

# American Beer (1941–1948): Years of Myths, War, and Famine

Gregory Paul Casey

Retired, Perry Park, CO, U.S.A.

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## ABSTRACT

The last of the three-part series of *Technical Quarterly* articles providing insights to the upcoming MBAA publication *The Inspiring and Surprising History and Legacy of American Lager Beer: 1941–1948*, the focus of this paper is a review of the American brewing industry during the tumultuous years of World War II (1941–1945) and those immediately following in support of global famine relief (1946–1948). This is perhaps the most remarkable 7 year period ever in the history of the American brewing industry, with production rising by just over 36 million barrels of beer—a staggering increase of 65.3%. While the beer before and after this period was very similar, the beer in between was anything but. Surprisingly, the brewing materials that were scarcest during this period were rice and especially corn-based adjuncts, not malt. But perhaps the greatest surprise of all was that the beer fueling the explosive growth was a significantly lighter, lower original gravity, and lower malt-to-adjunct ratio beer. Indeed, for a time during 1945, the industry’s overall use of adjuncts exceeded 50%. A stunning array of materials—many never used prior or since—were employed to brew America’s adjunct lager beer. Included in the “adjunct potpourri” were an astounding 141.5 million pounds of cassava products (e.g., manioc and tapioca) and 12.8 million pounds of potatoes. Surprisingly, however, both were first used *after* World War II, during the Relief years, triggered by federal mandates restricting the use of rice and corn in

brewing. All material restrictions lifted in the summer of 1948, and supplies of all brewing materials returned to pre-war levels, but few in the industry could ignore that the lighter lager of the war and famine years had triggered a profound upward step-shift in sales. In the decades that followed, annual industry volume remained largely static, even declining on a per capita basis. Not until 1964 would the industry finally reach 100 million barrels of domestic production, followed in 1970 by the surpassing of the post-Prohibition per capita record of 1948. Buoyed by the 1973–1982 introduction of the modern 100 calorie light adjunct lagers, new records were subsequently set with per capita consumption of domestically produced beer reaching 26.17 gallons in 1981 and domestic production of 203,658,410 barrels in 1990, records that still stand. However, despite the phenomenal growth experienced by the American craft brewing industry over the past 30 years, by 2019 overall industry performance against per capita and annual domestic production metrics has declined by 9.26 gallons and 24.6 million barrels of beer, respectively. Insights to spur 21st century growth, for both macro and craft brewers alike, can be found in the lessons of the past.

**Keywords:** adjunct lager beer, American beer history, cassava, corn, global famine relief, grain restrictions, malt substitutes, potatoes, raw barley, raw wheat, rice, sorghum grains, soybeans, WWII

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## Introduction

The upcoming 2021 Master Brewers publication *The Inspiring and Surprising History and Legacy of American Lager Beer: 1941–1948* adheres to the adage, “things come in threes.” The book’s first third addresses the multitude of *what*, *why*, *when*, *by whom*, and *where* myths surrounding the origin of adjunct lager beer in the United States. Historical references are employed to illustrate how each of 29 myths is just that—a myth. As far as dealing with *when* and *why* adjunct lager beer first took hold in the United States, unquestionably the reigning “mother of all myths” asserts the style was born during World War II (WWII). Per the paradigm, it was war-induced malt shortages that first drove American brewers to use rice and corn, only continuing their use after the war in order to maximize profitability while relying on mass-marketing campaigns to essentially force the style on a gullible public over the eight decades since.

The resiliency of this central myth (perhaps the original American urban legend) is quite remarkable given the plethora

of accredited authors who have documented the consumer-driven 19th century origins of adjunct lager beer in the United States. These include Maureen Ogle and her landmark 2006 publication *Ambitious Brew: The Story of American Beer* (74) as well as Mark Dredge and his 2019 book *A Brief History of Lager* (43), along with the first two papers in this series providing deeper-dive supporting evidence (40,41). Accordingly, this third paper focuses on providing insights to the second and third parts of the upcoming publication, namely, the difficulties faced by the American brewing industry in obtaining traditional brewing materials during the turbulent years of WWII (1941–1945), but even more so during 1946–1948, when the United States, spearheading global famine relief efforts, acted as earth’s largest kitchen pantry.

## Repeal (1933) to Pearl Harbor (December 7, 1941): “An American Flavor”

To paint a picture of the materials used to brew American beer during the Repeal era prior to Pearl Harbor, I would like to employ the use of two period references—one visual, the other the spoken words of an American master brewer. Beginning with the visual, depicted in Figure 1, are photographs of two beer coasters from the late 1930s. They are part of my breweriana collection specific to the history of the use of malt substitutes in

E-mail: yeast\_doc@yahoo.com

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the American brewing industry and were issued to bars and restaurants in 1938 and 1939 by the Hampden Brewing Company of Willimansett, Massachusetts. Even a cursory glance demonstrates just how comfortable this brewer was in informing consumers they brewed with not one but *two* types of malt substitutes. Equally revealing is how the brewery stressed their ale was “mild” and lager “light.” Both were strategic elements of the brewery’s “good measure” advertisement campaign, and I just love how the beer barrel cut-away depicting layers of rice, hops, sugar, and malt was employed to link the “what” with the “why” behind the use of each of these materials. Complementing this emphasis was the brewery’s 1937 “perfect harmony” campaign, with ads in local newspapers depicting four singing bags (labeled malt, rice, corn sugar, and hops), below which was the caption highlighting the brewery’s use of adjuncts since 1896 (then as the Springfield Brewery): “The distinctive Hampden flavor comes from 41 years of experience in blending pure malt, hops, rice and corn sugar—in just the right proportions and in generous quantities” (50).

If, per the second of the 29 myths, brewers prior to WWII were secretive regarding their use of malt substitutes, then clearly this Massachusetts brewer of the late 1930s never got the memo! Turning from the visual to the spoken word, this quote traces back to just 15 days prior to the December 7 attack on Pearl Harbor. It was made by Frederick Loeffler, a Butte, Montana, master brewer who 7 years later would go on to serve as president of MBAA District Rocky Mountain (48). Born in Germany about 1890 (67), Loeffler trained as a master brewer in Stuttgart prior to immigrating to the United States in 1924 (65). With Repeal, he was back in the saddle as the master brewer at the Butte Brewing Company, his brewing heritage widely touted in brand ads placed in Montana newspapers. In an interview printed in the November 23, 1941, edition of the *Montana Standard*, the reporter—revealing a bias against the use of adjuncts typical of the American press since the 1870s—prefaced his summary by indicating Loeffler “admitted” the following regarding an “American” flavor of America’s National Beverage (66):

Mr. Loeffler admitted that the process in America is somewhat different from that used in Europe, but only to the extent of giving the beer an “American” flavor. This difference, he said, amounts to the use of a few malt adjuncts, such as rice,

corn grits, or corn sugar. We must still use barley, malt, hops, water, yeast and—as in the case of American breweries—rice and corn products. The European likes his beer the way it has been made for centuries. The American on the other hand has been educated in a different flavor that is produced through the use of the adjuncts I have mentioned. These additions give the American beer its distinct “American” type and character, especially created to please the American palate and to make the best use of American brewing materials. To produce a beer satisfactory to the general public is the job of the master brewer.

In the eight years prior to Loeffler’s interview, the American brewing industry had experienced periods of both immense joy and considerable concern. Starting with the former, certainly the repeal of Prohibition in 1933 was greeted with open arms as America’s brewers could once again get back to the business of brewing, first with “3.2” (% ABW) beer (April 7 to December 5, 1933) and finally full-strength beer (from December 5, 1933, onward). Certainly, the heady years of growth in the years immediately following Repeal could only have served to reinforce these emotions.

But then came the years of concern, 1938–1941. As illustrated in Table 1, this is the period total industry production volume declined, despite still being ~10 million barrels below the industry’s peak set prior to Prohibition in 1914 of 66,189,473 barrels. Equally alarming was the troublesome drop in per capita consumption of beer (Fig. 2). While 1937–1938 saw America’s first economic recession since the end of the Great Depression, the state of the industry in 1939, 1940, and 1941 clearly revealed all was not well. In terms of the beer brewed during this window of time, we can say with certainty that the vast majority was brewed with significant quantities of rice and corn-based adjuncts. Indeed, with the benefit of industry data depicting state by state statistics for the materials used as well as brewery and production volumes from fiscal year 1940 (Table 2), we can also say this was true for every state in the union. (Well, almost every state: South Dakota’s single brewery reported that 100% of its 2,562 barrels of beer brewed in 1940 used only malt, hops, water, and yeast.) However, in that last full year of peace the remaining 54,889,175 barrels brewed across America’s remaining 610 breweries consumed 1.9 billion pounds of malt, 778.5 million pounds of rice and corn-based

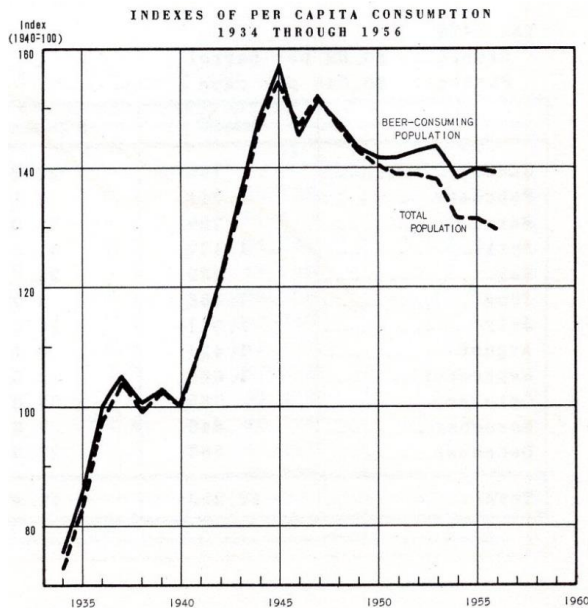


**Figure 1.** Hampden Brewing Company light beer and ale coasters from 1938–1939: about as transparent as a brewer can get regarding the use of adjuncts! Original coasters part of the author’s personal archives. Photos courtesy TavernTrove.com.

**Table 1.** U.S. beer production (in barrels) for 1840 to 2019<sup>a</sup>

| Year | Barrels    | Year        | Barrels           | Year        | Barrels           | Year        | Barrels            | Year        | Barrels            |
|------|------------|-------------|-------------------|-------------|-------------------|-------------|--------------------|-------------|--------------------|
| 1840 | 741,935    | 1895        | 33,589,784        | 1930*       | 3,681,183         | 1965        | 108,015,217        | 2000        | 199,173,709        |
| 1850 | 1,193,948  | 1896        | 35,859,250        | 1931*       | 3,136,888         | 1966        | 109,736,341        | 2001        | 199,332,251        |
| 1860 | 3,812,346  | 1897        | 34,423,494        | 1932*       | 2,765,858         | 1967        | 116,564,350        | 2002        | 200,406,545        |
| 1863 | 1,765,827  | 1898        | 37,493,300        | <b>1933</b> | <b>11,059,071</b> | 1968        | 117,523,511        | 2003        | 194,812,010        |
| 1864 | 3,459,119  | 1899        | 36,581,114        | <b>1934</b> | <b>37,678,313</b> | 1969        | 122,657,497        | 2004        | 198,144,114        |
| 1865 | 3,657,181  | 1900        | 39,330,848        | <b>1935</b> | <b>45,228,605</b> | 1970        | 134,653,881        | 2005        | 197,252,016        |
| 1866 | 6,207,401  | 1901        | 40,517,078        | <b>1936</b> | <b>51,812,062</b> | 1971        | 134,091,661        | 2006        | 197,696,158        |
| 1867 | 6,291,184  | 1902        | 44,478,832        | <b>1937</b> | <b>58,748,087</b> | 1972        | 140,326,680        | 2007        | 198,464,270        |
| 1868 | 6,146,663  | 1903        | 46,650,730        | <b>1938</b> | <b>56,340,163</b> | <b>1973</b> | <b>143,013,573</b> | 2008        | 196,538,396        |
| 1869 | 6,342,055  | 1904        | 48,208,133        | <b>1939</b> | <b>53,870,553</b> | <b>1974</b> | <b>153,053,027</b> | 2009        | 196,810,099        |
| 1870 | 6,574,617  | 1905        | 49,459,540        | <b>1940</b> | <b>54,891,737</b> | <b>1975</b> | <b>157,870,017</b> | 2010        | 195,143,831        |
| 1871 | 7,740,206  | 1906        | 54,651,637        | <b>1941</b> | <b>55,213,850</b> | <b>1976</b> | <b>160,663,276</b> | 2011        | 192,718,037        |
| 1872 | 8,659,427  | 1907        | 58,546,111        | <b>1942</b> | <b>63,716,697</b> | <b>1977</b> | <b>172,228,595</b> | 2012        | 196,067,345        |
| 1873 | 9,633,323  | 1908        | 58,747,680        | <b>1943</b> | <b>71,018,257</b> | <b>1978</b> | <b>171,639,479</b> | 2013        | 191,851,698        |
| 1874 | 9,600,897  | 1909        | 56,303,497        | <b>1944</b> | <b>81,725,820</b> | <b>1979</b> | <b>183,515,187</b> | 2014        | 192,842,609        |
| 1875 | 9,452,697  | 1910        | 59,485,117        | <b>1945</b> | <b>86,604,080</b> | <b>1980</b> | <b>188,373,657</b> | 2015        | 191,160,545        |
| 1876 | 9,902,352  | 1911        | 63,283,123        | <b>1946</b> | <b>84,977,700</b> | <b>1981</b> | <b>193,687,085</b> | 2016        | 190,401,269        |
| 1877 | 9,810,060  | 1912        | 62,176,694        | <b>1947</b> | <b>87,856,902</b> | <b>1982</b> | <b>194,349,406</b> | 2017        | 186,051,964        |
| 1878 | 10,241,471 | 1913        | 65,324,516        | <b>1948</b> | <b>91,291,219</b> | 1983        | 195,123,375        | 2018        | 183,140,811        |
| 1879 | 11,103,084 | <b>1914</b> | <b>66,189,473</b> | 1949        | 89,735,647        | 1984        | 193,021,392        | <b>2019</b> | <b>179,069,325</b> |
| 1880 | 13,347,111 | 1915        | 59,808,210        | 1950        | 88,807,075        | 1985        | 193,307,822        | 2020        | N/A                |
| 1881 | 14,311,028 | 1916        | 58,808,210        | 1951        | 88,976,226        | 1986        | 196,498,984        | 2021        | ?                  |
| 1882 | 16,952,085 | 1917        | 60,817,379        | 1952        | 89,600,916        | 1987        | 195,420,205        | 2022        | ?                  |
| 1883 | 17,757,892 | 1918        | 50,266,216        | 1953        | 90,443,832        | 1988        | 198,024,766        | 2023        | ?                  |
| 1884 | 18,998,619 | 1919*       | 27,712,648        | 1954        | 92,561,067        | 1989        | 200,124,365        | 2024        | ?                  |
| 1885 | 19,185,953 | 1920*       | 9,231,280         | 1955        | 89,791,154        | <b>1990</b> | <b>203,658,410</b> | 2025        | ?                  |
| 1886 | 20,710,933 | 1921*       | 9,220,188         | 1956        | 90,697,911        | 1991        | 202,370,518        | 2026        | ?                  |
| 1887 | 23,121,526 | 1922*       | 6,347,799         | 1957        | 89,881,935        | 1992        | 202,107,376        | 2027        | ?                  |
| 1888 | 24,680,219 | 1923*       | 5,268,709         | 1958        | 89,010,812        | 1993        | 202,638,598        | 2028        | ?                  |
| 1889 | 25,119,853 | 1924*       | 4,890,545         | 1959        | 90,973,768        | 1994        | 202,039,109        | 2029        | ?                  |
| 1890 | 27,561,944 | 1925*       | 5,118,594         | 1960        | 94,547,867        | 1995        | 199,215,197        | 2030        | ?                  |
| 1891 | 30,497,209 | 1926*       | 4,855,551         | 1961        | 93,496,452        | 1996        | 201,050,049        |             |                    |
| 1892 | 31,856,626 | 1927*       | 4,382,335         | 1962        | 96,417,543        | 1997        | 198,904,373        |             |                    |
| 1893 | 34,591,179 | 1928*       | 4,161,284         | 1963        | 97,961,421        | 1998        | 198,130,339        |             |                    |
| 1894 | 33,362,373 | 1929*       | 3,866,141         | 1964        | 103,017,915       | 1999        | 198,251,742        |             |                    |

<sup>a</sup> Table produced by the author using data sourced from: 1840 and 1850 (53); 1863–1896 (19,20,23); 1860, 1897–1910, and 2008–2019 (courtesy Lester Jones, Chief Economist of the National Beer Wholesalers Association); and 1911–2007 (24,25). Asterisk (\*) indicates Prohibition-era non-alcoholic “cereal beverage” containing less than 0.5% alcohol by volume. Highlights: 1914 is the industry’s peak annual production prior to Prohibition (1919); 1933–1937 are years of industry growth following the repeal of Prohibition; 1938–1941 are years of industry decline preceding America’s entry into World War II; 1942–1948 are years of rapid growth, first exceeding 1914’s record in 1943 and then going to break the 90 million barrel threshold in 1948; 1973–1982 is the window spanning the introduction of modern light beers (~100 calories); 1990 is the still standing historical industry record of 203,658,410 barrels; 2019 is the most recently available data, which at 179,069,325 barrels is down 24,589,085 barrels from the 1990 high; and 2020–2030 is perhaps, per the Discussion, the decade marking the beginning of the missing fifth “Blüthezeit” (flowering time) in the “Marsch der Leichtigkeit” (March of Lightness) of domestically produced malt beverages.



**Figure 2.** Per capita consumption (in gallons) of beer in the United from 1934 to 1956 depicted both on the basis of total population (dotted lines) and that fraction of the total population over the age of 21 weighted by the “relative consuming importance” of age groups 21–39, 40–59, and 60 and over. From 1957 United States Brewers Foundation *Brewers Almanac* (21). Reproduced, by permission, of Mary Jane Saunders, Vice-President, General Counsel, and Secretary of the Beer Institute in Washington, DC.

malt substitutes, and 31.9 million pounds of hops and hop extract. While the national average ratio, by weight, of 72% malt to 28% adjuncts varied little by state, the preferred form of malt substitute varied considerably depending on regional and state preferences. For example, in all northeastern states (including New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Delaware, Maryland, New Hampshire, and Rhode Island) corn-based adjuncts were a clear preference over rice. However, in the Pacific region (including California, Hawaii, Oregon, and Washington) and many of the western states (e.g., Colorado, Montana, and Utah) rice was king over corn—as was also true in Florida, Kentucky, Louisiana, Oklahoma, Tennessee, Texas, and Missouri.

But also abundantly evident in both Table 1 and Figure 2 is that from 1941 to 1948 the American brewing industry enjoyed massive and transformational increases in both total annual production and per capita consumption of beer. When critiqued on a relative basis against industry performance since then, the 7 year growth of 36 million barrels represents, to this day, an

unprecedented response by the American consumer to American beer. No other period in our history comes close.

Indeed, what I find most inspiring about this era is how, whenever challenged by periods of chronic or acute shortages in brewing materials (*especially* adjuncts), this generation of highly collaborative American master brewers and brewing scientists simply rolled up their sleeves and got to work developing practical solutions to every obstacle. Although the beer brewed during this time bore little resemblance to the 72% malt/28% adjunct beer of 1940, the period illustrated “lessons in lightness” in ways that still resonate today. But before delving into this aspect of our industry’s history, a brief year-by-year review of American beer is in order.

