other vaults like Schnaderbeck's are still waiting underground to be rediscovered.

Acknowledgements

I would like to thank Professor Arnulf Hausleiter for assisting with the photography for the 3D model, Dr Matthias Kolbe for creating the model, and Dr Matthew J. Adams, for generously uploading it to his Sketchfab platform. Professor Corinna Rohn kindly introduced me, virtually, to Falko Arendt-Fleming, who shared his invaluable knowledge of German historic brewery architecture with me. Discussions with Professor Susan Appel, Patricia Salmon, Michael Padwee and Dr. Bernhard Purin, as well as Joshua Richholt and Professor Steve C. Okulewicz's first-hand accounts, were very helpful. I am grateful to Connie Schnaderbeck-Fordan and Jerome Schnaderbeck for sharing their family's archives. I thank Christopher D. Brazee for his superb site photographs, available at <https://www.flickr.com/photos/7752650@N03/>, and Diane George RPA, for her excellent notes and drawings.

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22. *Daily Tribune* (1854) op. cit., pp.25-26.
23. *Brooklyn Daily Eagle* (1875) op. cit.
24. *Brooklyn Daily Eagle* (1874) 'Eighth District delegates 8th Assembly District,' 17 September.
25. Rich, H. (1903) *One Hundred Years of Brewing*. Chicago: H. Rich & Co., p.157, Schlagel, A. (1976) op. cit., p.8; LaFever, A. (2010) 'Breweries of New York: A look at how the cultural and industrial development of the brewing industry influenced brewery architecture in New York City.' Term paper for American Architecture I, Columbia University, Prof. Andrew Dolkart p.10, Image 1.
26. Rich, H. (1903) op. cit. p.207.