### Years of War: 1941—Harbingers of Lightness

The year 1941 was a year of “business as usual” for the American brewing industry until the United States suddenly found itself embroiled in WWII with the December 7, 1941, surprise

**Table 2.** Report of the Commissioner of Internal Revenue for fiscal year 1940. Fermented malt liquors: total number of breweries and annual production (in barrels of 31 gallons), by state and materials used in production, by kinds and by states (14).

| State          | Breweries | Production (barrels) | Grain and grain products <sup>a</sup> |             |             | Sugar and syrups (lbs) | Hops and hop extract (lbs) |
|----------------|-----------|----------------------|---------------------------------------|-------------|-------------|------------------------|----------------------------|
|                |           |                      | Malt (lbs)                            | Corn (lbs)  | Rice (lbs)  |                        |                            |
| Alaska         | 2         | 1,330                | 58,596                                | 8,500       | 5,200       | ...                    | 1,117                      |
| Arizona        | 1         | 26,427               | 958,937                               | 248,500     | ...         | 1,200                  | 11,637                     |
| California     | 32        | 2,567,680            | 93,408,141                            | 14,034,387  | 14,103,487  | 4,566,696              | 1,528,295                  |
| Colorado       | 4         | 258,992              | 9,335,930                             | 707,514     | 2,218,800   | 20,396                 | 150,168                    |
| Connecticut    | 9         | 417,967              | 15,420,538                            | 3,968,042   | 84,000      | 2,518,161              | 328,067                    |
| Delaware       | 2         | 49,362               | 1,946,309                             | 617,640     | 46,080      | 2,722                  | 32,761                     |
| D.C.           | 1         | 89,665               | 3,033,100                             | ...         | 1,455,500   | 67,500                 | 41,960                     |
| Florida        | 7         | 218,417              | 7,708,882                             | 744,300     | 1,801,144   | 599,247                | 130,134                    |
| Georgia        | 1         | 66,552               | 2,179,875                             | 782,300     | ...         | 379,600                | 43,841                     |
| Hawaii         | 7         | 81,944               | 1,884,932                             | 195,500     | 4,623,309   | 236,377                | 24,040                     |
| Idaho          | 5         | 36,638               | 1,399,558                             | 205,297     | 198,882     | 5,655                  | 21,742                     |
| Illinois       | 52        | 3,747,516            | 120,672,833                           | 40,852,045  | 11,936,345  | 5,824,233              | 1,959,753                  |
| Indiana        | 16        | 1,699,364            | 62,190,299                            | 14,638,660  | 673,000     | 4,616,688              | 903,106                    |
| Iowa           | 4         | 136,575              | 4,538,418                             | 1,829,340   | ...         | 22,840                 | 79,144                     |
| Kentucky       | 8         | 811,163              | 27,817,004                            | 2,921,620   | 7,259,940   | 811,555                | 471,970                    |
| Louisiana      | 7         | 904,618              | 29,595,478                            | ...         | 7,726,400   | 6,370,469              | 454,386                    |
| Maryland       | 9         | 1,295,609            | 47,573,628                            | 8,665,475   | 2,926,194   | 5,996,726              | 797,147                    |
| Massachusetts  | 15        | 1,287,934            | 51,729,876                            | 7,206,045   | 1,548,292   | 11,882,866             | 1,235,024                  |
| Michigan       | 39        | 2,739,981            | 98,749,555                            | 28,496,725  | 8,043,045   | 2,363,482              | 1,486,551                  |
| Minnesota      | 22        | 2,640,240            | 89,461,426                            | 14,779,272  | ...         | 13,890,026             | 1,435,137                  |
| Missouri       | 17        | 4,302,715            | 144,793,331                           | 11,209,834  | 51,676,249  | 1,695,611              | 2,283,254                  |
| Montana        | 8         | 191,269              | 7,533,367                             | 317,420     | 1,398,900   | 463,069                | 102,345                    |
| Nebraska       | 5         | 338,796              | 10,988,584                            | 2,666,062   | 1,457,800   | 368,568                | 159,988                    |
| Nevada         | 2         | 16,906               | 582,813                               | 192,100     | 36,500      | 200                    | 9,220                      |
| New Hampshire  | 1         | 39,037               | 1,282,740                             | 254,120     | ...         | 537,210                | 31,980                     |
| New Jersey     | 13        | 3,452,523            | 131,483,619                           | 32,458,686  | 1,131,932   | 14,579,018             | 2,193,220                  |
| New York       | 61        | 8,867,803            | 329,492,533                           | 86,092,043  | 17,431,932  | 19,901,940             | 5,399,517                  |
| North Carolina | 1         | 101,061              | 3,381,930                             | 1,152,200   | ...         | 638,400                | 59,598                     |
| Ohio           | 50        | 3,712,656            | 127,793,254                           | 34,500,831  | 10,648,170  | 7,328,773              | 2,128,634                  |
| Oklahoma       | 3         | 75,466               | 2,366,895                             | 429,900     | 574,800     | 2,220                  | 36,870                     |
| Oregon         | 6         | 129,987              | 4,725,595                             | 45,850      | 1,413,100   | 29,853                 | 77,832                     |
| Pennsylvania   | 84        | 6,195,236            | 227,074,105                           | 54,649,871  | 10,721,041  | 23,258,520             | 3,858,626                  |
| Rhode Island   | 3         | 647,187              | 23,417,396                            | 4,563,500   | 1,799,367   | 5,895,819              | 591,265                    |
| South Dakota   | 1         | 2,562                | 116,294                               | ...         | ...         | ...                    | 1,234                      |
| Tennessee      | 3         | 134,241              | 4,407,680                             | 639,720     | 1,062,140   | 326,650                | 60,887                     |
| Texas          | 8         | 805,134              | 28,261,830                            | 324,000     | 10,952,807  | 606,327                | 433,189                    |
| Utah           | 3         | 124,173              | 4,329,922                             | 446,190     | 650,200     | ...                    | 67,376                     |
| Virginia       | 4         | 123,451              | 4,429,279                             | 1,301,900   | 110,400     | 177,775                | 70,948                     |
| Washington     | 15        | 759,383              | 27,976,363                            | 1,789,382   | 6,530,927   | 582,132                | 430,753                    |
| West Virginia  | 2         | 34,144               | 1,268,570                             | 406,544     | ...         | 2,699                  | 19,807                     |
| Wisconsin      | 75        | 5,701,887            | 200,961,604                           | 66,326,915  | 6,596,721   | 8,276,619              | 2,739,452                  |
| Wyoming        | 3         | 57,046               | 2,088,656                             | 433,315     | 188,750     | 29,855                 | 34,951                     |
| Total          | 611       | 54,891,737           | 1,968,419,675                         | 441,101,545 | 188,943,875 | 144,877,697            | 31,926,866                 |

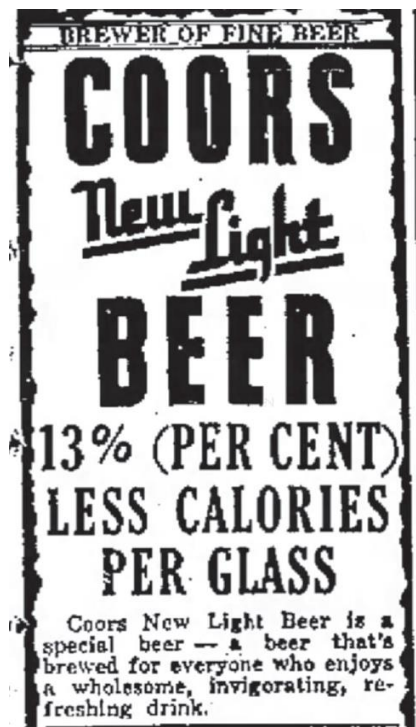
<sup>a</sup> In addition, 3,987 pounds of rye and 3,535,908 pounds of wheat and wheat flakes.



attack on Pearl Harbor by the Empire of Japan. However, there were already a bevy of “lightness harbingers” vis-à-vis the beer that was to follow in the years and even decades after. One is found in a brand of beer brewed in the Colorado Rocky Mountains by a brewer named Bill Coors. As near as I have been able to determine, it was the first beer ever brewed in America where both the product design and supporting marketing campaign specifically emphasized the theme of fewer calories. Its name? It was called “Coors New Light Beer,” with newspaper ads across Colorado (e.g., the June 19, 1941, ad from the *Greeley Daily Tribune* shown in Figure 3 [49]) and adjacent states touting it as a lighter lager beer containing 13% fewer calories than Coors Banquet beer. With the latter typically containing 145 calories, I estimate Coors New Light Beer possessed 126 calories per 12 ounce serving. It came as a complete surprise to me that a mid-way light beer (today’s Coors Light contains just 102 calories) was brewed 79 years ago, something I had not known even though I was an employee of Coors from 1999 to 2013.

But there is no shortage of other surprises from this pre-war time. Included in these is the plethora of brands that highlighted the use of rice and/or corn on their labels (continuing what was already a common practice well before Prohibition). Rice-specific examples include 1940 bottle labels for Camden Lager Beer from New Jersey and Schmidt’s from Michigan (Fig. 4). Even more surprising (at least to me) were the numerous pre-war marketing campaigns stressing brands as being “non-fattening,” “sugar free,” or containing “no glucose” (i.e., corn syrup), with an example of these latter two themes likewise found in the Schmidt’s label from 1940.

One period image wonderfully capturing the growing prominence of “light” beer in America before WWII was published in the September 1941 issue of *Brewers Digest* (56). It depicted a



**Figure 3.** Ad for Coors New Light Beer placed in the *Greeley Daily Tribune* from Greeley, Colorado, on June 19, 1941 (49). Reproduced, by permission, of the Molson Coors Beverage Company.

New York “supermarket” shopper standing in front of a floor display of six popular brands of regional beer, including three standard adjunct lagers (Rupperts, Krueger’s, and Feigenspan P.O.N.), two light adjunct brands (Schaefer Light and Feigenspan Light), but only one all-malt brand (Trommer’s). As with the earlier mention of Coors New Light Beer, I reference these historical vignettes not as an endorsement in any way (none of these brands have since survived) but solely for the purpose of illustrating how, by these last days of 1941 before the war, American consumers were already well acquainted with the concepts and themes of “light,” “lighter,” “lower calories,” “non-fattening,” “sugar free,” and “no glucose” when it came to American beer!

### Years of War: 1942—“We May Have to Resort to Practically Entire Malt Brewing”

The first full year at war had *no* impact on the supplies of the traditional brewing materials of malt, rice, corn, and hops to the American brewing industry. The same, however, could not be said for anything and everything made of metal, regardless of what part of the brewing industry its use was required in. For the duration of the war, domestic canned beer—which had exploded in popularity since it was first introduced in 1935 by the



**Figure 4.** Beer labels from 1940 for brands listing rice as an ingredient: Camden Lager Beer (39) and Schmidt’s (91). Photos courtesy TavernTrove.com.

Gottfried Krueger Brewing Company—quickly became a thing of the past. Likewise, shortages in bottle crowns became so acute that vast amounts of used crowns were recovered, reformed, and reused. Fuel for local delivery trucks and rubber for replacement tires were strictly rationed. The clear priority given to the war effort relative to rail transport space began to handicap the ability of national brands to distribute beer beyond local markets. Indeed, so severe were these challenges that just days after the end of 1942, at a time when Anheuser-Busch had no West Coast breweries, the brewery informed distributors in Oregon, Washington, and California that effective February 1, 1943, it was ending all shipments of beer to these three states (26). But when it came to the materials used to brew beer, the following assessment made by the War Department 3 years prior held true for the entire calendar year: “Little if any dislocation of normal malt beverage production need be expected in the event of United States participation in war in the reasonably near future” (100).

Somewhat ironically however, the biggest material challenge faced by the industry in 1942 involved a material that American brewers were *not* using, namely, table sugar. With shipments to the United States of molasses from Central America, South America, and the Caribbean severely curtailed by U-boat torpedoes, shortages began to impact the ability of ethanol-producing plants to produce critically needed military-grade ethanol. In such an environment, allocating molasses for refinement into sugar became a luxury the nation could simply not afford. Enter a coalition of infuriated homemakers and still-licking-their-wounds Prohibitionists (keen to never let a crisis go to waste) whose combined ire was squarely directed at the American brewing industry. This “crisis” essentially boiled down to a matter of semantics over a single five-letter word: “sugar.” To a brewer, and in federal government statistics, “sugar” was understood as having been produced from corn—not molasses as the laymen assumed. Only through aggressive educational and marketing efforts by industry trade associations (e.g., the United Brewers Industrial Foundation) and individual breweries was the hullabaloo ultimately diffused. Given the industry reported using 144 million pounds of (corn) sugars and syrups by year’s end in the brewing of 68,469,471 barrels of beer, that was a very good thing indeed (94)!

Returning to 1942, the MBAA’s 39th Annual Convention was canceled due to travel restrictions and fuel shortages. In its place the Board of Directors settled on “Substitution Meetings.” The format involved holding a Board of Governors meeting the afternoon prior to 1- or 2-day technical sessions and was adhered to for the duration of the war. The technical sessions were structured around two main themes, (1) materials and associated best practices and (2) equipment and associated best practices, in which a variety of “Boards of Authority” experts served to both share and elicit experiences from attendees specific to each topic of discussion. Lengthy verbatim transcripts of these sessions were then published and sent to MBAA members (see Figure 5 for 1942’s Proceedings). In a pre-Internet world, where the printed word remained the dominant form of communication, this approach would soon prove to be invaluable both during and after the war in disseminating hard-earned best practice experiences unique to 1941–1948.

However, given that 1942 was a tranquil period relative to brewing materials, what was there to discuss in the half-day long “Materials and Associated Best Practices” in Cleveland? Well, as it turns out, there was *much* to be discussed—53 pages worth of transcript worth to be precise—with the opening (and lengthiest) question perhaps the most surprising of them all:

“How does the regular American malt from 6-rowed barley adapt itself to the production of an all malt beer?” (79). Yes, as bizarre as it may seem today, at this point in the war the concern weighing front and center in the minds of attendees was whether anticipated shortages in malt substitutes, especially corn-based products, would force American brewers to “resort” to brewing all-malt beer! It is why Board of Authority member Henry R. Henius (of San Francisco’s General Brewing Company) counseled in his remarks:

It would seem to me it might be a good thing for all of us to give some thought to the possibility of making beer wholly from malt because if the grain situation in this country during these war times presents more and more difficulties due to shortages of those things, we may have to resort to practically entire malt brewing or at least brewing with larger quantities of malt than we have been using during the recent years.

### The Legacy of Karl Strauss

Before moving on to 1943, there is one feature found in *The Inspiring and Surprising History and Legacy of American Lager Beer: 1941–1948* that I hope will be of particular interest to the Master Brewers membership. For each year reviewed, the final pages are dedicated to highlighting both the “what” and “how” associated with that year’s annual meeting. Inspirationally, these insights were made possible by Karl Strauss, who, to this day, remains the only master brewer to be awarded the trifecta of the MBAA Award of Merit (in 1981), the MBAA Award of Honor (in 1992), and the MBAA Distinguished Life Service Award (in 2003). On a personal level, in 2001–2002, while Chairman of the MBAA Education Committee, I had the honor of serving with Karl as co-chairs of the MBAA/ASBC sponsored workshop “Origins and Troubleshooting Beer Flavor Defects.” Held at the 2002 MBAA meeting in Austin, Texas, I will never forget our working together preparing spiked samples and then marveling at the enthusiasm, energy, and humility with which this then 90-year-old gentleman distributed them to participants (composed overwhelmingly of America’s then rapidly expanding generation of young craft brewers).

Ever the educator, after his passing in 2006 at the age of 94, his estate donated his archives to the American Breweriana Association (ABA) in Potosi, Wisconsin. Included in these was Karl’s personally signed collection of MBAA Proceedings from the 1940s and 1950s. With the incredibly kind assistance of ABA member Len Chylack, whose passion is the establishment of The United States Brewing Industry Research Center at the ABA’s National Brewery Museum Library in Potosi, I was provided the honor of accessing and researching these materials. Truly a treasure trove of insights to the challenges faced, met, and overcome during 1941–1948, they enrich our understanding of this long-forgotten era in ways that never would have been possible had Karl Strauss not placed such value on ensuring they remained an intact part of America’s brewing history. Karl was born October 5, 1912, on the grounds of the Feldschlösschen Bräu in Minden, Germany. That this history was preserved by a Weihenstephan-trained brewer whose mother and brother both perished in the Holocaust, and who himself barely escaped this fate by leaving Nazi Germany in February 1939, makes Karl’s journey as an American brewer all the more remarkable (95,96).



Throughout the session, brewer after brewer—especially those with all-malt brewing experience obtained in Canada (including future MBAA President Captain Francis N. Ward from District Ontario)—reassured attendees that indeed a palatable all-malt lager beer could be brewed for American consumers long accustomed, since the last decades of the 19th century, to preferring adjunct lager beer. My favorite highlight was when Milwaukee’s Frederick Gettleman, then one of the very few brewers of all-malt beer in the United States, confidently (and I suppose teasingly?) said: “I do not know why you fellows have so much trouble in making all malt beer. We have made it for 50 or 80 years. That is an old story. You can make it just as durable and just as stable as you can with anything. You can use that same yeast sometimes as many as 30 years” (79).

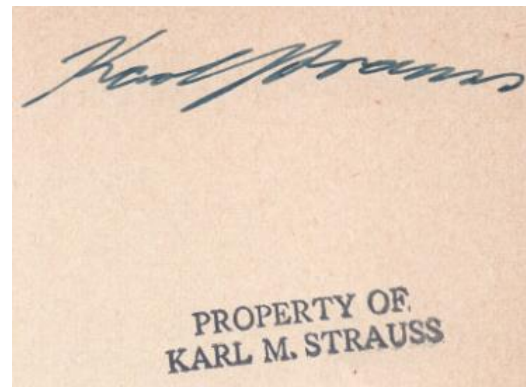
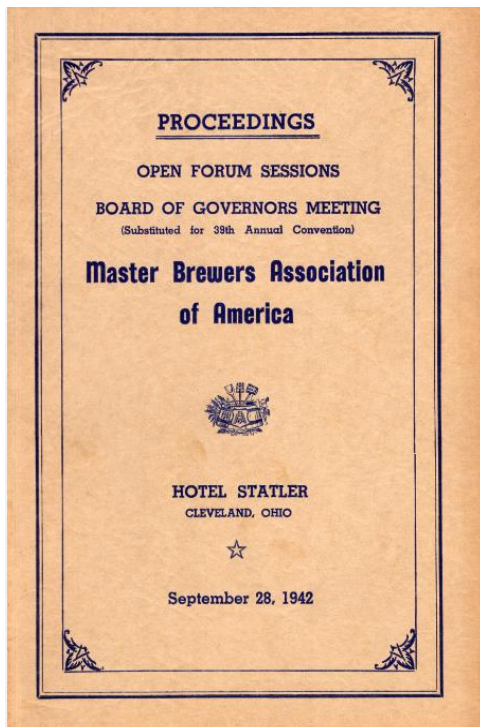
Truly a transcript capturing a fascinating moment of perspective and significance in the history of the American brewing industry; other questions that clearly demonstrated that the primary concern in 1942 was over future shortages in malt substitutes, not malt, included: “With the development of new hybrid varieties of corn, has any research been done which might make available the use of yellow corn, thereby encouraging a more stable supply and cheaper prices?” (80); “Wouldn’t it be possible to use wheat for brewing in place of some other materials since there is such abundance available?” (81); “Is there any difference in the physical or chemical structure of California, Texas or Louisiana rice?” (82); and “Manufacturers of soybean flakes recommend the use of this material in improving the mash and insuring vigorous, healthy yeast. Does the Material Improvement Committee have any data on this material?” (83).

But as the events of the spring and summer of 1943 were about to brutally demonstrate, the last thing the American brewer of 1942 needed to be concerned about was brewing all-malt beer!

## Overview of 1943–1948: “Substitutes for the Substitutes of the Substitutes”

If there is one expression that best captures the greatest challenge faced by the American brewing industry from 1943 onward it is this: “substitutes for the substitutes of the substitutes.” A mouthful I know, but please bear with me as I explain. Certainly, every American brewer is familiar with the term “malt substitute.” In my mind it is synonymous with the style of beer that was the focus of my entire professional career: adjunct lager beer. For perspective, over the course of my 26 year career in the United States, this involved the brewing of brands with anywhere from 0 to 76% of the malt “substituted” by either rice and/or corn-based adjuncts. To others, the term undoubtedly comes with a lot of negative baggage, especially those not fond of light American lager beer. But be that as it may, as 1942 ended and 1943 began, the vast majority of American beer consisted of lager beer brewed with about 30% malt substitutes.

Enter the start of what I consider to be most fascinating post-Prohibition period of history in the American brewing industry. An era of back-to-back challenges, the first is specific to the latter years of WWII (1943–1945), while the second pertains to the years of global famine relief (1946–1948). Throughout the former, both acute and chronic shortages in rice and corn-based adjuncts were met by the use of emergency wartime adjuncts such as barley grits, barley flakes, rye, oats, wheat, and sorghum grains such as kaffir corn and milo maize. All grains, these “substitutes for the substitutes” represent the category hereafter referred to S<sup>2</sup> adjuncts. During the latter period, however, when even S<sup>2</sup> adjuncts were pooled with the traditional adjuncts of rice and corn for a much higher call than brewing—global famine relief—the industry tapped into the use of hundreds of mil-



**Figure 5.** Front cover of the Proceedings of the 1942 MBAA Meeting and signature of Karl Strauss on the inside of the front cover (78). From the Karl Strauss Archives at the American Breweriana Association in Potosi, Wisconsin. Published with permission of the MBAA.

lions of pounds of *non-grain* “substitutes for the substitutes of the substitutes,” hereafter referred to as the S<sup>3</sup> category of adjuncts. See Table 3.

With this overview in mind, following is a high-level *Reader’s Digest* version of the wild ride that was the American brewing industry of 1943 to 1948.

### 1943: “Breweries Are Now Screaming for Corn”

The caption for 1943 has in some ways a double meaning in the brewing context. It was pulled from a headline in the July 6, 1943, edition of the Muncie, Indiana, *Morning Star* (54) and begs the question *why* exactly was it that, in the peak of summer in 1943, the American brewing industry was in the position of “screaming for corn”? Given the central myth that wartime shortages of malt first drove the use of corn and rice as malt substitutes, was this an example of a newspaper (smack in the middle of America’s corn belt) *celebrating* such a development—or not? Well, in this case, the answer most definitely falls in the “or not” column. For due to the allocation of corn, especially corn starch, to a stunning array of both domestic and wartime applications (55), the “screaming” came from an industry, long accustomed to using corn-based adjuncts as malt substitutes, suddenly finding itself in the position of severely lacking adequate supplies.

It represented the second of a brutal “one-two punch” that hammered the industry over the first half of 1943. The first took place on March 1, 1943, when the War Production Board issued “Order M-288” (58). Implemented “in order to conserve the use of malt and malt syrups for the manufacture of industrial alcohol,” it required brewers using over 70,000 bushels of malt in fiscal year 1942 (i.e., March 1, 1942—February 28, 1943) to “not use during any three month period more than 93 percent of the quantity of malt syrup or of malted barley, wheat, rye or other malted grain that they used in the corresponding three-month period in 1942,” while “limiting” to 100% the four three-month quotas in fiscal year 1943 for brewers who used less than 70,000 bushels in 1942 (3). With molasses supplies inconsistent at best during this phase of the war for reasons previously mentioned, Order M-288 essentially distilled down to America’s malt supply joining the war effort. While these 93 and 100% quotas remained basically unchanged for all but the last few months of the war, supplies at these levels proved to be both predictable and reliable for the war’s duration. Relative to sourcing adjuncts, however, beginning in 1943 and carrying through to 1948, the descriptors of “predictable and reliable” proved to be but wishful thinking.

**Table 3.** Reference table comparing traditional rice and corn-based adjuncts to the various “emergency” malt substitutes used throughout 1943–1948 delineated, by the author, on the basis of whether they were grain (i.e., S<sup>2</sup> adjuncts) or non-grain (S<sup>3</sup> adjuncts) sources of extract

| Traditional adjuncts (1870s–2020s) | S <sup>2</sup> adjuncts: “substitutes for the substitutes” | S <sup>3</sup> adjuncts: “substitutes for the substitutes of the substitutes” |
|------------------------------------|--|---|
| Corn grits                         | Barley grits   | Cassava as manioc meal  |
| Corn flakes                        | Barley meal  | Cassava as manioc grits   |
| Corn meal                          | Barley flakes  | Cassava as tapioca starch   |
| Corn sugar                         | Kaffir corn  | Molasses  |
| Corn starch                        | Milo maize   | Potatoes  |
| Corn syrup                         | Oats   | Quota free syrups   |
| Rice grits                         | Rye  | Soybeans  |
| Rice meal                          | Wheat  | Whey  |

One of the first to raise the red flag about impending shortages of malt substitutes in 1943 was Gustave L. Goob, manager of the Brewing Materials Department of the New York-based Corn Products Sales Company. In an article published in the May 15, 1943, issue of the *Brewers Journal* entitled “A Dire Situation in Malt Adjuncts,” Goob opened his paper with these words: “The situation of the entire brewing industry as far as malt-adjuncts—such as rice, refined grits, cornflakes and common grits—are concerned is most dire” (47).

It was the culmination of a series of events, each of which worked against the industry’s ability to obtain adequate supplies of malt adjuncts. In the case of rice, a perfect storm of circumstances essentially forced America’s smaller and medium-sized breweries to have little choice but to seek alternative adjuncts, including: (1) the relatively small domestic crop from 1942; (2) greatly diminished import of rice from abroad; (3) of particular significance, the enormous purchasing power and ability to commit to long-term supply contracts possessed by the nation’s largest brewers using rice as an adjunct; (4) America’s Lend-Lease commitments to Great Britain to provide critical supplies of not just ships, trucks, jeeps, munitions, tanks, and planes but also food, including rice; and finally (5) the ban by the War Food Administration Department on using table-grade rice for brewing in order “to conserve rice for food purposes,” after brewers desperate for supplies of rice grits began purchasing it from food producers (30).

For many, however, turning to corn-based adjuncts was simply not an option as supplies of these were even harder to find than rice—*much* harder, in fact—even for brewers who for generations had used corn as their preferred adjunct. Given the absence of federal quotas placed on the use of corn in brewing at this time (neither would there be until *after* the war), at first it seems counter-intuitive that by July 1943 American breweries found themselves “screaming for corn.”

So, who or what was responsible for this situation? Was there more than one culprit? Certainly, as Goob had foretold, the insatiable appetite for corn (especially corn starch) for military-related applications was a factor. It fueled not just American industries requiring corn products for these purposes, but by virtue of being included within the umbrella of the Lend-Lease program also enabled the same strategic applications within the industries of the United Kingdom. However, as significant as these needs for corn were at the time, there was one other “appetite” at play in 1943 that shifted shortages in corn-based adjuncts from the chronic column to the critical side of the ledger: the American pig.

The reason that America’s hogs played such a prominent role in the scarcity of corn roasted down to a single word: profit. That year a corn farmer basically had two options, a “beer vs. bacon” scenario if you will. They could either sell it (Plan A) or feed it (Plan B). In terms of Plan A, the Office of Price Administration had established ceiling prices farmers could obtain for corn each year since the Depression era. In 1943 this was set at \$1.07 per bushel, but relative to Plan B, the going return was \$1.25 to \$1.40 per bushel if that corn was used instead to feed hogs, most of which were destined to become pork in Lend-Lease shipments to the United Kingdom (1). It goes without saying that Plan B came out on top, and the plethora of American brewers who relied on corn-based adjuncts were suddenly left high and dry with little corn left in the trough for their needs. While there were literally hundreds of newspaper headlines warning of impending beer shortages due to corn shortages that July, my favorite without question was the following from the July 23, 1943, edition of the *Pittsburgh Post Gazette*: “Hogs Get



**CORN GRITS Are Not Being Missed  
By Brewers Who Are Now Using**

**Stamco  
Barley Grits**

**CAN BE USED RAW OR COOKED  
FILTRATION FAST AND BRILLIANT  
BREWERY YIELD EXCELLENT**

No Matter What Adjunct You Are Now Using You Should  
Not Fail to Phone, Wire or Write Your Order to

**Standard Milling Co.**

309 WEST JACKSON BLVD.  
CHICAGO 6, ILLINOIS

TELEPHONE WABASH 6620-6658-8900

For full particulars contact the  
RAHR MALTING CO. REPRESENTATIVE IN YOUR TERRITORY

**Figure 6.** Advertisement placed in the July 1943 issue of *Brewers Digest* by the Rahr Malting Company of Manitowoc, WI, for Stamco Barley Grits (28). Reproduced, by permission, of William Rahr, President and CEO of the Rahr Corporation.

Corn; Beer Scarce Here: Grits, Syrups Used by Most Breweries Lacking as Result of War Feed Program” (76).

Associated with the sudden shortage of corn-based adjuncts was perhaps the most remarkable surprise of all—not just for 1943 but throughout all the years of war and famine—that the summer’s corn crisis resulted in numerous examples of American breweries choosing to cease, or severely curtail, brewing operations rather than brew all-malt lager beer. Talk about popping paradigms! One illustrative period example is the following statement made in the July 29, 1943, edition of the *Pottsville Republican* by a spokesperson for the breweries of Schuylkill County, Pennsylvania: “To further add to the woes of the breweries and those who love the amber fluid, there has now come a shortage of corn so acute that breweries have been forced to suspend production temporarily and that includes some of the breweries located in our own county” (77).

Given the just-described material challenges of 1943, how exactly did the American brewing industry ever manage to pull off brewing an additional 7,301,560 million *more* barrels of beer compared to 1942? The answer: by using, in just the last six months of the year, over 100 million pounds of wheat and barley adjuncts—especially barley. Reportedly used to the extent of 20–25% of the total brewing materials, with “1,000 lbs. of corn grits replaced by 1,200 lbs. of barley” (29). The most broadly used of these came in the form of “Stamco” pearled or barley grits (Fig. 6) and “FROMAL” pre-gelatinized barley flakes (Fig. 7), from the Rahr Malting Company (28) and Froedtert Grain and Malting Company (27), respectively. These adjuncts came, not surprisingly, with steep learning curves regarding filtration, physical stability, sensory, and yeast management challenges (86). Enter the MBAA’s “Second Substitution” meeting held October 23–24 in Cincinnati, Ohio; the “War Time Adjuncts” technical session; and Chair-

Necessity, being the mother of invention, Froedtert Grain & Malting Company has developed a new product for the brewing industry . . . FROMAL—a gelatinized substitute for rice, flakes or grits. This is our *third* contribution to the brewing industry.

1. K. K. MALT for a thick, creamy, bilowy, velvet-like foam.
2. Purchase of the American Malting Company plant in Detroit, and operating it 24 hours a day.
3. FROMAL—to take the place of scarce rice, flakes and grits.

FROMAL is added direct to the mash-tub without previously cooking as is done with pre-gelatinized adjuncts. Forty-five percent FROMAL works very favorably in the laboratory, and reports indicate that 20% to 25% works well in the brewery. FROMAL converts in less time than the same percentage of corn flakes, grits or rice, and it inverts in five minutes or less. It imparts an aroma and flavor to the wort equal to an all-malt mash brew, whereas, the corn mixture or a rice mixture lacks the same inten-

sity of aroma and flavor. It definitely gives beer more body and flavor.

It took many months to perfect FROMAL and while we cannot commence to supply the brewers with their entire adjunct requirements, we will, to the best of our ability, help the adjunct situation a little. We feel it is a moral obligation on our part, first to take care of those customers who have been regular users of our brewers malt in the past. We do not under any circumstances wish to give the impression that we can take care of the entire amount of adjuncts that any brewer may need. We would be only too glad to do this if our capacity would permit. Later on, if our capacity increases, which it will, we shall be very happy indeed to take better care of our present users, as well as those who have not been our regular customers.

We are extremely pleased that we can be helpful and do our bit for the brewing industry during these trying times. I want to assure every brewer personally that FROMAL has not been developed because of monetary considerations. It was done to help out in a tough situation.

**Figure 7.** Excerpt taken from of “An Important Announcement” advertisement placed by the Froedtert Grain and Malting Company of Milwaukee, WI in the July 1943 issue of *Brewers Digest* for FROMAL, a pre-gelatinized flaked barley replacement for “scarce rice, flakes and grits” (27). Reproduced, by permission, of Malteurop Malting Company.

man August H. Haffenreffer's opening remark, "the Master Brewer has learned more by actual practical experience in these last few months than in the last few years" (84)—an understatement if there ever was one!

The transcript of this technical session contains surprise after surprise as participants (identified only by a number in the Proceedings transcript to encourage openness and candor) shared their observations, problems, and solutions relative to brewing with S<sup>2</sup> adjuncts, which none had ever expected to brew with just months prior. Certainly, the topic I found to be the most fascinating was the process explored in one brewery of "Kettle Pasteurization"—literally! In this case the brewer in question was using barley as an emergency adjunct and found conventional chillproofing and filtration regimens did not to prevent chillhaze in non-pasteurized keg beer. The trial, with chillproofed and filtered beer piped from the cellar back to the kettle, was abandoned once it became apparent the warmed (140°F) but very clear beer exiting the kettle immediately redeveloped haze when passed through the cooler en route to the keg packaging line (84).

But not all lessons shared that year resulted in failures—from it—including those discussed toward the end of the session regarding first experiences with sorghum grains (i.e., kaffir corn and milo maize). Given the familiarity and experiences shared by participants regarding sorghum, it is highly probable these formed the bulk of "other material" reported in the Federal monthly statistics for July 1943 through August 1944 (discussed later and shown in a table). Consistent with this is the experience shared by "Brewer No. 23," who after noting he made "several hundred thousand barrels using sorghum grits" went on to say that based on letters mailed to the brewery by members of the military from "Guadalcanal and so forth," these GIs were "very well satisfied" with malt-sorghum beer (85).

By year's end, the 71,018,257 barrels of beer produced in 1943 also happened to establish a new record for beer production, one that had lasted 29 years (Table 1). An impressive accomplishment for sure, especially given the challenging circumstances faced in 1943. For several reasons it marked the beginning of America's lightest "standard" lager beer brewed since the style was first introduced in the United States in the 1840s. Between the imposition of a 3.2% alcohol limit on all beer allocated to the armed forces, the brewing of more with less for the home front, and the trend toward lighter lagers already started prior to the war, 1943 represented the start of a temporary, but quite pronounced, 5 year step-shift into "lightness." In a January 10, 1944, speech given by United States Brewers Association (USBA) Secretary C. D. Williams at the 68th Annual Meeting, the "less with more" theme was front and center when he said (31):

Compared to 1942, you were allowed to use less crowns, less cartons, less malt, less corn, less deliveries. You used more resourcefulness, and about the same amount of materials—say 7% less malt, 6% less hops, 5% more rice, but about 100,000,000 lbs of barley, wheat and other materials which you didn't use before. So, in sum total, the amount of brewing materials used was about the same, say 2% more than in 1942. And you sold almost 13% more beer! Brewing materials went further as alcoholic strength was reduced by reason of the Army allotment, and the trend toward lighter civilian beers.

For perspective, relative to the "lighter civilian beers," J. E. Siebel Sons' Company reported that in 1943 the average original extract value of American ales and lagers declined from 13.4 to 12.9°P and 12.1 to 11.2°P, respectively (32).

## 1944: "And Yet Facts Are Facts"

During America's last full year of war, supplies of corn and rice adjuncts remained chronically insufficient, with wheat and barley adjuncts used at rates comparable to those reported for the last 6 months of 1943. Regarding malt, the 93 or 100% quotas (based on 1942 usage) remained unchanged, although with the U-boat threat essentially eliminated by that summer and ample inventories of molasses available for producing military-grade alcohol, the War Food Administration increased malt quotas in December by 5% for breweries using between 8,000 and 70,000 bushels in a 3 month quota period (33). However, relative to other brewing materials, easily the most significant development in 1944 was the widespread introduction of sorghum grains and soybeans in brewing recipes and trade advertisements (6). So much so that sorghum grain and sorghum grain products (with 39.95 million pounds reported as brewed in the months of September through December) and soybeans and soybean products (with 404,029 pounds used in December) were added as new categories in monthly federal reports summarizing the types and quantities of brewing materials used in America's breweries (Table 4).

But consumers do not eat materials; they drink the beer brewed from the crops of the land. And in this regard easily the most significant industry accomplishment in 1944 was that the year saw yet another new record set for annual beer production, shattering 1943's record by 10.7 million barrels (Table 1). As an achievement it demonstrated not only the technical prowess of the American brewer but also the receptiveness of the American public to the fruits of their labor. Noted one senior industry executive in a November 1, 1944, address at the 7th Annual Convention of the National Beer Wholesalers Association (57):

In the four year period from 1936 to 1940, consumption of beer actually dropped about one and a half million barrels—from 53,000,000 in 1936 to 51,600,000 in 1940. The future then was far from promising. It looked as if we were doomed to spend our energies dashing wildly around midfield but getting nowhere.

The four years that have since elapsed tell a story little short of fantastic. Any prophet who in 1940 would have predicted what has actually occurred, would have been accused of suffering from delusions of grandeur and dealt with as a psychopathic case. And yet facts are facts. Conservative estimates for 1944 indicate an all-time high consumption of 78,000,000 barrels. This means an increase of 26,000,000 barrels over 1940 as compared with the decline of a million and a half in the earlier period.

An *astounding* accomplishment, it was marvelously enabled by an incredible "all hands on deck" collaborative spirit between the MBAA and the American Society of Brewing Chemists (ASBC). Emblematic of this was another collaboration that traced its origins to a recommendation made by "Brewer No. 126" toward the end of the MBAA's Second Substitution meeting in 1943. By November it had spurred the creation of a seven-member "Special Adjuncts" Technical Committee charged with conducting a multi-month-long industry survey to first capture and then report on process best practices and product quality learnings specific to the sudden and unexpected use of novel brewing adjuncts. But mind you, this was not just any committee, for the credentials of the seven members included:

- The Technical Chairmen of both the MBAA (Edward W. Huber) and ASBC (Kurt Becker)
- Future Presidents of both the MBAA (Edward W. Huber, 1949–1951) and ASBC (Philip Gray, 1948–1950; Kurt Becker, 1954–1955)

- The Past President of the American Association of Cereal Chemists (Claude F. Davis)
- The founding editor of the iconic *ASBC Methods of Analysis* (Louis Ehrenfeld)
- A master brewer who traced his family lineage in the profession back to 1753 (Frank Brogniez)
- The son of a co-founder of Chicago’s iconic Wahl-Henius Institute (Henry R. Henius)

Consuming months of effort, their findings were published in the June 1944 issue of the *MBAA Communications* (a copy of which I have been unable to locate) and thoroughly reviewed and discussed during a technical session dedicated solely to brewing materials at the MBAA’s “Third Substitution” meeting held in Saint Louis later that fall (87). Conducted by the panel shown in Figure 8 (which included three of the “Special Adjuncts” Committee), nothing was left on the table when it came to how best to use these materials: from milo maize and kaffir corn, to barley in every form imaginable, to yellow versus white corn, to wheat, oats, or rye, to soybeans, to potato starch, with details regarding use as meal, grits, or flakes, with or without husks, cooked or uncooked, and especially regarding final product quality. Fortunately, thanks to Master Brewers headquarters staff, a copy of the 1946 Proceedings of the 11th Annual Meeting of the ASBC was found (90). Inside were all ASBC Technical Committee Reports from May 1944 to May 1946, including “Special Adjuncts.” By combining this with the over 45 pages of Proceedings transcript from the MBAA’s Brewing Materials Technical Session, we are able today to hear the voices and sense the personalities of long-deceased members of our industry and,

more importantly, gain a true appreciation of just what this extraordinary and inspiring generation of brewers and brewing scientists accomplished.

### 1945: Fifty-Fifty

While 1945 saw the end of WWII, relative to brewing materials it was the most challenging year of the entire war. In the 8 months before Germany (in May) and then Japan (in September) finally surrendered, America’s malt was called upon once again for use in “the production of industrial alcohol used in making synthetic rubber, smokeless powder, and other necessary war items” (4). Accordingly, the 93 and 100% malt quotas in effect since March 1, 1943, were on that same date in 1945 reduced further: “Brewers using between 8,000 and 70,000 bushels of malt per year have had their quotas reduced from 100% to 93%, a cut of 7%, while brewers using over 70,000 bushels will now receive 81% of their original quotas instead of 93% as heretofore, a cut of 12% from the previous quota in force from March 1, 1943 to March 1, 1945” (92).