27. Lintner, C. (1878) *Lehrbuch der Bierbrauerei nach dem heutigen Standpunkte der Theorie und Praxis unter Mitwirkung der angeheerensten Theoretiker und Praktiker*. Braunschweig: Friedrich Vieweg und Sohn, p.316
28. Rich, H. (1903) op. cit., p.93.
29. Tausing, J.E. (1877) *Die Theorie und Praxis der Malzbereitung und Bierfabrikation mit besonderer Berücksichtigung des Wiener Brauverfahrens nach eigenen Ergahrungen bearbeitet*. Leipzig: J.M. Gebhardt, p.535.
30. *Daily Tribune* (1854) op. cit.; Tausing, J.E. (1877) op. cit., pp.535-536. Winter beer, which was not aged, does not keep its freshness or its carbonation very long and must be sold quickly after the keg is tapped. But it had the advantage of being cheaper to produce and less risky, having less chance to spoil.
31. Schlagel, A. (1976) op. cit., p.6.
32. Lintner, C. (1878) op. cit., p.316.
33. Tausing, J.E. (1877) op. cit., p.537.
34. *ibid.*, p.539.
35. *ibid.*, p.540.
36. *ibid.*
37. Schmidt, C.H. (1853) *Grundsätze der Bierbrauerei nach den neuesten technisch-chemischen Entdeckungen*. Weimar: B.F. Voigt, p.187; Tausing, J.E. (1877) op. cit., pp.537-538.
38. Schmidt, C.H. (1853) op. cit., p.185; Lintner, C. (1878) op. cit., p.322; Tausing, J.E. (1877) op. cit., p.540.
39. Tausing, J.E. (1877) op. cit., p.543, Fig. 148.
40. Schmidt, C.H. (1853) op. cit., p.186; Tausing, J.E. (1877) op. cit., p.537.
41. Schmidt, C.H. (1853) op. cit., p.187; Lintner, C. (1878) op. cit., p.321.
42. Schlagel, A. (1976) op. cit., p.24.
43. Tausing, J.E. (1877) op. cit., p.544.
44. Cincinnati has an extensive network of vaults under the streets in the heart of its 19th century German neighborhood, nicknamed 'Over-the-Rhine' ('Brewery's underground tunnels open for tours,' 5WLWT, Nov. 15, 2013, <https://www.youtube.com/watch?v=tC0SZb0s-kA>). *Marauders* (2016) was partly filmed in the section of tunnels built by the John Kauffman Brewing Co. after 1859.
45. Rich, H. (1903) op. cit., p.207.
46. *Engel and Wolf's Brewery* [1855] Engel and Wolf's Brewery and Vaults at Fountain Green. Office Number 26 and 28 Dillwyn Street between Vine and Callowhill and Third and Fourth Streets, Philadelphia. Lithograph by A. Kollner. The Library Company of Philadelphia. https://digital.librarycompany.org/islandora/object/digitool%3A36236?solr_nav%5Bid%5D=663ca09e029a1ce69d6d&solr_nav%5Bpage%5D=0&solr_nav%5Boffset%5D=0 Accessed 1 January 2021.
47. Williams, C. (2013) 'An Examination of the Lemp Brewery Cave,' *Brewery History*. No.155, p.17.
48. Schmidt, C.H. (1853) op. cit., pp.185-186; Lintner, C. (1878) op. cit., p.317; Rich, H. (1903) op. cit., pp.145-146.
49. Rich, H. (1903) op. cit., p.212.
50. Williams, C. (2013) op. cit., p.18.
51. *ibid.*, p.31.
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53. Twilley, N. (2009) Bronx Beer Caves. Edible Geography Thinking through Food. <http://www.ediblegeography.com/bronx-beer-caves/> Accessed 16 December 2020. IMAGE: Ebling's Special Brew label.
54. Kirby, M. (1965) 'Allan Kaprow's "Eat."' *Tulane Drama Review*. 10: 2, pp.46-48.
55. Salmon, P.M. (2016) *Staten Island's Brewery Barons*. New York: P.M. Salmon. Pp.vi, 52-53.
56. *ibid.*
57. According to S. Okulewicz, a geologist and life-long Staten Islander, at the back of the bar, 'There was a pipe coming out of the wall in a crack in the serpentine with a basin below it, and a narrow channel running down the middle of the concrete floor, about two inches wide, to capture the overflow' (pers. comm.).
58. Rich, H. (1903) op. cit., pp.209. 213.
59. *ibid.*, p.70.
60. *ibid.*, p.260; Schlagel, A. (1976) op. cit., p.125; *Higginson's* (1868) op. cit., pl.83; the address was 169 Meserole Street, no doubt the same as the complex at the corner of Scholes and Smith Streets (the former name of Humboldt Street), marked 'J. Sheiders Brewery' on Dripps, M. (1869) *Map of the city of Brooklyn: being the former cities of Brooklyn & Williamsburgh and the town of Bushwick, as consolidated January 1st, 1855 by an act of the legislature of the State of New York ... showing also a part of the City of New York*. New York: M. Dripps.
61. *Smith's Brooklyn Directory*, 1855-56.
62. Schlagel, A. (1976) op. cit., p.18.
63. Rich, H. (1903) op. cit., pp.175-176, 230.
64. *Higginson's* (1868) op. cit., pl.84.
65. Rich, H. (1903) op. cit., p.176; Schlagel, A. (1976) op. cit., p.18.
66. *Higginson's* (1868) op. cit., pl.83.
67. *Brooklyn Daily Eagle* (1875) op. cit., p.2.
68. *Brooklyn Daily Eagle* (1870) 'Lager Beer: where and how the Beverage is Made,' 2 August, p.2.
69. Bromley, G.W. & Co. (1880) *Atlas of the Entire City of Brooklyn*. New York: Geo. W. Bromley & E. Robinson, pl.27.
70. *Brooklyn Daily Eagle* (1875) op. cit., p.2.
71. Schlagel, A. (1976) op. cit., p.58.
72. *Brooklyn Daily Eagle* (1889) 'Otto Huber Dead. The Eastern District Brewer Passed Away Last Evening,' 1 September, p.1; Rich, H. (1903) op. cit., p.376; Schlagel, A. (1976) op. cit., p.58.
73. This description was supplied by Joshua Richholt, former proprietor of the recently closed venue called "The Well," a large beer hall and garden housed in the former brewery. According to Richholt, the beer hall's name was not originally inspired by the artesian well, 'but ... had a rather more nefarious origin. Back when NYC was broke and things less safe, the police named that area of Brooklyn, The Well, as it was where they said all the drugs and criminals came from. No matter what they did, the well never ran

dry' (pers. comm. Messenger, 12 December 2020). The extensive former brewery building complex at 1 Bushwick Place, including a warehouse built in 1858, sold in March 2015 for \$26 million and was then occupied by music rehearsal and recording spaces, Mauer M. (2015) 'East Williamsburg music mecca sells for \$26M: Tenants at 260-272 Meserole include the Well, the Wick and the Sweatshop', *The Real Deal - New York Real Estate News*. March 25. <https://therealdeal.com/2015/03/25/east-williamsburg-music-mecca-sells-for-26m/> Accessed 6 January 2021.

74. Stoll was considered one of the pioneer architects and engineers of breweries.' In 1871, he patented an improved malt reservoir *Brooklyn Daily Eagle* (1871) 'Recent Local Patents,' 20 January. 20, p.2; National Register op. cit.). Carpenter-builder Philip Engelhardt immigrated from Baden. His son, Theobald M. Engelhardt, became a well-known Brooklyn architect who created various buildings including breweries.