The increased need for malt during this late stage of the war triggered a relatively short-lived but unique period in the history of the American brewing industry, one where extract derived from adjuncts exceeded 50%, while that from malt fell below 50%. The end of the war with Japan in August 1945 did not translate into an abrupt end to malt quotas. Relief only started to be felt much later in the year: first, effective November 9, 1945, brewers were allowed to double the amount of malt inventory they could carry at any one time, from 15% of 1942

**Table 4.** Materials used by American breweries in 1944<sup>a</sup>

| Material                                 | January 1944<br>(5,758,291) <sup>b</sup> | February 1944<br>(5,758,291) | March 1944<br>(7,421,802)     | April 1944<br>(6,782,634)   | May 1944<br>(7,226,546)      | June 1944<br>(8,131,069)     |
|--|--|------------------------------|-------------------------------|-----------------------------|------------------------------|------------------------------|
| Malt and malt products                   | 158,081,870                              | 152,430,840                  | 197,794,184                   | 180,330,989                 | 194,364,249                  | 217,267,663                  |
| Corn and corn products                   | 64,682,520                               | 65,702,324                   | 86,327,194                    | 78,938,435                  | 83,864,763                   | 91,787,981                   |
| Rice and rice products                   | 13,332,725                               | 14,058,212                   | 16,065,839                    | 15,629,323                  | 17,285,251                   | 19,857,342                   |
| Wheat and wheat products                 | 2,381,981                                | 2,363,600                    | 3,038,410                     | 2,904,007                   | 3,771,132                    | 4,460,933                    |
| Barley and barley products               | 10,836,323                               | 9,700,020                    | 13,908,723                    | 14,327,853                  | 16,572,484                   | 17,683,461                   |
| Sorghum grain and sorghum grain products | Not reported                             | Not reported                 | Not reported                  | Not reported                | Not reported                 | Not reported                 |
| Soybeans and soybean products            | Not reported                             | Not reported                 | Not reported                  | Not reported                | Not reported                 | Not reported                 |
| Sugar and syrups                         | 13,736,901                               | 13,236,738                   | 19,373,104                    | 16,226,279                  | 14,683,009                   | 16,796,860                   |
| Hops and hop extracts                    | 2,565,322                                | 2,446,490                    | 3,372,952                     | 2,898,809                   | 3,085,850                    | 3,653,511                    |
| Other materials <sup>c</sup>             | 1,404,499                                | 797,521                      | 1,131,397                     | 1,389,221                   | 923,433                      | 1,116,065                    |
| Total                                    | 267,021,141                              | 260,735,745                  | 340,911,803                   | 312,644,916                 | 334,550,171                  | 372,623,816                  |
|  | July 1944<br>(8,091,979)                 | August 1944<br>(8,275,404)   | September 1944<br>(7,682,717) | October 1944<br>(7,560,806) | November 1944<br>(6,696,949) | December 1944<br>(6,173,703) |
| Malt and malt products                   | 216,283,914                              | 219,475,762                  | 199,351,280                   | 196,315,614                 | 176,254,668                  | 159,947,962                  |
| Corn and corn products                   | 94,046,921                               | 96,402,161                   | 82,898,440                    | 76,126,230                  | 67,512,589                   | 62,522,955                   |
| Rice and rice products                   | 19,974,880                               | 19,441,568                   | 19,196,871                    | 21,240,862                  | 19,170,858                   | 17,067,743                   |
| Wheat and wheat products                 | 4,516,203                                | 4,980,444                    | 4,451,089                     | 4,783,690                   | 3,553,930                    | 2,979,730                    |
| Barley and barley products               | 16,306,075                               | 15,099,621                   | 15,064,449                    | 14,855,286                  | 11,780,612                   | 10,931,344                   |
| Sorghum grain and sorghum grain products | Not reported                             | Not reported                 | 9,463,219                     | 11,288,318                  | 9,844,247                    | 9,356,227                    |
| Soybeans and soybean products            | Not reported                             | Not reported                 | Not reported                  | Not reported                | Not reported                 | 404,029                      |
| Sugar and syrups                         | 17,508,022                               | 17,709,364                   | 19,051,617                    | 19,978,536                  | 17,464,063                   | 17,103,492                   |
| Hops and hop extracts                    | 3,408,568                                | 3,493,108                    | 3,257,465                     | 3,736,103                   | 2,879,741                    | 2,688,585                    |
| Other materials <sup>c</sup>             | 1,106,313                                | 2,001,399                    | 523,254                       | 1,350,421                   | 528,396                      | 162,088                      |
| Total                                    | 372,930,896                              | 378,605,419                  | 353,257,254                   | 349,675,060                 | 308,989,104                  | 283,164,155                  |

<sup>a</sup> Data in this table sourced from issues of *Brewers Journal* and the *American Brewer* held in The United States Brewing Industry Research Center at the National Brewery Museum of the American Breweriana Association in Potosi, Wisconsin.

<sup>b</sup> Number in parentheses indicates barrels brewed.

<sup>c</sup> Likely predominantly early use of soybeans as well as milo maize and kaffir corn meal and grits.



usage to 30% (5); and then, effective December 1, 1945, brewers were allowed to increase by 20% the amount of malt used in the previous 3 month quota period (37).

Relative to the other two categories of traditional American brewing materials (hops and malt substitutes), however, things looked much brighter as 1945 came to a close. Regarding hops (which throughout the entire war had been “restricted” to a 150% quota against the quantities of hops and hop products used from March 1, 1942, to February 28, 1943) it was announced that effective January 11, 1946, “all restrictions upon the purchase by brewers of hops and hops products” were being removed (101). Throughout the war, hops, as an agricultural crop, were never required for applications unique to wartime needs—unlike malt and malt substitutes. Likewise, acting neither as a source of animal feed or human nutrition and consuming only a miniscule fraction of overall agricultural acreage, there was no expectation that hops would be required for post-war famine relief efforts. In terms of adjuncts, by year’s end even supplies of refined corn starch began to appear after a virtually complete absence of over 2 years (35).

However, putting a damper on these two bright lights was the fact that for the majority of the year brewers had to deal with the lowest malt quotas of the entire war. One suggestion, expressed in a March 1945 editorial in the *Brewers Digest*, recommended the industry’s response should be to hold 1944 recipes constant, reducing production proportionate to the lower malt quotas (34). Noting the industry had over the past 2 years already reduced the average amount of malt used per barrel by 9 pounds, it argued that any further reduction would “be reflected in the quality of the beverage few will deny” (34). It was, however, a recommendation that clearly had few converts, with the industry producing an additional 4,878,260 barrels of beer in 1945 compared with 1944 (Table 1). Representing the third consecutive year of new annual production records, the consumer’s response—which none could deny—indicated the public did not share the editorial’s perspective regarding beer quality. In an extreme 1945 example, it was reported one “popular

brewery” in the New York metropolitan area (68) combined the use of “commercially available soluble proteins” (as a yeast food supplement) and “malt enzyme activators” to brew “an extra pale beer” using an unbelievable ratio of 7.5% malt to 92.5% adjuncts (barley flakes + corn flakes)!

Given such a brewing landscape, it is understandable why, at the MBAA’s fourth and last “Substitution Meeting” (held in Chicago October 26–27), much of the technical meeting continued to focus on the use of S<sup>2</sup> adjuncts, but this time with the inclusion of the first S<sup>3</sup> adjunct: soybean flakes (Table 3) (89). With malt-to-adjunct ratios of 50:50 not uncommon in 1945, key malt nutrients critical for yeast vitality (e.g., amino acids and lipids) were diluted by the elevated use of carbohydrate-rich adjuncts. Enter the 6.9 million pounds of soybean flakes used that year. But it clear from the transcript there was not a universal consensus as to how soybeans impacted fermentation.

Was it strictly a nutritional supplement or did it also contribute fermentable extract? Where should it be used—the cooker, mash-tun, or kettle? When should it be used—periodically or intermittently? At what levels should it be used? What, if any, impact did soybeans have on beer flavor? If affirmative, at what addition rates did sensory attributes begin to be affected? Did soybeans improve or hurt foam properties? All these questions involving this now long-forgotten American brewing adjunct were presented, discussed, and debated with a robustness that seems surreal given that *not once* throughout my career had I ever heard mention of its use by American brewers.

### 1946: “Tapioca, Potatoes, Molasses, Oh My!”

Late in 1945 a consulting economist by the name of Walter Alwyn-Schmidt published a paper in the *American Brewer* entitled “20 Gallons per Capita—Is This Consumption Possible?” (2). With peace finally in hand, Alwyn-Schmidt was hopeful America’s 28-year journey through wave after wave of national traumas had finally come to an end. What with World War I (1917–1918 for the United States), Prohibition (1919–1933), the Wall Street Crash of 1929, the Great Depression of 1929–1933, and America’s involvement in WWII (1941–1945), the American people and brewing industry barely had the chance to know what “normal” felt like when it came to both life and beer. While new *production* records had been achieved in the last three years of the war, when it came to *per capita* beer consumption, at war’s end the record still stood at 20.90 gallons from 1911 (Table 5). That this year fell into a period pre-dating all of these national traumas was not a coincidence to Walter Alwyn-Schmidt. Surely, he speculated, with the dawn of a new age of peace at hand and literally millions of military personnel returning to civilian life in the United States, before long a new *per capita* record would be set—perhaps even as soon as 1946. He could not have been more wrong.

In a cruel twist of irony, America’s joyous period of celebration following the end of WWII was destined to be very brief. For with food and transportation supply chains shattered across all of Continental Europe and much of Asia, the American people were soon once again called to war. As with the call to war in 1941, where after 4 years of bloody fighting the Axis powers were finally vanquished, in 1946, 1947, and 1948 the call to service was likewise global in scope. But this time the foe to be vanquished was *hunger*, not opposing armies, navies, and air forces, with the hunger of people in nations that had but recently been at war with the United States being in the greatest need of conquering. If, as I have often heard said, WWII was America’s last “good war,” I consider this subsequent national effort



Brewing Materials Panel: Left to right—Dr. Stephen Laufer, Kurt Becker, President Berkes, Prof. James G. Dickson, Chairman Henry R. Henius .

**Figure 8.** Photo of the Brewing Materials Panel from the Third Technical Session at the MBAA’s “Third Substitution Meeting” held October 12–14, 1944, in Saint Louis, Missouri (88). From the Karl Strauss Archives at the American Breweriana Association in Potosi, Wisconsin. Published with permission of the MBAA.



equally as deserving of the designation, especially in light of the historically unprecedented generosity so immediately provided to former foes. Perhaps no other words better captured this sentiment than those of former President Herbert Hoover, who, after a 35,000 mile trip around the world in the opening weeks of 1946 as America’s “Food Ambassador,” had this to say as to why the United States had a moral obligation to spearhead global famine relief efforts: “It is unthinkable because we do not want the American flag flying over nation-wide Buchenwalds” (51).

Estimating that, if the United States did nothing, soon 300 million people would be living on less than 900 calories a day, Hoover’s Buchenwald reference was by no means random. A notorious concentration camp in the hills overlooking Weimar, it was liberated by American forces near the end of WWII. Widely covered by the America media, for many Americans it was their first exposure to the horrors of these camps—including the awareness inmates were subsisting on less than 900 calories a day. His words hit home.

I reference these events as the global context is crucial to understanding why the years of global famine relief immediately following WWII were significantly *more* challenging to

the American brewing industry than the years of war. For included in President Truman’s February 6, 1946, address to the nation (where he outlined his “nine-point” plan to ward off global famine) were the following brewing-specific elements, all implemented effective March 1, 1946: (1) a complete ban on the use of both wheat and table-grade rice; and (2) requiring that the pooled value of all brewing grains used in 1946, both traditional (i.e., malt, corn, and rice) and non-traditional (e.g., kaffir corn, milo maize, barley, soybean, rye, and oats), be reduced to the pooled value of all grains used in 1940—effectively a 30% reduction compared with the collective quantities used in 1945 (69).

Remarkably, despite these conditions, and finding itself unable to meet demand (as evidenced by the frequency with which American newspapers bemoaned beer shortages [e.g., 18]), the American brewing industry came within a hair of matching 1945’s record volume, producing just 1.88% less beer (Table 1). Perhaps it is stating the obvious, but it bears emphasizing that in brewing essentially the same volume of beer with 30% less pooled grains from March 1 to August 31 (then with later changes to the pooled quota 15% less from September 1 to October 26 and 10% less to year’s end [38]), the industry had

**Table 5.** Per capita beer consumption of beer produced in the United States (in gallons) from 1840 to 2019<sup>a</sup>

| Year | Per capita | Year  | Per capita | Year  | Per capita | Year | Per capita | Year | Per capita |
|------|------------|-------|------------|-------|------------|------|------------|------|------------|
| 1840 | 1.4        | 1895  | 15.0       | 1930* | 0.93       | 1965 | 17.23      | 2000 | 21.88      |
| 1850 | 1.6        | 1896  | 15.7       | 1931* | 0.78       | 1966 | 17.31      | 2001 | 21.68      |
| 1860 | 3.2        | 1897  | 14.8       | 1932* | 0.69       | 1967 | 18.18      | 2002 | 21.59      |
| 1863 | 1.7        | 1898  | 15.8       | 1933  | 2.73       | 1968 | 18.15      | 2003 | 20.91      |
| 1864 | 3.3        | 1899  | 15.2       | 1934  | 9.24       | 1969 | 18.76      | 2004 | 20.97      |
| 1865 | 3.4        | 1900  | 16.02      | 1935  | 11.02      | 1970 | 20.36      | 2005 | 20.69      |
| 1866 | 5.6        | 1901  | 16.19      | 1936  | 12.54      | 1971 | 20.02      | 2006 | 20.54      |
| 1867 | 5.5        | 1902  | 17.42      | 1937  | 14.14      | 1972 | 20.73      | 2007 | 20.42      |
| 1868 | 5.2        | 1903  | 17.94      | 1938  | 13.45      | 1973 | 20.92      | 2008 | 20.04      |
| 1869 | 5.2        | 1904  | 18.19      | 1939  | 12.76      | 1974 | 22.19      | 2009 | 19.87      |
| 1870 | 5.3        | 1905  | 18.29      | 1940  | 12.88      | 1975 | 22.66      | 2010 | 19.56      |
| 1871 | 6.0        | 1906  | 19.83      | 1941  | 12.83      | 1976 | 22.84      | 2011 | 19.17      |
| 1872 | 6.6        | 1907  | 20.86      | 1942  | 14.65      | 1977 | 24.24      | 2012 | 19.36      |
| 1873 | 7.1        | 1908  | 20.53      | 1943  | 16.10      | 1978 | 23.90      | 2013 | 18.81      |
| 1874 | 6.9        | 1909  | 19.29      | 1944  | 18.31      | 1979 | 25.28      | 2014 | 18.78      |
| 1875 | 6.6        | 1910  | 19.96      | 1945  | 19.19      | 1980 | 25.70      | 2015 | 18.48      |
| 1876 | 6.7        | 1911  | 20.90      | 1946  | 18.63      | 1981 | 26.17      | 2016 | 18.28      |
| 1877 | 6.5        | 1912  | 20.22      | 1947  | 18.90      | 1982 | 26.01      | 2017 | 17.75      |
| 1878 | 6.6        | 1913  | 20.83      | 1948  | 19.30      | 1983 | 25.87      | 2018 | 17.38      |
| 1879 | 7.0        | 1914  | 20.70      | 1949  | 18.65      | 1984 | 25.37      | 2019 | 16.91      |
| 1880 | 8.2        | 1915  | 18.49      | 1950  | 18.08      | 1985 | 25.19      | 2020 | N/A        |
| 1881 | 8.6        | 1916  | 17.83      | 1951  | 17.81      | 1986 | 25.37      | 2021 | ?          |
| 1882 | 10.0       | 1917  | 18.26      | 1952  | 17.63      | 1987 | 25.00      | 2022 | ?          |
| 1883 | 10.2       | 1918  | 15.10      | 1953  | 17.50      | 1988 | 25.11      | 2023 | ?          |
| 1884 | 10.7       | 1919* | 8.22       | 1954  | 17.60      | 1989 | 25.14      | 2024 | ?          |
| 1885 | 10.5       | 1920* | 2.70       | 1955  | 16.78      | 1990 | 25.29      | 2025 | ?          |
| 1886 | 11.1       | 1921* | 2.63       | 1956  | 16.65      | 1991 | 24.80      | 2026 | ?          |
| 1887 | 12.1       | 1922* | 1.79       | 1957  | 16.20      | 1992 | 24.42      | 2027 | ?          |
| 1888 | 12.7       | 1923* | 1.46       | 1958  | 15.78      | 1993 | 24.17      | 2028 | ?          |
| 1889 | 12.6       | 1924* | 1.33       | 1959  | 15.86      | 1994 | 23.80      | 2029 | ?          |
| 1890 | 13.6       | 1925* | 1.37       | 1960  | 16.22      | 1995 | 23.19      | 2030 | ?          |
| 1891 | 14.7       | 1926* | 1.28       | 1961  | 15.78      | 1996 | 23.14      |      |            |
| 1892 | 15.0       | 1927* | 1.14       | 1962  | 16.02      | 1997 | 22.62      |      |            |
| 1893 | 16.0       | 1928* | 1.07       | 1963  | 16.05      | 1998 | 22.27      |      |            |
| 1894 | 15.2       | 1929* | 0.98       | 1964  | 16.64      | 1999 | 22.02      |      |            |

<sup>a</sup> Table produced by the author using data sourced from: 1840, 1850, and 1860 (53); 1863 to 1899 (21,22); and 1900–2019 (courtesy Lester Jones, Chief Economist of the National Beer Wholesalers Association). Asterisk (\*) indicates Prohibition-era non-alcoholic “cereal beverage” containing less than 0.5% alcohol by volume. Highlights: 1911 is the industry’s pre-Prohibition peak per capita beer consumption of 20.9 gallons/person (Prohibition lasted from 1919 to 1933); 1942–1948 are years of pronounced growth in per capita beer consumption, including spikes over 19 gallons/person in 1945 and 1948 at 19.19 and 19.30 gallons, respectively; 1973–1982 is the window spanning the introduction of modern light beers (~100 calories), including the still standing historical industry record of 26.17 gallons set in 1981; 2019 is the most recently available data, which at 16.91 gallons is down 9.6 gallons from the 1981 high; and 2020–2030 is perhaps, per the Discussion, the decade marking the beginning of the missing fifth “Blüthezeit” (flowering time) in the “Marsch der Leichtigkeit” (March of Lightness) of domestically produced malt beverages.

clearly not adopted the strategy of brewing proportionately less beer. Instead, it had followed the strategy of sourcing extract using massive amounts of *non-grain* materials. Enter the beginning of the S<sup>3</sup> era.

So, per Macbeth's famous quote of "out, out, brief candle," what were the non-grain players that strut and fret their time upon the American brewing stage doing before being heard of no more? Well, they came in the form of two entirely new categories of brewing materials—cassava and cassava products and potatoes and potato products—as well as the use of a variety of different grades of quota free syrups (mostly from America's sugar cane mills and refineries located in Louisiana and on the eastern seaboard [16]). This was as eclectic a group of brewing adjuncts as there has ever been (well, at least, until Sam Caligione arrived on the American brewing scene, with Dogfish Head Craft Brewed Ales). I still shake my head in amazement knowing that in 1946 at least 5.17 million pounds of potatoes and potato products found their way into American beer.

But dwarfing the use of potatoes was the use of South American-sourced cassava and cassava products. From the spring of 1946 to mid-1948 the category reigned as the king of non-grain adjuncts with 74.99 million pounds used in just the last 6 months of 1946 alone. When I first came across mention of this category, I was completely ignorant of just what the heck it was, especially given the plethora of product names and grades encompassed within it. With this in mind, I hope the following pulled from Kurt Becker's "Non-Grain Adjuncts" article in the August 1946 issue of *Brewers Digest* will prove helpful (16):

From the thickened rhizomes (roots) of two tropical plants known as "sweet cassava" (*Manihot aipi* Pohl) and "bitter cassava" (*Manihot utilisima* Pohl) widely grown in Brazil, a starchy material is obtained by grinding, washing with water, screening and drying which is known by such trade names as manioc, manioc, mandioca, cassava, Para arrowroot, and others. It is a main staple of food in Brazil and also widely used for a great number of industrial purposes.

Becker considered it "a very satisfactory adjunct," recommending:

For best results, manioca in the form of meal or fine grits should be boiled in the cooker for about 10–30 minutes. At rates up to 40% of the total materials, normal processing in brew house as well as cellars has generally been observed. In its effects on the taste of the beer, manioca is more or less a "neutral" brewing material, and only occasionally has it been observed that a slight reduction in the hop rate is indicated where the percentage of manioca is high. Manioca is also being converted into syrup of 73–78% total and 50–60% fermentable extract and good over-all brewing properties.

Armed with this broad array of quota-free, non-grain adjuncts (including even tapioca, the most highly refined grade of cassava starch [97]), the review of 1946 in *The Inspiring and Surprising History and Legacy of American Lager Beer: 1941–1948* covers what I believe to be a unique year in the entire history of the American lager brewing industry. Envisioning master brewers as they went about their business chanting "tapioca, potatoes, molasses, oh my!", the array of strategies, processes, and technology that must have been employed in 1946 is simply breathtaking. From the use of activated carbon in kettles to ameliorate color, foam, and flavor issues associated with many of the quota-free sugars (and dealing with the down-stream issues caused by its use [16]), to how to test inventories of cassava-based adjuncts for levels of poisonous hydrocyanic acid (71), to the installation of new brew house systems able to convert raw molasses to a clear and deodorized syrup—or simply using it

directly (70,72)—they simply found solutions to every problem. Surprisingly, in addition to the endless permutations and combinations of recipes never used before—or since—they also included the first recorded use of a microbial-sourced "complex enzyme preparation of both alpha and beta amylases" (*decades* before their widespread use in today's low-calorie brands of light lager beer [73]). The creativity, resiliency, energy, and spirit of innovation demonstrated by America's "Band of Brewers" war-rant being part of our industry's collective consciousness today—if for no other reason than to thank them for doing everything they could during that first year of peace to ensure America's returning "Band of Brothers" never suffered from a want of ice-cold American beer.

## 1947: Easy Come, Easy Go

In what proved to be the last full calendar year before *all* restrictions on brewing materials were removed, in some ways 1947 was a year defined by periods of the past, present, and future relative to the history of the American brewing industry. Beginning with the "past," in January and February the industry was constrained to the same restrictions on brewing materials as were in place at the end of 1946. Moving on to the "present" (in this case 1947), over the last quarter of the year the industry adhered to a list of voluntary restrictions generated in response to what was the first live televised speech from the White House Oval Office made by a sitting American President (36). Taking place the evening of October 5, 1946, President Truman challenged both the people and industries of the United States to voluntarily commit to a national goal of providing an additional 100 million bushels of grain for famine relief to Europe—then entering its second post-war winter. By the middle of the month, the response of America's brewing industry to President Truman's challenge had both been developed, and endorsed, by the federal government. Drafted through a collaboration of representatives from the Small Brewers Committee (SBC) and United States Brewers Foundation (USBF) (7), America's brewers made the following 90 day pledges effective November 1, 1947 (sooner in the case of sorghum grains), namely (46):

1. The brewing industry would use no wheat or wheat products.
2. There would be no use made of feed barley or feed barley products.
3. No sorghum grains would be purchased from October 17, 1947, to February 1, 1948.
4. No use would be made of table grades of rice products.
5. During the 90 day period, each brewer would reduce the amount of corn products as used during September 1947 by 25% and also would not use more than 75% in any single month of the total corn and corn products used during September 1947.

It is significant to note each of these pledges was specific to malt *substitutes*, with no restrictions on malt offered by, or requested from, the American brewing industry. Simply put, malt fed the needs of war, not people's hunger. But corn did, with Baltimore's *Evening Sun* reporting "the use of corn by breweries decreased 41 percent between September and November," far more than the industry's commitment to a 25% reduction (15). I find this a powerful and inspirational example of just how far removed a period paradigm (i.e., greed motivated the industry's use of corn and rice after the war) can be from what history has to say on the matter.

However as to the "future" and 1947, the period between the "past" and "present" formed the majority of the calendar year.

This window, between March and October, was likely one that brought a lot of joy across America. For the first time since March 1, 1943, brewers were once again free to brew with *unlimited* quantities of the materials of their choice (with the exception of relatively painless bans on the use of wheat and food-grade rice). Whether these were traditional (i.e., malt, brewers' rice grits, corn-based adjuncts, and hops), S<sup>2</sup>, or S<sup>3</sup> categories, it mattered not to the federal government what blend of these the American brewer chose to use. During this period, with commercial supplies of all these materials readily available in quantities sufficient to meet demand, American brewers were once again free to brew the beer of *their* choice, just as is the case today.

So how did the year play out? Not surprisingly, while both S<sup>2</sup> and S<sup>3</sup> malt substitutes continued to be used, given the respite of the months of the “future” their overall use dropped significantly (11). With the dark year of 1946 behind it, overall industry beer production resumed its march of setting new records, with 87,856,902 barrels brewed, 1,252,822 more than the previously record year of 1945 (Table 1). Yet compared with the relatively draconian environment of 1946, this small increase in 1947—for the majority of which brewers enjoyed considerable freedom—triggered in the industry a debate likely as controversial today as it was then. While presented and discussed in much greater detail in the forthcoming book, it is one I hope readers will find as thought-provoking as I did, especially relative to applications for our industry's future.

And just what was the crux of this now 74-year-old debate that I believe merits much more than a fleeting interest today? Fundamentally it boiled down to this simple question: was the explosive industry growth experienced since America's entry into the war *because of* or *in spite of* the very beer itself? In other words, if the industry had been unaffected by the war and free to brew the same beer as provided to consumers before the war, would the same growth have been realized in an America whose workers were flush with cash as a result of the domestic economic boom created by the war? Or, given the unplanned changes to American beer necessitated by the war, was it a fortuitous case of “less equals more” vis-à-vis a less robust beer actually playing a profound role in driving the industry's dramatic growth? In the American brewing industry of 1947, finally free (for much of the year at least) to return to “normal” malt-to-adjunct ratios, such questions were far from esoteric.

So, what triggered such a debate, especially taking place as it did during the first window of normalcy? It was sparked by a phenomenon the industry had not seen since before the war: a slump in beer sales. Throughout the spring and summer of 1947, tavern owners reported sales off by 20–60% compared with the same months in 1946. In Wisconsin alone, year-over-year beer sales dropped by an astonishing 1,080,130 barrels—and that was just in the month of September! Statistics included in editorials written by *Brewers Journal* editor David Gibson entitled “Need the Brewing Industry Despair?” (44) and “Any Reason for This Slump?” (45) illustrate just how perplexed and confused the industry was by the slump. Wrote Gibson: “Here is a job for someone. To make an analysis of the situation to decide what can be done to remedy it—and to see that it is done” (45).

Well, a “someone” by the name of Frank Lynn, consulting editor for *Brewers Digest*, certainly did not shy away from offering a remedy. In accepting the baton, he was fully aware his viewpoints and recommendations would likely not be shared by the vast majority of American brewers and breweries, especially given what was presumably a widespread febrile excitement to

return to traditional brewing formulations and materials (well at least from March through October!). Even prior to 1947, it is evident Lynn subscribed to the “less is more” philosophy. In 1946 for example, he wrote two editorials, which given their prophetic accuracy, I view as historical industry landmarks, namely:

- “A More Delicate Beer Might Hit the Bull's-eye! Lower Gravity Can Mean Higher Quality and Broader Consumer Acceptance” (59)
- “Perhaps a Lighter Beer...” (60)

But by the spring of 1947, with the majority of American breweries operating under the paradigm that “the thing to do is use more malt and more material” (62) by “adjusting their formulas coincidentally with the increased availability of brewing materials and an increase in the mash bill” (61), Lynn essentially told the industry: “Hold It!” He tackled head-on the sensitive and timeless subject of *who best defines quality*—the brewer or the consumer—provocatively arguing in his editorials: “The public does not always appreciate what a group of connoisseurs might call tops in beer quality. It would seem the part of wisdom not to automatically jump back into much heavier and stronger beers now just because materials are freely available” (63); “The real connoisseurs only occasionally drink heavy beer, but soon for many reasons, they turn to a more delicate one, well tasting and well flavored, which they prefer” (62); “I conclude: swing your appeal to the American people again and again. You will earn success, more than was ever earned anywhere” (62); “Brewers in general have adopted an entirely different procedure in this respect. They have themselves in most instances assumed the role of judge in assessing the flavor of their product on the assumption that since beer production is their specialized business, they must perforce be experts in judging beer quality. While this assumption is largely valid, it fails to take into account the consumer's reaction to certain flavor nuances” (61); and “Of course, it will involve the making of painful concessions to public taste at times. The Master Brewer may feel that he is sacrificing some of the art of brewing or that he is compromising his profession” (63).

These are certainly words and sentiments that I myself debated with others many times over the course of my career, and I can well imagine his perspective was not widely shared 74 years ago nor likely by many today. Indeed, based on his editorial of June 1947 we can assume this was the case, given how after a prefacing mea culpa of “full apologies to some swell people in our industry” he put everything on the table when he wrote (63):

Who can say how much of our volume of sales during the curtailment period might have been the result of our very lowering of gravity? It is possible that the Industry might always have sold more beer if it had put out a more delicate product? And conversely, who can say but what the falling off in sales so far in 1947 might have been partially due to a sudden increase in gravity?

Lynn's proposed solution to the slump lay in proactively listening to the voice of the *consumer* (61):

Here the consumer plays the deciding role, a fact which too many brewers have ignored in the past. Except for a few progressive concerns, brewers have done little to emulate the example of other food processors who have established consumer tasting panels which pass critical judgment upon their products and whose findings are used as guides in flavor development. These processors have recognized the advantages which accrue from letting the consumer decide on the flavor he prefers most and then of meeting that particular flavor demand.

And, later in the same issue (62), Lynn continued:

In determining the ideal quality and taste, etc., we must be concerned primarily with the tastes and preferences of the masses of the American public. And in determining that, we must take into consideration not only present beer drinkers but that great reservoir of potential beer drinkers which we will have to win over if consumption is to increase.

While perhaps he was but a voice in the wilderness, there were certainly others in the industry who shared Lynn's philosophy, including his counterparts at the *American Brewer* (editors Robert Schwarz and Stephen Laufer), co-authors of what I consider to be the best technical paper on this topic. Entitled "Composition and Character of American Beers Before, During and After World War II" (93), it was first presented at a District New York MBAA meeting in 1945, but as "at the time the industry was brewing under war-time conditions it was considered inadvisable to publish the paper" (8). Finally released in 1947 with the same text, but tables and figures updated with two additional years of data, the "before" period begins with the aforementioned landmark year of 1914, representative of the pre-Prohibition production record not broken until 1943.

The paper provides a goldmine of commentary, perspective, and opinions regarding the beer of the "before" and "during" windows and the relative success each enjoyed (or not) in the marketplace. It is supported by an incredible array of figures and tables, and I was in awe of the passion for beer so obviously required to write this epic paper. But it is how they tapped into their "before" and "during" analyses in forming their thoughts as to what America's "after" beer *would* be—and *should* be—that made me shake my head time after time in respectful amazement over their prescient abilities. Specific to the "would be," consider the following example:

When more malt comes back to the breweries, will any master brewer fail to welcome it so as to use more of it in his beer? And when corn products and rice and sugars and syrup, as we used them before the war, are again available in unrestricted quantities, will not these tried and standard brewing adjuncts be used in more liberal amounts? If the authors, as brewing colleagues, may present an opinion, it, frankly, is in the affirmative.

Given what we know of the American beer landscape today, their "more liberal" prediction specific to the increased use of corn and rice in the brewing of ever lighter adjunct lager beers proved remarkably prophetic, albeit requiring many decades before reaching full manifestation. But equally as prophetic were their thoughts as to what *should* be included in America's beer landscape. Here they expressed a clear hope that "more liberal" adjunct lager would *not* be the sole future of America's beer soul. Once again tapping into the "before" of American beer history, they noted how in the not-so-distant past "the public had a larger variety of beers from which to choose and to satisfy differing beer taste or beer desires at various times." Referring to pre-Prohibition America, they described it as one where it was still possible to find brewers of "Munich, Würzburger, Kulmbacher type beers ... amber to almost black, ales, porters, and stouts ... a variety of pale beers from distinctly and strongly hopped Pilsener character to the more full-bodied and decidedly less bitter, pale and dark Munich and Vienna types." In this portfolio of styles, virtually extinct by the late 1940s (but which today populate the chalkboards in countless craft brewery taprooms across the United States, Canada, and around the world!), Schwarz and Laufer only saw *opportunity* for post-war industry growth, arguing: "If, in post-war times, the old saying, 'Variety is the spice of life' still will hold true, then should we not now

prepare to offer our public different beers on different occasions to quench different varieties and kinds of thirst?"

As America now well knows, their "should" vision only became a reality when future generations of grandchildren and great-grandchildren gave a whole new meaning to what the word "should" meant! Now no longer remotely synonymous with a single style, the energy, passion, creativity, and spirit of innovation that is America's second revolution in beer—the American craft beer movement—has wonderfully redefined "more liberal" as including in scope just about *anything* that can be harvested from nature's bounty.

But returning to period voices in alignment with those of Frank Lynn, another I found to be remarkably prophetic was that of George Tilton, a senior executive at Anheuser-Busch, Incorporated. In early 1947 he gave a speech at the Annual Convention of the USBF entitled "Vital Need for Postwar Market Research" (99). In it he essentially laid out the principle of beer "drinkability" and how it, and not "powerful advertising and sales promotions," was the key to ultimate commercial success. He stressed how critical *consumer* research was in defining this Holy Grail of beer attributes. Forty-two years later, when I first heard the word "drinkability" during August A. Busch III's speech at the 1989 Brewers Conclave, I remember thinking "well, that's not even a word." As someone educated in the Queen's English in Canada, in my mind the word made absolutely no sense. Is not every beer "drinkable"? However, with the benefit of a long professional career now over, having seen which breweries flourished in the decades following the war (and even more significantly those that did not) both Tilton's and Mr. Busch's words now make all the sense in the world to me. Totally.

But beyond being prophetic, there was one quote in particular from Tilton's speech that resonated more with me than any other: "If history repeats itself, we can see the brewers of these disappearing brands spending more and more money on sales promotion in a frantic effort to maintain sales. The bitter reality of tomorrow is written in the consumers' preference of today."

Eight decades later, the irony found in those words speaks for itself. However, it is because they speak with a wisdom I believe is equally applicable to *both* macro and craft brewers, and more importantly to the *futures* of both, that I feel they warrant highlighting. If there is one lesson more than any other history has taught us it is this: stasis is not in nature's DNA, nor will it ever be found in the American brewing industry—macro and craft alike. Tilton's counsel, as to how to avoid being a victim of history repeating itself, rings to me with the same challenging truth today as it did then.

### 1948: "A March Towards Monopoly"

With the voluntary restrictions of late 1947 set to expire February 1, 1948, the same parties agreed to a new set of similar, but distinct, pledges (98). With June 30, 1948, set as the expiration date, the industry committed to the following (9):

1. For the first three months beginning March 1, 1948, brewers would use neither wheat nor wheat products, table grade rice, nor products made from table grade rice.
2. Each brewer would use no more than 85% of the quantity of grain and grain products, other than barley malt and barley malt products, as used by each during the corresponding quarter of 1947, and no more than 105% of the quantity of barley malt products used during the corresponding quarter of 1947.
3. A minimum quota of 120,000 pounds of grains per month was allowed to each brewery while operated by



the same brewery ownership entering March 1. [Author’s note: perhaps this was to discourage small breweries from being purchased by larger breweries in order to gain their allotted grain?]

While these pledges remained in effect through June 30, on that very same day both the USBF and SBC were rewarded with a simple telegram from the Secretary of Agriculture informing them their members—along with all unaffiliated brewers—“were released from the voluntary grain conservation agreement” (42). And just like that, it was over. No caveats, no exceptions, or quotas: *everything* was back on the table when it came to brewing materials.

Entering 1948, America had 466 breweries spread across 39 states and one territory, Hawaii (10). Just a mere decade prior, in 1938, the number had stood at 696 breweries over 40 states and two territories (Alaska and Hawaii) (12). By October 1948, the number had already dropped to 448, with John E. O’Neill, General Counsel of the Small Brewers Association, lamenting that as “fewer brewers are making more beer” he feared for the American brewing industry that it was a harbinger of “a march towards monopoly” (52). While the “average” American lager beer from this period had gone through numerous variations (Table 6), compared with the beer entering the period it was a slightly higher real degree of fermentation and lower original gravity and real extract beer that for decades after would go on to represent O’Neill’s feared march. Time has proven O’Neill to be just as skilled at prophesies as his contemporaries Tilton, Schwarz, Laufer, and Lynn. By the start of my journey in the American brewing industry in 1987, just 3 years shy of the first revolution’s denouement of 203 million barrels of beer set in 1990, that number had precipitously declined to what was essentially a cadre of three “macro” breweries—all of whom I had the honor and privilege of working for and with. That said, though, it is my sincere hope somewhere O’Neill’s spirit is smiling from ear to ear, both from a sense of pride as to what today’s “Brewers Association” of small brewers has accomplished and also from a deep appreciation and respect in giving those “fewer brewers” of his generation a run for their money today!

## Discussion

July 1, 1948, marked the end of one of the most extraordinary periods in the long history of the American brewing industry. Mostly forgotten, especially in connection with the years of global famine relief, it bears stressing that while WWII lasted 1,365 days for the United States, for the nation’s brewers restricted access to traditional brewing materials lasted an incredible 1,942 days—a full 42% longer than the war itself. Given this

highly condensed period overview, what conclusions can be reached specific to the paper’s title themes of myths, war, and famine? Certainly, relative to myths, it provides a period-specific complement to the first two *Technical Quarterly* articles. For regarding the central myth that American adjunct lager beer traces its origins back to WWII, collectively all three papers provide abundant historical evidence such was not the case. But also flowing through this paper are the legacies left by that generation of pre-Prohibition American brewers and brewing scientists who fought for so long, so hard, and against so many forces to protect the right of American brewers to brew with the materials of their choice. Had the battle been lost and the brewing industry of 1941 to 1948 been beholden to an “American Reinheitsgebot,” how different would the history of American beer have been, not only from this period, but before and since as well? It was the professional *freedom* empowered by this legacy—to brew with materials beyond the limitations of malt, hops, water, and yeast—that played an instrumental role not only in enabling the explosive industry growth of 1941 to 1948 but also in enabling the full “Blüthezeit” (flowering time) of *two* American beer revolutions.

As for conclusions specific to the themes of war (1941–1945) and famine (1946–1948), these must be drawn solely from the critical assessments made in this third, and last, paper in the series. To facilitate these, I would like to begin with the use of two images (one a table, the other a graph) in providing my conclusions regarding the industry’s history over this remarkable 7 year period. Both exhibit a simple, yet incredibly powerful, symmetry in visually conveying era dynamics regarding brewing materials and, of greater importance of course, American beer itself. So, let’s begin.

The first, shown in Table 7, is pulled from the April 1948 issue of the *American Brewer* (minor formatting modifications) (11). Packing an inordinate amount of data, it presents a month-by-month picture from January 1943 to December 1947 painted in metrics of the pounds of materials per barrel, extract per barrel, and wort original gravity of the materials used in the American brewing industry. While the data are incredibly informative, it is not the numbers themselves I would like to draw attention to. For just as a wall-mounted graph depicting the entire monthly history of the Dow Jones Industrial Average, when viewed from afar, tells a story without the values themselves being legible (i.e., directionally upward), so too are the stories contained within each of the 11 columns between malt and malt products and other material told. Even a cursory top-to-bottom viewing of each column conveys its own story regarding this unique period of American brewing history.

Beginning with the traditional categories of brewing materials (i.e., malt and malt products, corn and corn products, rice

**Table 6.** Average composition of American lager beer (in percent) during 1941–1949 conducted by the analytical department of New York City’s Schwarz Laboratories, Incorporated<sup>a</sup>

| Year | Wort original gravity | Real degree of fermentation | Apparent extract | Real extract | Protein (N × 6.25) | Alcohol   |           |
|------|-----------------------|-----------------------------|------------------|--------------|--------------------|-----------|-----------|
|      |                       |                             |                  |              |                    | By weight | By volume |
| 1941 | 12.0                  | 56.7                        | 3.59             | 5.19         | 0.36               | 3.49      | 4.47      |
| 1942 | 12.0                  | 56.7                        | 3.58             | 5.17         | 0.37               | 3.47      | 4.45      |
| 1943 | 11.4                  | 57.0                        | 3.39             | 4.92         | 0.32               | 3.31      | 4.24      |
| 1944 | 11.2                  | 57.0                        | 3.31             | 4.83         | 0.28               | 3.23      | 4.14      |
| 1945 | 11.1                  | 57.8                        | 3.23             | 4.73         | 0.27               | 3.27      | 4.18      |
| 1946 | 10.6                  | 58.3                        | 2.90             | 4.38         | 0.28               | 3.16      | 4.04      |
| 1947 | 11.1                  | 59.8                        | 2.95             | 4.51         | 0.31               | 3.37      | 4.31      |
| 1949 | 11.7                  | 60.3                        | 2.94             | 4.61         | 0.40               | 3.59      | 4.61      |

<sup>a</sup> Samples: 1941–1946, pooled 12 month average of monthly samples (93); 1947, pooled average of January–June monthly samples (93); and 1949, pooled average of January–March monthly samples (13).