75. National Register, op. cit.

76. The landmarked complex was transformed into green-focus lofts in the ice house with small manufacturing and other businesses in the main building. Taking advantage of the ideal conditions for cheese aging in the subterranean vaults, the owners created the Crown Finish Caves in partnership with the Parish Creamery Co. in Vermont, (*Cheese Reporter* (2014) 'NYC's Newest Cheese Cave Created In 1850s Underground Lagering Tunnels', 25 July, pp.6-7. <https://static1.squarespace.com/static/548312f0e4b05054300d1e72/t/5485eb2ae4b0e2b388dfa4fb/1418062634476/cheese+reporter.pdf> Accessed 1 January 2021; Krommydas N. (2014) 'Inside the Caves of Brooklyn's Brewing History - A Tour with Joshua M. Bernstein'. <http://www.ediblebrooklyn.com/2014/01/15/photos-inside-caves-brooklyns-brewing-history-tour-joshua-m-bernstein/> Accessed 1 January 2021). Before the COVID 19 pandemic, they also held bimonthly concerts in the vaults.

77. 'Rootsweb' lists Sebastian Schnaderbeck's birth date as 10 June 1806; the 1875 U.S. Federal Census as 'about 1809', and a printed death notice in the Schnaderbeck family album records that he was in his 83rd year at his death.

78. The children's birthdates were taken from the 1875 U.S. Federal Census. Herriet is the name recorded in the Schnaderbeck family album, but it appears as Harriet in the census.

79. U.S. Federal Census 1900; *Lain and Healy's Brooklyn and Long Island Business Directory*, Brooklyn: Lain & Co., 1897.

80. *The New York City Directory*. New York: Charles R. Rode, 1850-51; *Doggett's New York City Partnership Directory*, New York: J. Doggett Jr.

81. Schnaderbeck is also spelled without the 'c' in the earliest directory listings.

82. *New York City Directory* 1845-46.

83. His home is only recorded as Williamsburg without a street address in the 1847 to 1855 directories (*Doggett's New York City Directory*. New York: J. Doggett Jr.; *Rode's New York Business Directory*, New York: Charles R. Rode). His address at 81 Second was first recorded in 1855-56; his 97 Union Avenue address (corner

of South First Street, as noted in most of the directory listings), in 1858-59.

84. *Polk's Brooklyn (N.Y.) City Directory*, New York: R.L. Polk & Co., 1855-56 and *Lain's Brooklyn New York Directory*, Brooklyn: Lain & Co., 1857-58 and 1858-59.

85. New York City Tax Assessments. Brooklyn, ward 15, block 2791, 1865; *New York Herald* (1865) 'Obituary, Henry August Kraeger,' 6 September, p.8.

86. *New York City Directory* 1858-59, 1860-61; *Brooklyn Daily Eagle* (1860). The earliest preserved tax assessments, from 1866, list a 'beer cellar'.

87. *Brooklyn Daily Eagle* (1883) op. cit.; Ernst, R. (1949) op. cit., p.91. At that time the brewery was valued at \$20,000 (approximately \$383,000 today; tax assessments).

88. *New York Times* (1861) 'Markets by Telegraph,' 19 June.

89. The ancestor, Andrees Schnatterbock (sic) is named in the Schnaderbeck family album. Above his name is the brewer's six-pointed star and the word 'Schild' (shield). The text written in ink reads: 'Dieses kleine schöne Büchlein gehört dem Andrees Schnatterbock 1818' (This beautiful little booklet belongs to Andrees Schnatterbock 1818). I thank Jerome Schnaderbeck for providing a photograph of the page and Dr. Bernhard Purin for deciphering the handwriting and providing the translation.

90. *Brooklyn Daily Eagle* (1875) op. cit.

91. The addresses recorded in the tax assessments of 1866, the earliest preserved, are 8 Wyckoff, Beer, and 9 Wyckoff, Cellar. Street addresses were frequently changed in this period.

92. *Higginson's* (1868) op. cit., pl.84.

93. For instance, Robinson, E. (1886) *Robinson's Atlas of the City of Brooklyn*. New York. E. Robinson and R.H. Pidgeon, Civil Engineers. New York: E. Robinson, pl.14, and later maps.

94. Hyde, E.B. (1912) *Atlas of the Borough of Brooklyn, City of New York*. Brooklyn: E. Belcher Hyde, Vol. 3. pl.6; Sanborn (1918-47) *Insurance Maps of the Borough of Brooklyn*. Vol. 3, pl.37.

95. Sanborn (1918-47) *Insurance Maps of the Borough of Brooklyn*. Vol. 3, pl.37.

96. Sanborn (1982) *Insurance Maps of the Borough of Brooklyn*. Vol. 3, pl.37; Sanborn (1984) *Insurance Maps of the Borough of Brooklyn*. Vol. 3, pl.37.

97. *Lain's Brooklyn New York Directory*. Brooklyn: Lain & Co., 1858-59.

98. *Smith's Brooklyn Directory*. 1854-55; *Hearn's Brooklyn City Directory*. Brooklyn: Henry R. and William J. Hearne, 1854-55.

99. *Smith's Brooklyn Directory*. 1855-5.

100. *Smith's Brooklyn Directory*. 1856-57.

101. *Lain's Brooklyn New York Directory*. Brooklyn: Lain & Co., 1858-59.

102. Schlagel, A. (1976) op. cit., pp.1-3.

103. Rich, H. (1903) op. cit., p.137; Widmann, F. (1912) 'The Development of the Buildings and Equipments of Breweries from Pioneer Times to the Present Day,' *The Western Brewer: and Journal of the Barley, Malt and Hop Trades*. Vol. 38, pp.29-33.

104. *Higginson's* (1868) op. cit.

105. New York State Census 1875; *Brooklyn Daily Eagle* (1886) 'Schnaderbeck's old Brewery. It will become a Theatre after numerous metamorphoses,' 29 July, p.2.

106. *Brooklyn Daily Eagle* (1883) op. cit., p.9; Tax assessments 1884.

107. A pencil notation on the Maujer Street building depicted on the 1868 Higginson map reads 'to be altered to Theater' (Fig. 2), and the 2 August 1884 issue of *The American Architect and Building News* records a Building Patent for 34 and 46 Maujer Street, with the note: 'old Brewery altered to Theater: cost \$10,000; owner, C.S. Gray, DeKalb Ave., cor. Fort Greene Pl.' Mr. Charles Gray purchased part of the building from Henry Hesse in November 1884 (Tax Assessments). Only the 'framework of the parquet' floor had been laid. In the meantime, the vacant building was cannibalized for its fixtures and 'gutted' (Sanborn (1887) *Insurance Maps of Brooklyn New York*, Vol. 4, pl.109A; *Brooklyn Daily Eagle* (1886) op. cit.) Work on the theater resumed in 1886 at a cost of \$75,000 with completion of a three-tier performance space seating 2,000, expected by 1 October of that year (*Brooklyn Daily Eagle* (1886) op. cit.) Despite the brewery's dereliction, it was still considered, in 1886, 'one of the most substantially constructed buildings in the Eastern District' (ibid.) In that year, a fourth story was added, and the brewery turned into a 'Congress Hall', possibly used for religious gatherings, (Tax assessments; Sanborn (1887) op. cit, pl.109A). According to the maps: Hyde, E.B. (1898) *Atlas of the Brooklyn borough of the City of New York : originally Kings Co. ...* New York: E.B. Hyde & Co., map, pl.32, it was a 'Church', while *Insurance Maps of the Borough of Brooklyn*, Vol. 4, New York: Sanborn Map Co., pl.109, notes in pencil: 'Congress Hall (closed).'

108. *Brooklyn Daily Eagle* (1883) op. cit., p.9; Tax assessments 1884.

109. *Brooklyn Daily Eagle* (1860) op. cit.

110. *Brooklyn Daily Eagle* (1863) 'A Family Poisoned,' 26 January, p.3.

111. *Brooklyn Daily Eagle* (1873) 'Alleged Medical Mistake. The Death of a Man by Poisoning Certified as from Natural Causes,' 1 February, p.4.

112. *ibid.*

113. F. Arendt-Fleming, pers. comm.

114. This is implied in the account of the Huber Brewery's operations, in which the brew was pumped into the ice house, presumably through pipes, *Brooklyn Daily Eagle* (1875) op. cit.). Lintner, C. (1878) op. cit., pp.311-312 describes how the barrels might be filled using a hose, preferably one made from beef intestine rather than rubber.

115. This lager brewery was located on Myrtle and Wyckoff Avenues; Rich, H. (1903) op. cit., p.271; Newtown - Welz & Zerweck Brewery - Ridgewood (2019) Digital Archives, Queens Library. <http://digitalarchives.queenslibrary.org/browse/newtown-welz-zerweck-brewery-ridgewood> Accessed 22 December 2020.

116. Terry Brothers (n.d.) Hudson River & New England Brick Collection and Identifier: M-Z. Brick Collecting.com. <https://brickcollecting.com/collection2.htm#terry> Accessed 5 January 2021; 'A Brief History of Roseton and Danskammer Point, NY.' Brick Collecting.com, <https://brickcollecting.com/roseton.htm> Accessed 5 January 2021; I thank Michael Padwee for pointing me to these references.

117. F. Arendt-Fleming, pers. comm.

118. *Brooklyn Daily Eagle* (1875) op. cit.