**Table 7.** Pounds of materials per barrel, extract per barrel, and percent balling of malt beverages produced in the United States from January 1943 to December 1947 (11)<sup>a</sup>

| Month | Malt etc. | Corn etc. | Rice etc. | Wheat etc. | Barley etc. | Sorghum etc. | Soybeans etc. | Brewers sugars and syrups | Cassava etc. | Potatoes etc. | Other material | Total adjuncts | Total materials | Computer values     |                         |                       | Hops and hop extracts |           |
|-------|-----------|-----------|-----------|------------|-------------|--------------|---------------|---------------------------|--------------|---------------|----------------|----------------|-----------------|---------------------|-------------------------|-----------------------|-----------------------|-----------|
|       |           |           |           |            |             |              |               |                           |              |               |                |                |                 | % Extract from malt | % Extract from adjuncts | Total extract lbs/hbl |                       | % Balling |
| 1943  |           |           |           |            |             |              |               |                           |              |               |                |                |                 |                     |                         |                       |                       |           |
| Jan   | 35.02     | 9.81      | 2.33      |            |             |              |               | 2.00                      |              |               |                | 14.14          | 49.16           | 66.64               | 33.36                   | 33.63                 | 12.4                  | 0.49      |
| Feb   | 31.15     | 10.11     | 2.09      |            |             |              |               | 1.91                      |              |               |                | 14.11          | 45.26           | 64.06               | 35.94                   | 31.12                 | 11.5                  | 0.48      |
| Mar   | 32.91     | 10.64     | 2.35      |            |             |              |               | 2.11                      |              |               |                | 15.10          | 48.01           | 63.77               | 36.23                   | 32.91                 | 12.2                  | 0.47      |
| Apr   | 31.84     | 11.22     | 2.05      |            |             |              |               | 2.17                      |              |               |                | 15.44          | 47.28           | 62.44               | 37.56                   | 32.63                 | 12.0                  | 0.46      |
| May   | 31.84     | 11.06     | 2.23      |            |             |              |               | 2.20                      |              |               |                | 15.49          | 47.33           | 63.38               | 37.62                   | 32.66                 | 12.0                  | 0.47      |
| Jun   | 30.32     | 11.40     | 2.06      |            |             |              |               | 2.05                      |              |               |                | 15.51          | 45.83           | 61.20               | 38.80                   | 31.71                 | 11.7                  | 0.45      |
| Jul   | 31.74     | 9.3       | 2.29      | 0.37       |             |              |               | 1.97                      |              |               | 1.56           | 15.49          | 47.23           | 62.27               | 37.73                   | 31.74                 | 11.7                  | 0.45      |
| Aug   | 27.11     | 8.26      | 2.21      | 0.43       | 3.35        |              |               | 2.05                      |              |               | 0.23           | 16.53          | 43.64           | 58.52               | 41.48                   | 27.11                 | 10.1                  | 0.46      |
| Sep   | 28.99     | 9.49      | 2.09      | 0.91       | 2.53        |              |               | 2.11                      |              |               | 0.31           | 17.44          | 46.43           | 58.20               | 41.80                   | 31.87                 | 11.8                  | 0.45      |
| Oct   | 28.59     | 9.92      | 2.39      | 0.48       | 2.40        |              |               | 2.22                      |              |               | 0.16           | 17.57          | 46.16           | 57.58               | 42.42                   | 31.78                 | 11.7                  | 0.45      |
| Nov   | 28.14     | 10.50     | 2.30      | 0.43       | 2.12        |              |               | 2.34                      |              |               | 0.43           | 18.05          | 46.19           | 56.23               | 43.77                   | 31.96                 | 11.8                  | 0.45      |
| Dec   | 27.67     | 10.81     | 2.17      | 0.42       | 2.13        |              |               | 2.48                      |              |               | 0.42           | 18.42          | 46.06           | 55.52               | 44.48                   | 31.89                 | 11.8                  | 0.46      |
| 1944  |           |           |           |            |             |              |               |                           |              |               |                |                |                 |                     |                         |                       |                       |           |
| Jan   | 27.31     | 11.8      | 2.30      | 0.41       | 1.81        |              |               | 2.16                      |              |               | 0.46           | 18.38          | 45.69           | 55.17               | 44.83                   | 31.68                 | 11.7                  | 0.44      |
| Feb   | 26.97     | 11.63     | 2.49      | 0.42       | 1.72        |              |               | 2.37                      |              |               | 0.14           | 18.73          | 45.70           | 54.54               | 45.46                   | 31.65                 | 11.7                  | 0.43      |
| Mar   | 26.65     | 11.63     | 2.16      | 0.41       | 1.89        |              |               | 2.34                      |              |               | 0.15           | 18.83          | 45.48           | 57.57               | 42.43                   | 29.63                 | 11.0                  | 0.44      |
| Apr   | 26.59     | 11.64     | 2.30      | 0.43       | 2.11        |              |               | 2.61                      |              |               | 0.20           | 19.07          | 45.66           | 53.84               | 46.16                   | 31.60                 | 11.7                  | 0.43      |
| May   | 27.87     | 12.03     | 2.48      | 0.54       | 2.36        |              |               | 2.39                      |              |               | 0.13           | 19.66          | 47.59           | 54.34               | 45.66                   | 33.70                 | 12.3                  | 0.44      |
| Jun   | 28.60     | 12.08     | 2.61      | 0.59       | 2.33        |              |               | 2.16                      |              |               | 0.12           | 19.94          | 48.54           | 54.36               | 45.44                   | 33.55                 | 12.4                  | 0.48      |
| Jul   | 26.73     | 11.62     | 2.44      | 0.56       | 2.02        |              |               | 2.21                      |              |               | 0.14           | 18.94          | 44.67           | 53.93               | 47.07                   | 31.72                 | 11.7                  | 0.42      |
| Aug   | 26.52     | 11.65     | 2.35      | 0.60       | 1.82        |              |               | 2.14                      |              |               | 0.25           | 18.13          | 44.65           | 54.07               | 45.93                   | 31.39                 | 11.6                  | 0.42      |
| Sep   | 25.56     | 10.79     | 2.50      | 0.58       | 1.96        | 1.23         |               | 2.81                      |              |               | 0.68           | 20.55          | 46.11           | 52.15               | 47.85                   | 31.37                 | 11.6                  | 0.42      |
| Oct   | 25.96     | 10.07     | 2.81      | 0.63       | 1.96        | 1.49         |               | 2.64                      |              |               | 0.18           | 19.78          | 46.74           | 52.31               | 47.63                   | 31.77                 | 11.8                  | 0.49      |
| Nov   | 26.86     | 10.29     | 2.92      | 0.54       | 1.80        | 0.15         |               | 2.66                      |              |               | 0.08           | 19.78          | 46.64           | 53.09               | 46.91                   | 32.38                 | 12.0                  | 0.44      |
| Dec   | 25.91     | 10.13     | 2.76      | 0.48       | 1.77        | 1.52         | 0.07          | 2.77                      |              |               | 0.03           | 19.52          | 45.43           | 52.58               | 47.42                   | 31.53                 | 11.6                  | 0.44      |
| 1945  |           |           |           |            |             |              |               |                           |              |               |                |                |                 |                     |                         |                       |                       |           |
| Jan   | 25.92     | 10.63     | 2.52      | 0.51       | 1.77        | 1.48         | 0.07          | 2.63                      |              |               | 0.03           | 19.64          | 45.56           | 52.46               | 47.54                   | 31.63                 | 11.7                  | 0.43      |
| Feb   | 25.89     | 11.10     | 2.24      | 0.53       | 1.74        | 1.07         | 0.08          | 2.80                      |              |               | 0.03           | 19.58          | 45.56           | 52.49               | 47.51                   | 31.57                 | 11.7                  | 0.48      |
| Mar   | 24.00     | 11.34     | 2.45      | 0.59       | 2.22        | 0.98         | 0.07          | 3.14                      |              |               | 0.07           | 20.86          | 44.86           | 51.72               | 47.28                   | 31.28                 | 11.5                  | 0.43      |
| Apr   | 23.64     | 11.65     | 2.31      | 0.65       | 2.42        | 0.87         | 0.07          | 3.13                      |              |               | 0.04           | 21.16          | 44.80           | 48.43               | 51.57                   | 31.25                 | 11.5                  | 0.43      |
| May   | 23.73     | 11.92     | 2.31      | 0.64       | 2.34        | 0.81         | 0.05          | 3.03                      |              |               | 0.06           | 21.19          | 44.92           | 47.44               | 52.56                   | 32.02                 | 11.9                  | 0.43      |
| Jun   | 23.67     | 12.08     | 2.38      | 0.63       | 2.47        | 0.73         | 0.08          | 2.98                      |              |               | 0.05           | 21.41          | 45.08           | 48.26               | 51.74                   | 31.39                 | 11.6                  | 0.42      |
| Jul   | 23.52     | 11.39     | 2.51      | 0.73       | 2.48        | 1.11         | 0.08          | 2.92                      |              |               | 0.04           | 21.27          | 45.09           | 48.51               | 51.49                   | 31.43                 | 11.6                  | 0.43      |
| Aug   | 24.37     | 10.80     | 2.55      | 0.79       | 2.58        | 1.45         | 0.07          | 2.89                      |              |               | 0.05           | 21.18          | 45.55           | 49.22               | 50.78                   | 31.19                 | 11.5                  | 0.43      |
| Sep   | 24.93     | 9.94      | 2.61      | 0.83       | 2.60        | 2.20         | 0.09          | 2.53                      |              |               | 0.06           | 20.97          | 45.92           | 50.09               | 49.91                   | 31.85                 | 11.8                  | 0.44      |
| Oct   | 25.01     | 10.12     | 2.72      | 0.79       | 2.59        | 2.31         | 0.09          | 2.28                      |              |               | 0.05           | 20.98          | 45.99           | 50.17               | 49.83                   | 31.90                 | 11.8                  | 0.44      |
| Nov   | 25.22     | 10.00     | 3.09      | 0.81       | 2.44        | 2.09         | 0.09          | 2.27                      |              |               | 0.04           | 20.83          | 46.05           | 50.50               | 49.50                   | 31.96                 | 11.8                  | 0.50      |
| Dec   | 26.69     | 9.73      | 3.40      | 0.62       | 2.22        | 1.65         | 0.08          | 2.42                      |              |               | 0.02           | 20.12          | 46.81           | 55.14               | 44.86                   | 30.98                 | 11.5                  | 0.47      |
| 1946  |           |           |           |            |             |              |               |                           |              |               |                |                |                 |                     |                         |                       |                       |           |
| Jan   | 26.72     | 9.29      | 3.46      | 0.64       | 1.76        | 2.03         | 0.08          | 2.39                      |              |               | 0.001          | 19.67          | 46.39           | 53.18               | 46.82                   | 32.15                 | 11.9                  | 0.45      |
| Feb   | 25.97     | 9.35      | 3.16      | 0.79       | 1.95        | 2.28         | 0.09          | 2.57                      |              |               | 0.002          | 20.19          | 46.16           | 52.00               | 48.00                   | 31.96                 | 11.8                  | 0.45      |
| Mar   | 24.77     | 8.42      | 2.78      | 0.07       | 1.14        | 1.68         | 0.07          | 2.45                      |              |               | 0.02           | 16.64          | 41.41           | 55.31               | 44.69                   | 28.66                 | 10.6                  | 0.45      |
| Apr   | 25.40     | 7.96      | 2.66      | 0.01       | 0.79        | 1.57         | 0.06          | 2.82                      |              |               | 0.17           | 16.13          | 41.54           | 54.43               | 45.57                   | 29.83                 | 11.1                  | 0.43      |
| May   | 26.31     | 7.11      | 2.40      | 0.08       | 0.63        | 1.46         | 0.06          | 2.95                      |              |               | 0.27           | 14.96          | 41.26           | 58.17               | 41.83                   | 28.96                 | 10.6                  | 0.45      |
| Jun   | 26.17     | 5.86      | 2.22      | 0.05       | 0.74        | 1.77         | 0.06          | 3.35                      |              |               | 0.41           | 14.46          | 40.57           | 60.11               | 39.89                   | 27.86                 | 10.3                  | 0.45      |
| Jul   | 26.76     | 5.69      | 2.03      | 0.03       | 0.34        | 1.76         | 0.06          | 3.30                      | 0.51         | 0.20          | 0.02           | 13.94          | 40.70           | 61.12               | 38.88                   | 28.00                 | 10.5                  | 0.45      |
| Aug   | 26.04     | 5.45      | 1.69      | 0.02       | 0.28        | 1.42         | 0.06          | 3.39                      | 1.86         | 0.19          | 0.003          | 14.39          | 40.43           | 59.66               | 40.34                   | 29.93                 | 10.4                  | 0.44      |
| Sep   | 27.12     | 6.33      | 1.85      | 0.02       | 0.18        | 1.52         | 0.06          | 2.85                      | 1.88         | 1.06          | 0.002          | 14.41          | 41.53           | 63.26               | 36.74                   | 27.44                 | 10.2                  | 0.45      |
| Oct   | 27.54     | 6.36      | 1.63      | 0.004      | 0.11        | 1.43         | 0.06          | 2.61                      | 2.38         | 0.08          | 0.001          | 14.66          | 42.20           | 59.49               | 40.51                   | 28.03                 | 10.5                  | 0.46      |
| Nov   | 28.21     | 6.90      | 2.10      | 0.002      | 0.12        | 1.44         | 0.06          | 2.34                      | 2.07         | 0.08          |                | 15.11          | 43.32           | 61.66               | 38.34                   | 29.88                 | 11.1                  | 0.46      |
| Dec   | 29.11     | 7.70      | 2.19      |            | 0.15        | 1.23         | 0.06          | 2.46                      | 1.43         | 0.05          |                | 15.27          | 44.38           | 61.50               | 38.50                   | 30.57                 | 11.3                  | 0.46      |
| 1947  |           |           |           |            |             |              |               |                           |              |               |                |                |                 |                     |                         |                       |                       |           |
| Jan   | 29.04     | 8.58      | 2.32      |            | 0.16        | 0.98         | 0.05          | 2.31                      | 1.17         | 0.04          |                | 15.61          | 44.65           | 59.09               | 40.91                   | 30.86                 | 11.4                  | 0.46      |
| Feb   | 29.42     | 9.32      | 2.22      |            | 0.11        | 0.67         | 0.05          | 2.16                      | 0.89         | 0.06          |                | 15.48          | 44.90           | 60.03               | 39.97                   | 30.94                 | 11.5                  | 0.46      |
| Mar   | 29.17     | 10.25     | 2.02      | 0.02       | 0.13        | 0.45         | 0.05          | 2.09                      | 0.60         | 0.02          |                | 15.50          | 44.80           | 60.51               | 39.49                   | 30.51                 | 11.3                  | 0.46      |
| Apr   | 30.18     | 10.30     | 1.84      |            | 0.13        | 0.43         | 0.05          | 2.11                      | 0.58         | 0.02          |                | 15.46          | 45.64           | 61.43               | 38.57                   | 31.42                 | 11.6                  | 0.46      |
| May   | 30.18     | 10.64     | 1.78      |            | 0.11        | 0.34         | 0.05          | 2.01                      | 0.54         | 0.03          |                | 15.50          | 45.68           | 61.48               | 38.52                   | 31.43                 | 11.6                  | 0.47      |
| Jun   | 30.19     | 11.19     | 1.32      | 0.01       | 0.10        | 0.30         | 0.05          | 2.16                      | 0.49         | 0.02          |                | 15.64          | 45.83           | 61.45               | 38.55                   | 31.79                 | 11.7                  | 0.47      |
| Jul   | 31.31     | 10.67     | 1.99      | 0.03       | 0.09        | 0.21         | 0.05          | 2.12                      | 0.37         | 0.02          |                | 15.55          | 46.86           | 61.18               | 38.82                   | 32.14                 | 11.9                  | 0.47      |
| Aug   | 30.22     | 10.71     | 2.02      | 0.12       | 0.08        | 0.21         | 0.04          | 2.06                      | 0.32         | 0.01          |                | 15.57          | 45.79           | 61.47               | 38.53                   | 30.89                 | 11.4                  | 0.47      |
| Sep   | 30.34     | 10.70     | 2.13      | 0.18       | 0.09        | 0.23         | 0.05          | 2.10                      | 0.01         | 0.04          |                | 15.64          | 45.98           | 61.23               | 38.77                   | 31.54                 | 11.7                  | 0.46      |
| Oct   | 30.36     | 10.83     | 2.18      | 0.18       | 0.07        | 0.21         | 0.05          | 2.15                      | 0.04         | 0.001         |                | 15.71          | 46.07           | 61.28               | 38.72                   | 31.71                 | 11.7                  | 0.46      |
| Nov   | 30.97     | 8.05      | 4.00      | 0.03       | 0.09        | 0.53         | 0.05          | 2.07                      | 0.20         | 0.001         |                | 15.02          | 45.99           | 62.69               | 37.31                   | 31.59                 | 11.7                  | 0.46      |
| Dec   | 30.94     | 7.62      | 4.35      | 0.03       | 0.09        | 0.64         | 0.05          | 2.06                      | 0.13         | 0.007         |                | 15.08          | 45.92           | 62.58               | 37.42                   | 31.61                 | 11.7                  | 0.45      |

<sup>a</sup> Etc. = and its products (for example, malt etc. = malt and malt products).

and rice products, and brewers' sugars and syrups), we see uninterrupted columns of values indicating all four materials were used continuously throughout the war. However, an entirely different top-to-bottom picture is seen relative to the columns specific to  $S^2$  and  $S^3$  adjuncts. Specific to  $S^2$  adjuncts, at first we see only empty cells for the months of January 1943 through June 1943. Then, suddenly, values start to populate the columns for wheat and wheat products (July 1943) and barley and barley products (August 1943), but only these two categories. Over a year later, and once again quite suddenly, the still empty columns for the two remaining categories of  $S^2$  wartime grain adjuncts start to have values depicted, first for sorghum grain and sorghum grain products (September 1944) and soybeans and soybean products (December 1944). Save for the absence between late 1946 and early 1947 of values for wheat and wheat products (which in itself tells its own story as *the* most critical famine relief grain), the visual conveys that all four  $S^2$  grain adjuncts continued to be used throughout the remaining months of 1947.

Moving on to  $S^3$  adjuncts, from January 1943 right up to June 1946, we see columns with nothing but air. Then, boom, starting in July 1946 the columns for both cassava and cassava products and potatoes and potato products are first populated, continuing uninterrupted throughout the last half of the year and through all of 1947. Lastly, even the "other material" column tells its own unique story, beginning as it does in July 1943 (when the industry first found itself scrambling to address shortages in rice and corn-based malt substitutes) and ending so suddenly in November 1946 (indicating by that time the "adjunct arsenal" of  $S^2$  and  $S^3$  category materials was sufficient to meet all extract needs). While certainly taking the time to digest the actual values found in each column as to relative and absolute differences is time well spent, for me the power of Table 7 rests in the conclusions that can be reached simply by conducting this quick visual exercise.

However, recognizing not all readers may see in Table 7 the same visual beauty as I, the second image is offered in the hope it truly deserves the distinction of "a single picture is worth a thousand words." Presented in Figure 9, the graph plots three of the four Table 7 "computer values" attributes from January 1943 to December 1947. When it first appeared on my monitor screen I remember being immediately and profoundly moved by the history found—and *told*—in the powerful mirror-image symmetry of these three simple lines. Serving also as perhaps the ultimate example of a WWII-era myth-busting image, in it we see how entering 1943 (when there were zero federal restrictions on brewing materials and ample supplies of commercially sourced traditional brewing materials) America's "average" beer was unchanged from that which entered WWII (i.e., ~68% malt to 32% adjuncts).

But beginning with the malt quotas of March 1, 1943, and the acute, then chronic, shortages in corn-based adjuncts that followed shortly thereafter, we see a picture of progressively declining ratios of malt to adjuncts—only stabilizing throughout most of 1945 at a ratio of ~50% malt to 50% adjuncts (traditional +  $S^2$ )—with the peak adjunct value of 52.56% coincidentally observed during the V-E month (Victory in Europe) of May 1945. Then, following the war (when malt was no longer needed to support the war effort but food grains were urgently needed for famine relief) we see malt-to-adjunct ratios climb back up to where they were at the start of the war, albeit with a marginally lower ratio of ~62% malt to 38% adjuncts (traditional +  $S^2$  +  $S^3$ ). Expressed another way, a slightly heavier American beer entered WWII than the one that emerged from the years of war and famine, but in between, from the spring of 1943 to the spring of 1948, America's beer had one thing in common that made it unique: it was *lighter*. Indeed, of the 36 million barrels of growth that took place between 1941 and 1948, nearly half occurred over just 1944 and 1945: the same two years representing the highest overall use of adjuncts and

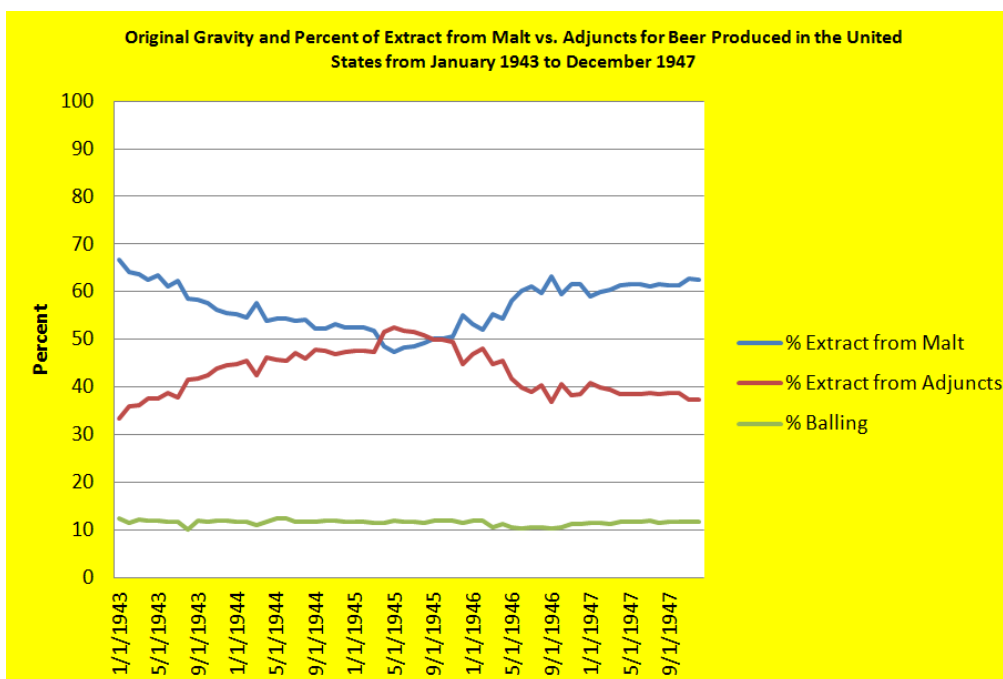


Figure 9. Original gravity and percent of extract from malt versus adjuncts for beer produced in the United States from January 1943 to December 1947. Graph produced by the author using the "computer values" depicted in Table 7 (11).

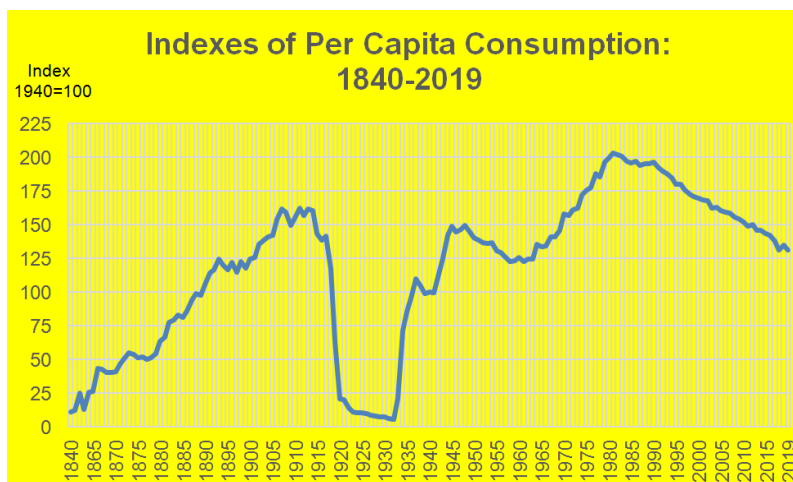
lowest of malt not only during the years of war and famine but to this day *ever* in the history of American beer.

But as with the debate of 1947, can we conclude the relationship between the growth of 1941–1948 and relative beer lightness was one of causation, not mere correlation due to other drivers? After all, in terms of the “voice of the consumer,” a causation linkage can only be *inferred* from the inflexible language of annual production (Table 1) and per capita (Table 5) statistics from this period. Not from a lack of trying, I have not come across a single period reference providing anything close to the type of insights as those gained today through consumer study groups. While the writings of George Tilton and Frank Lynn lead me to believe they were taking place at this time, any insights captured have clearly remained locked in time. However, also locked in time are the per capita and production statistics of 1840–1940 and 1949–2019. When both categories are critiqued against the nearly *two centuries* of American brewing industry history represented by Tables 1 and 5, I believe there are multiple periods consistent with a causation relationship between growth and “lightness.”

First, however, a few points of clarification to facilitate a standardized and shared understanding regarding the statistics presented in these two tables. If the past 13 years of research has taught me anything, it is that the protocol used in calculating and reporting “per capita” and “production” statistics has been as dynamic as the very Republic itself. Regarding the former, one can find it calculated based on the total population, or just that percentage of legal drinking age. Likewise, it could be reported against the “relative consuming consumption” of different age groups (as in Figure 2), or relative to withdrawals only, or domestic production only (macro + craft or each separately), or against combined industry shipments (domestic + imports). On top of this, “annual production” could represent calendar years or federal fiscal years ending either December 31 (1789–1841), June 30 (1842–1976), or September 30 (1977 to today). And so on, and so on, and so on. Because of the bewildering array of possibilities, it thus merits stressing the data in Table 1 for 1863–2019 represent annual domestic production on a fiscal year basis, with the per capita data in Table 5 for the comparable period likewise specifically calculated against these domestic figures. The production, shipment, or consumption of imported beer does not factor in either Table 1 or Table 5.

So why does pointing this out matter? Well, in part it is offered to help avert conflicting paradigms. For example, it is widely known in the industry that for many years now industry sales have varied very little from the 200 million barrel figure first set in 1989. But sometimes lost in this mirage of stasis over the past 30 years, and the excitement of the explosive growth of the American craft brewing industry, is the awareness that *as an industry*, the State of the Union is, relatively speaking, not a pretty picture. For example, while beer *shipments* (domestic + imports) in 2019 totaled 203.1 million barrels of beer (17), Table 1 reveals this figure was basically what domestic production alone was as far back as 1990. Since then, domestic production has declined to just over 179 million barrels, a level not seen since the late 1970s. Likewise, in terms of per capita statistics, when comparing 2010–2018 values calculated against *shipments* the picture is relatively stable, fluctuating within a narrow range of 19.9–20.7 gallons (75). However, per Table 5, when critiqued against domestic production, per capita consumption shows a pronounced decline over this period, dropping from 19.56 to 17.28 gallons, and further yet in 2019 to only 16.91 gallons, a level not seen since 1964. Domestically speaking, then, since the peak of 1981 the American brewing industry has been in the midst of a 40 year funk, and counting. To quote an industry colleague of mine, the American brewing industry, as a whole, has been “leaving a lot of money on the table.”

So, what of the aforementioned multiple periods that I believe illustrate a causation relationship between lightness and *growth*? When viewed in its entirety, I am struck by two observations in particular. First is the overall “Marsch der Leichtigkeit” (“March of Lightness”) of American lager beer over the course of these 180 years. Certainly, a lager drinker from the 1840s would be astonished by the lager of the 2020s. But it is the second observation that I find thought-provoking in terms of its implication for the industry’s past, present, and future. When the entire per capita history of lager beer is indexed and graphed against 1940 consumption (as representative of the first century of lager in America), in terms of “flowering times” I see evidence of four national “Blütezeiten” (Fig. 10). The first, beginning in the 1840s and carrying through much of the 1870s, is the introduction of lager beer to the United States as a lighter alternative to the heavier ales, porters, and stouts of 1776 to the 1840s. A period synonymous with all-malt Bavarian brown beer,



**Figure 10.** Per capita consumption of domestically produced beer from 1840 to 2019 indexed to 1940 = 100. Graph produced by the author using the data depicted in Table 5.



it was largely enjoyed exclusively within German-American communities. The second, beginning in the 1880s and peaking in the 1910s, saw the rise of Pilsener-style adjunct lager beer. This time, however, the style experienced remarkable commercial success due to its universal appeal. It not only cemented lager as the national beverage for *all* Americans but also by 1910 had also propelled the United States to the status of the leading beer producing nation *in the world*. The third period, and the subject of this paper, took place in the 1940s. While arguably a fortuitous example of a favorable outcome to “the law of unintended consequences,” it was associated with (and I believe triggered by) the lowest malt-to-adjunct lager beer ever brewed since lager’s introduction a century prior. Which leads to the fourth and most recent Blüthezeit in the Marsch der Leichtigkeit of American lager beer, but this time the flowering was an outcome of *intended* consequences.

In the decades following the 1940s, so dominant was the ~140–150 calorie adjunct lager beer that the styles of “American beer” essentially boiled down to an  $n = 1$ . Its post-war reign was first marked by decades of steady per capita decline (i.e., the 1950s and most of the 1960s) before completely reversing course and experiencing steady increases from the late 1960s through to the early 1980s. Undoubtedly much of this later growth stemmed from the annual tsunami of Boomers who came of legal drinking age over the same period. However, I believe it is no coincidence that: (1) the 1911 per capita consumption record of 20.90 gallons per person was finally broken in 1973 (at 20.92 gallons) and (2) the *still standing* historical industry records for both domestic production (203,658,410 barrels set in 1990) and per capita consumption of domestically brewed beer (26.17 gallons in 1981) all took place during the fourth Blüthezeit—the *designed* introduction of the modern ~100 calorie light lager beers. Beginning with Miller Lite’s national release in 1975 (although the brand was first released in August 1973 in limited markets in California, Illinois, Tennessee, and Rhode Island), Coors Light in 1978, and Bud Light in 1982, the birth of the modern light beer “transformed” American beer styles from an  $n = 1$  into an  $n = 2$ . Nevertheless, the American beer landscape still remained—as I recall Charlie Papazian accurately describing it early in my career—well, “boring.” That was of course until the rise in the 1990s of American micro-breweries and the craft beer revolution of the past three decades.

Clearly with an  $n = 90$  (as measured by the number of beer-style categories judged each fall at the Great American Beer Festival) an American brewing Blüthezeit on its own accord is in progress. In my mind what distinguishes this from the first four is that that, by design, it is of course the very antithesis of lightness. But what also distinguishes it is that while the beginnings of the previous four were all spaced by ~30 year cycles, this time the American brewing industry is now at least a decade overdue for its next flowering. Instead, it is eerily similar to Tilton’s description of 54 years ago where declining macro brewers spend “more and more money on sales promotion in a frantic effort to maintain sales,” while the growing craft industry taps into the “the consumers’ preference of today.” Collectively, though, our industry’s “bitter reality” is one of overall per capita and domestic production decline, not growth.

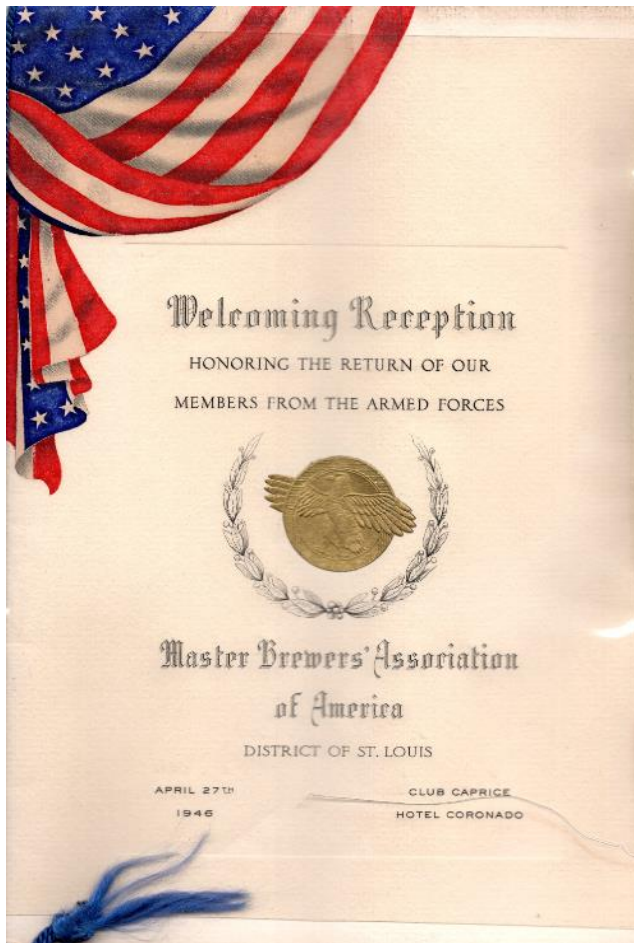
But I deeply believe that within the “lessons of lightness” from the 19th and 20th century Blüthezeiten resides “back to the future” guidance as to how to once again *proactively* spur in the early 21st century another period of record industry volume and per capita growth—for both macro and craft brewers alike. And it is this: in a nation, and *industry*, always “in the process of becoming,” the past 180 years have taught us the attainment of

new records for these metrics has stemmed from the American people rewarding step-shifts in “lightness.” Whether craft or macro, our past speaks to not forget the importance of “lightness” as a strategy in igniting that next, and now overdue, step-shift in consumer excitement—to *complement*, not replace, existing portfolios of brands and styles. Perhaps this has already started? Was the introduction of more “sessionable” versions of popular styles of craft beer (*especially* the industry’s iconic IPA) its first manifestation—or just an early harbinger? Do the hard seltzers currently taking the American marketplace by storm have the staying power to be part of the industry’s future? Likewise, at the other end of the lightness spectrum (but this time regarding alcohol and calories), will 2% or 50 calorie ultra-light adjunct lagers, or non-alcoholic beers, emerge to impact the American beer scene in a manner similar to that of hard seltzers? Whether already emerging, or on the horizon in products yet unimagined, what will be the cumulative effect of these? Will it be a single style of beer or a potpourri of different types of malt beverages? Will the pandemic dampen the likelihood of soon seeing the introduction of entirely new categories of “lightness”—or unleash them? While definitive answers to these questions will have to await the passage of time, there is one thing I believe with certainty regarding the future of the American brewing industry: the best has yet to come.

## Epilogue

This concludes the three-paper series penned in support of the 2021 release of *The Inspiring and Surprising History and Legacy of American Lager Beer: 1941–1948*. On a personal note, I would like to end by invoking one of my grandfather’s favorite expressions: “there’s nothing more zealous than a convert.” Having just last year spent more of my life living in the United States than in Canada, I have grown to become fiercely proud of being a member, albeit retired, of the American brewing industry. Based on decades of personal interactions and experiences with countless industry members within both the “macro” and craft industries, my respect for the American industry does not delineate between the two. In both worlds, whether they be hop growers, maltsters, brewers, applied brewing scientists, packaging line operators, quality control or quality assurance personnel, engineers, industry suppliers, procurement specialists, academics and educators, or experts in GMP, sanitation, food safety, and other disciplines, I see only passionate people partnering across *one* American brewing industry (in my case, having only held research and corporate roles, the only professional “stripes” I consider myself having earned were those of a brewing scientist and quality assurance leadership).

Equal in every way to the words, actions, and accomplishments of the people of the 19th and early 20th century American brewing industry, the latter’s legacies of defending and fueling America’s first beer revolution are beyond profound when it comes to beer and beer history. Not only did they enable the full potential of *their* revolution to be realized, but by doing so they also ensured the Blüthezeit of the American craft beer movement, a century later, would be free to flourish unhindered. That today *both* revolutions are simultaneously transforming the meaning of “beer” around the world is in my mind a wonderful reflection of American beer history. While the first wanes domestically as the second waxes, on a global basis both are vibrantly waxing, accomplishments that if they were able to speak from the grave today would undoubtedly generate a vigorous “*Gesundheit!*” from generations of long-deceased members of the American brewing industry. Begin-



**Figure 11.** Welcoming reception program honoring MBAA District Saint Louis members returning from WWII service (64). From the author’s personal archives. Published with permission of the MBAA.

ning with the most recent of these generations, the “Band of Brewers” from 1941–1948, it is my honor to give voice to their accomplishments and legacies. I hope you find the journey of delving into the history of American beer as inspiring and surprising as I did.

Gesundheit (to your personal, and our industry’s, future health)!

### Postscript

Among my most inspiring personal memorabilia from this era is the program shown in Figure 11. Issued by MBAA District Saint Louis, it was provided to all attendees at an April 27, 1946, welcoming reception “Honoring the Return of our Members from the Armed Forces.” Beautifully produced, with a bright blue braid running down its spine ending with a tassel, the cover combines the vibrant colors of the American flag with a centrally placed and gold-embossed military service discharge emblem. Inside are the names and brief biographies of the returning district members honored that evening, including Howard J. Finke (Griesedieck Brothers Brewery Company), Robert C. Gadsby (Anheuser-Busch), William O. Kiefaber (Hyde Park Breweries Association), George C. Moore (Merck and Company), Donald G. Ruff (Bluff City Brewery Company), Milton G. Scott (Meyer Supply Company), Paul H. Spelbrink (Barry Wehmiller Machinery Company), Henry O. Sturm, Jr. (Wallerstein Company), and Albert Von Hoffman (Von Hoffmann Press).

Given this event took place in 1946, it is highly likely many of the brands of lager beer enjoyed that evening were among some of the palest of the period. However, the significance of this, of course, pales in comparison to the human sacrifices made by the people of America and the Allied nations during WWII. In the course of my research specific to the years of WWII, whenever I came across an obituary noting the death of a member of the armed forces who prior to the war had been employed in the American and Canadian brewing industries, out of respect I

**Table 8.** Honor roll, ordered by date of death, of 75 members of the American and Canadian brewing industries who died in service during World War II<sup>a</sup>

| Year | Name  | Age | Industry affiliation  | Circumstances   |
|------|---|-----|---|---|
| 1942 | Private Benjamin M. Kranz                         | 24  | Bottler and member of Local 248 of the Brewery Workers Union in Chicago.  | Killed in action on September 11, 1942, in New Guinea. Member of the 186th Infantry of the 41st Division, the first contingent of American soldiers to be shipped overseas during WWII. Departed San Francisco for Sydney, Australia, on March 19, 1942, arriving (many on the deluxe Queen Elizabeth ocean liner) on April 6, 1942. Fought alongside Australian forces. Buried in the National Memorial Cemetery of the Pacific in Honolulu, Hawaii. |
|      | First Lieutenant Lester Ernest Milkey             | 50  | President of the Cellulo Company, a filter-mass manufacturer based in Sandusky, Ohio.   | Died October 30, 1942, in a mid-air collision with another plane while patrolling for U-Boat submarines off the coast of Florida.   |
|      | Private First Class Ralph Carpinelli              | 36  | Member of the Beer Drivers’ Local 38 of the Brewery Workers Union. Employee of the Goebel Brewing Company of Detroit, Michigan. | Killed in action during a Japanese air raid in the Battle of Buna (New Guinea Campaign) on November 26, 1942. Buried in the Manila American Cemetery and Memorial in Manila, the Philippines.   |
|      | First Lieutenant Pieter Johannes Paulus van Erkel | 28  | Son-in-law of the State Director for the Mississippi Committee of the Brewing Industry Foundation (William Pierce).             | Pilot killed on December 1, 1942, in a training accident near Vicksburg, Mississippi.   |
|      | Staff Sergeant Samuel Jones                       | 24  | Brewery Workers Union, Local No. 196, Memphis, Tennessee.   | Killed in action in Western Europe on December 6, 1942, while serving as a waist gunner on a B-17 Flying Fortress. Buried in the Netherlands American Cemetery and Memorial in Margraten, Netherlands.  |

(continued on next page)

<sup>a</sup> Each name was sourced from issues of *Brewers Journal* and the *American Brewer* contained in The United States Brewing Industry Research Center at the National Brewery Museum of the American Breweriana Association in Potosi, Wisconsin. The invaluable assistance of Len Chylack in providing access to these historic archives is greatly appreciated.

would routinely add their name to an “honor roll” table (Table 8). While as an industry we have forgotten the history of the American brewing industry from this earlier period of national crisis, the importance of honoring the memories of those who made the ultimate sacrifice during this time is of course timeless. It is in this spirit the honor roll table is offered.

But à la Paul Harvey and his famous tag line of “the rest of the story,” the life stories of those listed in this table do not end with the table—it is but the start. While I was reading the December 2020 issue of the magazine *World War II*, one article in particular caught my attention. Entitled “Volunteers Trace Memories of the Fallen” (102), it described the ambitious vision of Don Milne to develop before the 80th anniversary of the end

of WWII (i.e., 2025) an app instantly linking a scan of any name on a gravestone or memorial wall of the United States military casualties from WWII to stories about their lives. That’s an incredible 407,316 stories!

Hoping the honor roll table would be of interest to Don Milne, I reached out to him via his website (storiesbehindthestars.org). To make a long story short, I have joined his ranks of volunteers and committed to researching and penning in much greater detail the life stories of the 73 American servicemen named in the honor roll table. While it is but a proverbial drop in the bucket, I am humbled to have the privilege of ensuring that bucket, symbolically speaking at least, contains 73 metaphorical drops of American beer.

**Table 8.** *Continued from previous page*

| Year | Name                                     | Age | Industry affiliation  | Circumstances  |
|------|--|-----|---|--|
| 1943 | Captain Robert S. Holt                   | 41  | President of Finlay, Holt and Company, Limited, agents and importers of malt and other products, New York City. | Died of wounds received January 8, 1943, in the Southwest Pacific (over Tabar Island off the coast of Papua New Guinea) while serving as a combat intelligence officer of the Army Air Force. Buried in the National Memorial Cemetery of the Pacific in Honolulu, Hawaii. |
|      | Sergeant James C. Grace                  | 36  | Co-Owner of the Grace Brothers Brewing Company of Santa Rosa, California.                                       | Died February 11, 1943, in the Middle East war theater.  |
|      | Technical Sergeant Donald B. Evard       | 28  | Employee of the Berghoff Brewing Corporation, Fort Wayne, Indiana.  | Radio operator on a troop carrier plane lost over Central Africa on February 21, 1943. Buried in the North Africa American Cemetery and Memorial in Carthage, Tunisia.   |
|      | Seaman First Class Richard August Kapff  | 32  | Employee of the Buckeye Brewing Company of Toledo, Ohio.  | Enlisted as a seaman. Died February 27, 1943.  |
|      | First Lieutenant Otto A. Loesch          | 28  | Shipping department of the Brewing Corporation of America, Cleveland, Ohio.                                     | Killed April 10, 1943, when a fighter plane he was piloting exploded in flight and crashed near the Philadelphia municipal airport.  |
|      | Captain Leroy Allward                    | 38  | Toronto Sales Staff of John Labatt, Limited, London, Ontario, Canada.   | Died June 8, 1943, while overseas with the Toronto Scottish Regiment.  |
|      | Sergeant Louis Smulowitz                 | 30  | Employee of the Gibbons Brewing Company of Wilkes-Barre, Pennsylvania.  | Flight engineer on a B-17 Flying Fortress killed in action June 23, 1943, in the European war area.  |
|      | First William G. Robertson               | 25  | Son of Monte Robertson, President of the Casper Brewing Company of Casper, Wyoming.                             | Killed in action on July 11, 1943, in the Sicilian Campaign while serving in a road mine engineering detail. Buried in the Sicily-Rome American Cemetery and Memorial in Nettuno, Italy.   |
|      | Private Frank J. Moskal                  | 37  | Employee of the West End Brewing Company of Utica, New York.  | Killed in action on July 16, 1943, in North Africa.  |
|      | Private John Pierce                      | 23  | Apprentice brewer at the Crockery City Ice and Products Company of East Liverpool, Ohio.                        | Killed in action, New Guinea, Solomon Islands, South Pacific on July 18, 1943, while serving with the 37th Infantry “Buckeye” Division.  |
|      | Second Lieutenant Leonard Hugo Weiler    | 22  | Employee of the Dixie Brewing Company of New Orleans, Louisiana.  | Navigator in the Army Air Forces killed in action on August 8, 1943, in New Guinea Campaign.   |
|      | Lieutenant Norman Edwin Stoeckl          | 22  | Son of master brewer Hans Stoeckl of the Fresno Brewing Company of Fresno, California.                          | Pilot killed August 26, 1943, during training when his plane crash-landed in Boise, Idaho.   |
|      | Sergeant John F. Hansen                  | 22  | Employee of Anheuser-Busch, Incorporated, of Saint Louis, Missouri.   | Killed in action on November 26, 1943, in the North African Campaign while serving in the Army Air Corps. Buried in the North Africa American Cemetery and Memorial in Carthage, Tunisia.  |
| 1944 | Private First Class Michael Rizzo        | 24  | Employee of Koppitz-Melchers, Incorporated, of Detroit, Michigan.   | Killed in the line of duty in Australia on April 16, 1944.   |
|      | Staff Sergeant Edward C. Caputa          | 27  | Employee of the Minneapolis Brewing Company of Minneapolis, Minnesota.  | Killed in action during the Battle of Rome on May 13, 1944. Buried in the Sicily-Rome American Cemetery and Memorial in Nettuno, Italy.  |
|      | First Lieutenant Leonard M. LeGrand      | 35  | Employee of the Sioux City Brewing Company of Sioux City, South Dakota.   | Killed in action in the vicinity of the Anzio beachhead on May 23, 1944. Buried in the Sicily-Rome American Cemetery and Memorial in Nettuno, Italy.   |
|      | Sergeant John V. Hoyer                   | 23  | Employee of the Fitger Brewing Company of Duluth, Minnesota.  | Killed in action in Italy on May 27, 1944, while serving in a tank corps.  |
|      | Staff Sergeant Claiborne Howard McKennon | 36  | Employee of the San Antonio Brewing Association in San Antonio, Texas.  | Killed in action in India on July 8, 1944, while serving with an Anti-Aircraft Division in the Army Air Forces.  |
|      | Lieutenant Robert Eliot Austin           | 23  | Employee of the National Breweries Limited, Montreal, Canada.   | While serving in the Black Watch of the Royal Highland Regiment, was killed in action in Normandy on July 21, 1944, during a forced crossing of a river below Caen. Buried in the Bény-sur-Mer Canadian War Cemetery, Revers, France.                                      |

(continued on next page)

Table 8. Continued from previous page

| Year | Name   | Age | Industry affiliation  | Circumstances   |
|------|--|-----|---|---|
| 1944 | Staff Sergeant<br>Louis E. Koran                     | 28  | Employee of the Forest City Brewery,<br>Incorporated in Cleveland, Ohio.  | Killed in action in the Battle of Normandy, France, on July 26, 1944. Buried in the Normandy American Cemetery and Memorial in Colleville-sur-Mer, Basse-Normandie, France.                     |
|      | Private Clifford<br>Matthiesen                       | 36  | Employee of the United Union Breweries<br>Company of Walla Falls, Washington.   | Killed in action in the Battle of Normandy, France, on July 30, 1944.   |
|      | Private Richard H.<br>Wienert                        | 32  | Employee of the Free State Brewery Corporation<br>of Baltimore, Maryland.   | Killed in action in the Battle of Normandy, France, on July 31, 1944, just two months after visiting friends at the United States Brewers' Academy in New York City before transport to Europe. |
|      | Private First Class<br>John J. Langton               | 31  | Brewer employed in Providence, Rhode Island.  | Killed in action in the Battle of Normandy, France, on August 3, 1944.  |
|      | Private First Class<br>Alvin Jerome<br>Hillenbrand   | 33  | Employee of the F. W. Cook Company of<br>Evansville, Illinois.  | Paratrooper killed in action in the Battle of Normandy, France, on August 4, 1944, while serving as a member of the glider infantry.  |
|      | Technical Sergeant<br>George J. Zitsch               | 30  | Employee of the Gottfried Krueger Brewing<br>Company of Newark, New Jersey.   | Killed in action in the Battle of Normandy, France, on August 11, 1944. Buried in the Brittany American Cemetery and Memorial in Saint-James, Basse-Normandie, France.                          |
|      | Sergeant Edward<br>A. Johnson                        | 35  | Employee of the Theodore Hamm Brewing<br>Company of Saint Paul, Minnesota.  | Died on August 11, 1944, of wounds received the day prior in action in the Battle of Normandy, France.  |
|      | Corporal Roy<br>Staudenmayer                         | 31  | Member of Brewery Workers Union in Chicago.   | Killed in action on August 27, 1944, outside of Chartres in the Battle of Normandy, France.   |
|      | Technical Sergeant<br>George Ernest<br>Ries          | 27  | Employee of the Duquesne Brewing Company<br>of Pittsburgh, Pennsylvania.  | Killed in action over Amiens, France, on August 28, 1944, while serving as a gunner on an Army Air Forces bomber.   |
|      | Private Leonard G.<br>Oldfield                       | 34  | Employee of the Stroh Brewery Company of<br>Detroit, Michigan.  | Killed in action in Holland on September 15, 1944.  |
|      | Private Roy L.<br>Duke                               | 33  | Employee of the Pabst Brewing Company malt<br>syrup plant in Peoria, Illinois.  | Killed in action in Belgium on September 15, 1944.  |
|      | Private Wilfred T.<br>Garner                         | 29  | Employee of the Adam Scheidt Brewing<br>Company in Norristown, Pennsylvania.  | Killed in action in France on September 23, 1944.   |
|      | Private Henry J.<br>Kammermerier                     | 34  | Employee of the Duquesne Brewing Company<br>of Pittsburgh, Pennsylvania.  | Killed in action in France on October 12, 1944.   |
|      | Private Adolph J.<br>Osl, Jr.                        | 31  | Employee of the Fitzgerald Brothers Brewing<br>Company of Troy, New York.   | Killed in action in France on October 13, 1944.   |
|      | Private First Class<br>Sam G. Latiff                 | 24  | Employee of the Detroit Division of the Brewing<br>Corporation of America.  | Killed in action in France on October 19, 1944. Buried in the Lorraine American Cemetery and Memorial in Saint-Avoid, Lorraine, France.   |
|      | Private Joseph<br>Kunz                               | 31  | Employee of the F. & M. Schaefer Brewing<br>Company of Brooklyn, New York.  | Killed in action in Italy on October 21, 1944.  |
|      | Technician Third<br>Grade Henry S.<br>Rosenwald      | 38  | Employee of the Fidelio Brewery, Incorporated<br>of New York. Born in Germany, his parents<br>owned the Moritz Rosenwald Hop Company<br>in Nuremberg before fleeing in 1934 to escape<br>Nazi persecution because of their Jewish faith.<br>Graduated as a brewer from the USBA Class<br>of 1936.       | Killed in action in Italy on October 27, 1944. Buried in the Florence American Cemetery and Memorial in Florence, Italy.  |
|      | Machinist Mate 3rd<br>Class Frank<br>Matthew Theiler | 32  | Employee of the Falstaff Brewing Corporation<br>of Omaha, Nebraska.   | Killed in action while at sea in the South Pacific on October 29, 1944.   |
|      | Sergeant Kenneth<br>Coric                            | 25  | Employee of the Pabst Brewing Company malt<br>syrup plant in Peoria, Illinois.  | Killed in action in India on November 13, 1944, while flying a B-29 Super Fortress bomber in the China-Burma-India Theater.   |
|      | Private First Class<br>Kurt Fleischer<br>Maxwell     | 30  | General Manager of the Golden Gate Hop<br>Company in San Francisco, California. Born<br>in Germany to a Jewish family (his father was<br>a hop merchant). After paying a ransom to the<br>Nazis the entire family fled to the United<br>States. He became a naturalized citizen on<br>November 6, 1939. | Killed in action on November 16, 1944, in Leyte while serving in the Army Medical Corps. Buried in the Manila American Cemetery and Memorial in Manila, the Philippines.                        |
|      | Sergeant Frederick<br>W. Dinzl                       | 30  | Employee of the Aztec Brewing Company in<br>San Diego, California.  | Killed in action in Belgium on November 5, 1944. Buried in the Ardennes American Cemetery and Memorial in Neuville-en-Condroz, Neupré, Belgium.   |
|      | Private Joseph<br>Sebok                              | 29  | Employee of the Hoosier Brewing Company of<br>South Bend, Indiana.  | Killed in action in Germany on November 19, 1944.   |
|      | Technician 5th<br>Grade Wilbur L.<br>Schaefer        | 29  | Employee of the Pabst Brewing Company in<br>Milwaukee, Wisconsin.   | Killed in action in France on November 26, 1944. Buried in the Lorraine American Cemetery and Memorial in Saint-Avoid, Lorraine, France.  |
|      | Private William<br>Parry Jr.                         | 24  | Employee of the Stegmaier Brewing Company<br>of Wilkes-Barre, Pennsylvania.   | Killed in action outside of Weitburch, France, while serving with the 7th Army on November 26, 1944. Buried in the Lorraine American Cemetery and Memorial in Saint-Avoid, Lorraine, France.    |

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Table 8. Continued from previous page

| Year | Name   | Age | Industry affiliation  | Circumstances   |
|------|--|-----|---|---|
| 1944 | Private First Class Charles J. Delhom Sr.    | 30  | Employee of the Jackson Brewing Company of New Orleans, Louisiana.  | Killed in action in Germany on November 30, 1944. Buried in the Henri-Chapelle American Cemetery and Memorial in Henri-Chapelle, Liège, Belgium.  |
|      | Sergeant Wilbert F. Burbach                  | 23  | Employee of the Griesedieck Brothers Brewing Company of Saint Louis, Missouri.  | Killed in action in France on December 9, 1944.   |
|      | Private Leonard Reiss                        | 31  | Employee of the Red Top Brewing Company in Cincinnati, Ohio.  | Killed in action in France on December 10, 1944.  |
|      | Private Harold Hughlett                      | 28  | Employee of the Fox-Head Waukesha Corporation of Waukesha, Wisconsin.   | Killed in action in Germany on December 10, 1944. Buried in the Henri-Chapelle American Cemetery and Memorial in Henri-Chapelle, Liège, Belgium.  |
|      | Sergeant John C. Schmedle                    | 32  | Employee of Anheuser-Busch, Incorporated of Saint Louis, Missouri.  | Killed in action in Belgium on December 16, 1944, during the first day of the Battle of the Bulge.  |
|      | Private Norman B. Anderson                   | 34  | Employee of the Minneapolis Brewing Company of Minneapolis, Minnesota.  | Killed in action in the European Theater on the opening day of the Battle of the Bulge on December 16, 1944. Buried in the Lorraine American Cemetery and Memorial in Saint-Avold, Lorraine, France.                                  |
|      | Private Anthony Ringswald                    | 28  | Employee of the Falls City Brewing Company of Louisville, Kentucky.   | Killed in action in France on December 17, 1944.  |
|      | Private First Class Edward Borowiak          | 28  | Employee of the Gulf Brewing Company of Houston, Texas.   | Killed in action in France on December 31, 1944. Buried in the Epinal American Cemetery and Memorial in Dinozé, France.   |
| 1945 | Private Edward A. Fehlner                    | 29  | Employee of the West End Brewing Company in Utica, New York.  | Died on January 12, 1945, of wounds received in action in Belgium.  |
|      | Private William F. Shank                     | 42  | Employee of the Matz Brewing Company in Bellaire, Oregon.   | Killed in action of January 17, 1945. Buried in the Henri-Chapelle American Cemetery and Memorial in Henri-Chapelle, Liège, Belgium.  |
|      | Private First Class George A. Henrich        | 34  | Employee at the Hicksville, New York, branch of Peter Ballantine and Sons from Newark, New Jersey.  | Died in service at Finschafen, New Guinea, on January 27, 1945.   |
|      | Private William P. Kump                      | 38  | Employee of the Brewing Corporation of America in Cleveland, Ohio.  | Killed in action in Germany on February 8, 1945. Buried in the Luxembourg American Cemetery and Memorial in Hamm, Luxembourg.   |
|      | Second Lieutenant Edward Albert Bucek        | 27  | Employee of the Miller Brewing Company of Milwaukee, Wisconsin.   | Pilot killed when his B-24D Liberator bomber crashed into an Oregon mountain on February 9, 1945.   |
|      | Staff Sergeant Francis J. Sartory            | 27  | Employee of the Warsaw Brewing Company of Warsaw, Illinois.   | Killed in action February 11, 1945, near the town of San Jose in the Philippines while leading a platoon of the 25th Infantry Division.   |
|      | Private First Class Charles F. Gunst         | 29  | Employee of the Pfeiffer Brewing Company of Detroit, Michigan.  | One of the 318 sailors killed in action on February 21, 1945, when the aircraft carrier the USS Bismarck Sea was sunk by two kamikaze attacks off Iwo Jima. Remains lost at sea. Listed in the Honolulu Memorial in Honolulu, Hawaii. |
|      | First Lieutenant Joseph Aloys Kirschner      | 26  | Employee of the Griesedieck Brothers Brewing Company of Saint Louis, Missouri.  | Killed in action in Germany on February 23, 1945, while serving in the United States Medical Corps.   |
|      | Private First Class Edward J. Krone Jr.      | 22  | Employee of the Tip Top Brewing Company of Cleveland, Ohio.   | Killed in action February 23, 1945, on Iwo Jima.  |
|      | Private First Class Albert R. Chevalier      | 36  | A 1937 graduate of the USBA, prior to his enlistment he was employed by the San Francisco Brewing Company, the Rainier Brewing Company in Seattle, Washington, and the General Brewing Corporation.   | Died in the South Pacific on February 24, 1945, of an illness contracted in New Guinea while serving in the Boat Maintenance Battalion in the Amphibious Corps.   |
|      | Walter Stockinger                            | 28  | Employee of the Gottfried Krueger Brewing Company of Newark, New Jersey.  | Member of the United States Merchant Marine struck and killed by an Army truck in France on February 24, 1945.  |
|      | Second Lieutenant Albert Baber Mitlehner Jr. | 24  | Prior to graduating from Chicago's Siebel Institute of Technology in 1942 he was an employee at both the Great Western Malting Company of Vancouver, Washington, and the Blitz-Weinhard Company of Portland, Oregon. Immediately after his graduation he enlisted with the United States Marine Corps. His father, Albert M. Mitlehner, was president of the Northwestern District of the Master Brewers' Association of America. | Killed in action on Iwo Jima in March 1945.   |
|      | Private Robert S. Fitzpatrick                | 27  | Employee of the G. Heileman Brewing Company in La Crosse, Wisconsin.  | Killed in action in Germany on March 11, 1945.  |
|      | Private William Noble                        | 29  | Employee of the Fuhrmann and Schmidt Brewing Company of Shamokin, Pennsylvania.   | Killed in action March 12, 1945, on Iwo Jima. Buried in the National Memorial Cemetery of the Pacific in Honolulu, Hawaii.  |

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Table 8. Continued from previous page

| Year | Name   | Age | Industry affiliation  | Circumstances  |
|------|--|-----|---|--|
| 1945 | Private First Class George Nicolai               | 31  | Employee of the M. K. Goetz Brewing Company of Kansas City, Missouri.                   | Killed in action in Germany on April 9, 1945.  |
|      | Quartermaster First Class Clarence William Raith | 35  | Employee of the G. Heileman Brewing Company in La Crosse, Wisconsin.                    | Killed in action off Okinawa on April 12, 1945, while serving aboard a destroyer escort that was part of an outer screen warding off kamikaze attacks. |
|      | Private First Class Alphonse Schnalzer           | 28  | Employee of the Columbia Brewing Company of Saint Louis, Missouri.                      | Killed in action April 14, 1945, on Luzon in the Philippines. Buried in the Manila American Cemetery and Memorial in Manila, the Philippines.          |
|      | Private First Class Joseph Pracht Bader          | 31  | Employee of the Oertel Brewing Company of Louisville, Kentucky.                         | Killed in action in Germany on April 15, 1945. Buried in the Netherlands American Cemetery and Memorial in Margraten, Netherlands.                     |
|      | Private First Class Leroy William Lawson         | 32  | Employee of the Hyde Park Breweries Association, Incorporated of Saint Louis, Missouri. | Killed in action April 29, 1945, on Luzon in the Philippines.  |

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